# Connect EZ 16/32

## User Guide

Firmware version 25.2

# Revision history—90002540

| Revision | Date | Description |
|---|---|---|
| R | June 2025 | Added information about USB 3.0\USB 3.1 Gen 1 ports:<br>■ Front panel and LEDs<br>■ AnywhereUSB 2 Plus USB ports on a Connect EZ 16/32 |
| P | May 2025 | Release of Digi Connect EZ 16/32 LTS firmware version 25.2.<br>■ **We've adopted a Long-Term Support (LTS) release strategy. What does this mean for you?**<br>• *Increased stability and security.* Our LTS firmware is aligned with the Linux kernel LTS firmware, which means it is based on a stable and long-term supported version of the Linux kernel. This allows for regular security updates and bug fixes ensuring that the firmware benefits from the reliability and performance improvements provided by the LTS kernel.<br>**Note** To see how we plan to respond to known security vulnerabilities in products that use the DAL OS firmware, see DAL Vulnerability Patch Policy on the digi.com website.<br>• *Fewer releases.* Plan your updates without the pressure of a quarterly timebox.<br>This is the first release of the LTS firmware. Patch releases for security or bug fixes will be released and announced throughout the year. Feature updates will be released and announced as they are ready.<br>■ **"Premium features" has been renamed to "Subscriptions".**<br>The word *Subscriptions* more accurately describes the services in which you have enrolled and the ongoing payments associated with them.<br>■ **Assign a static address to a network interface on a device with IPv6 enabled.**<br>When using IPv6, you can now assign a static address to a network interface on your device, ensuring consistent identification and connectivity of devices on the network.<br>■ **Improved disconnect/reconnect to Digi Remote Manager for a device when upgrading cellular modem firmware over the air (OTA).**<br>Device downtime is minimized so service is minimally interrupted.<br>■ **New banner notification in the Web UI and CLI.**<br>A new banner notice has been added to the web UI and CLI to indicate when the configuration of a device is being managed by a template in |

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|---|---|---|
| | | Digi Remote Manager. This is useful so that configuration changes to that device are not made locally. If there are issues with the device, then it is important to know that the configuration is enforced remotely and any changes you may make to the device for testing purposes or fixes may be overwritten by the template.<br>■ **Regional cellular modem firmware bundles are now available.** Certain modems - Sierra EM9191 (Asia PAC) and EM7690 (worldwide) - have a lot of carrier-specific firmware images. Due to size constraints of the file system on the Connect EZ 16/32, not all of these images could be included. Now you can choose the firmware bundle for your specific cellular modem.<br>■ **IPsec is now supported in FIPS mode.** It's now easier for you to meet the federal security standards required by FIPS and keep sensitive data safe during transmission.<br>**Tip** For more information about this release, see the digi.com blog post, New Features in Digi Remote Manager and Our First LTS Firmware Release for DAL OS.<br>**Additional updates**<br>■ Updated serial port pinout table: Serial connector pinout<br>■ Updated list of serial port baud rate options: Default serial port configuration<br>■ Added the DAL OS Vulnerability Patch Policy<br>■ Updated the serial port LED description: Front panel and LEDs<br>■ Added **AnywhereUSB** topic: Load an SSL certificate |
| N | March 2025 | Release of Digi Navigator 2.0.<br>■ Get started with Connect EZ 16/32<br>■ Configure RealPort mode using the Digi Navigator |
| M | February 2025 | Release of Digi Connect EZ 16/32 firmware version 24.12.<br>■ **New user guide** - There's a new **Modem firmware user guide**! With added functionality in DAL OS 24.12.x firmware and Remote Manager, there's now even more ways to upgrade the modems in or attached to your Digi routers. Make sure to review the **Before you begin** topic too because the options available to you depend on the DAL OS firmware version you are running.<br>■ **Additional query state categories added** - Are you running DAL OS firmware 24.9 or newer on your devices? See the new categories added to the device-specific query state view in Remote Manager. Monitor |

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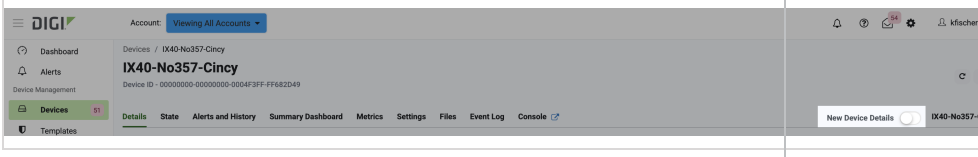
|---|---|---|
| | | device status in real time for Watchdog, Location, DHCP leases, SureLink, and many more groups!<br><br>**Note** The new query state metrics in the updated view do not replace datastream metrics. However, datastream metrics will be phased out later this year as we enhance query state metrics with additional categories.<br><br>How you see this new information depends on whether you using the legacy or new device details view.<br>• Click the **Details** tab and then select a group (for example, Ethernet) to see its status. The **New Device Details** toggle key must be on to see this view.<br> <br>• Click the **State** tab and then select a group (for example, Ethernet) to see its status. **The New Device Details** toggle key must be off to see this view.<br>  <br>■ Add or remove custom default configuration files using the **system custom-default-config** CLI command.<br><br>**Note** This new CLI command replaces the **system backup / type custom-defaults** and **system backup / remove custom-defaults**.<br><br>**Tip** For more information about this release, see the blog post, Digi Software Enhancements for DAL OS 24.12 Firmware and Digi Remote Manager.<br><br>**Additional updates**<br>■ Added information for enabling an SFP+ port: Configure an SFP+ port<br>■ Added and updated the SNMP configuration fields for enabling read-only and read/write access to SNMP versions 1 and 2c: Configure Simple Network Management Protocol (SNMP)<br>■ Updated Use the RESET button to reset your device to the factory defaults |

| Revision | Date | Description |
|---|---|---|
| L | November 2024 | Release of Digi Connect EZ 16/32 firmware version 24.9.<br>■ **Modem firmware updates**: There's no more guesswork about the carrier you need to choose when upgrading modem firmware. Now, choose a firmware bundle based on the type of modem you have. There's no need to know and/or specify the carrier because every firmware upgrade package includes all of the carrier images supported by Digi routers. The The modem firmware update is done using the modem firmware bundle ota CLI commands.<br>■ **New EDP client written in Rust**: The new client connector for how devices establish their connections to Digi Remote Manager, provides a faster connection, reduces data consumption, and includes Watchdog support.<br>■ **Serial port configuration copy feature**: You can copy the configuration defined for one serial port to other serial ports on the same device.<br>■ **Configuration validation and automated rollback to maintain remote access to your devices**:<br>Maintain remote access to your devices that have DAL OS 24.9 firmware or newer. Any configuration changes made by a template that result in devices losing connection to Remote Manager are automatically rolled back. To see whether configuration changes were rolled back, you can view the history of a device. For more information, see the Templates user guide.<br>■ **Cellular connectivity enhancements**:<br>• Modem manager has been updated to version 1.22.0.<br>• Modems are tracked by name instead of index.<br>• Default modem signal/status update interval changed from 30s to 10s.<br>• Default PDP context changed from 2 to 1.<br>• PDP context ID stored & read from mm.json to ensure stability when updating from 24.6 to 24.9.<br>■ **Miscellaneous enhancements**:<br>• No authentication SMTP option: Send emails without encryption.<br>• Download peer settings: If you are using a Digi device as a WireGuard server and you have a lot of client devices connected to it, you now have the option to download the template with all the settings and use it to configure other devices.<br>• Confirmation is now required to perform a system factory erase in the CLI.<br>• `DefaultIP` renamed to `SetupIP` in reporting metrics and CLI configuration.<br>• Network type, band, and signal strength are now included in speed test information reported from the device to Digi Remote Manager. |

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| | | ■ **Modbus hardening**:Take a look at the new Modbus hardening topic and use case about enhancing the security and reliability of Modbus communications between devices over your network.<br><br>**What's coming**<br>When accessing the device locally through the Web UI or CLI, you will be able to see more metrics in **Settings** > **Status**, such as connection status and network details. Though not much else changes in this release, the work behind the scenes is foundational. Coming soon, data streams in Digi Remote Manager will be replaced with a comprehensive view about the status of your devices. What you see in the local Web UI or CLI is what you will see in Digi Remote Manager.<br><br>**Tip** For more information about this release, see the blog post called, "Announcing the Latest Digi Software Solutions for DAL OS 24.9 Firmware" on digi.com.<br><br>**Additional changes**<br>■ Added documentation for the Containers feature.<br>**Changes for AnywhereUSB 2 port feature**<br>■ Updated the AnywhereUSB Manager Windows OS install process<br>■ Updated Use all Hub IPv4 addresses for IPv4 IP addresses only.<br>■ Added documentation for Configure the Include IPv6 Addrs in Autofind option.<br>■ Updated the uninstall process from the Windows Control Panel.<br>■ Updated Create a debug log file with the USB Debug Logging Wizard. |

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- Product serial number (s)
- Firmware version
- Operating system/browser (if applicable)
- Logs (from time of reported issue)
- Trace (if possible)
- Description of issue
- Steps to reproduce

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# Digi Connect EZ 16/32 User Guide

This guide provides reference and usage information for the Connect EZ 16/32.

Digi Connect EZ is Digi's next generation Device Server product line, providing connectivity for existing critical assets in business, commercial, and industrial automation applications. This product line builds on and extends the capabilities of our previous PortServer and Digi One products along with enhanced manageability, security, intelligence, and performance, while offering seamless connectivity for existing applications.

## Applicable hardware

This user guide contains information for these Connect EZ 16/32 models. Hardware features are shown in the table below.

| Name | SKU | MEI | Serial ports | SFP+ ports | AnywhereUSB USB ports | Core module and 2 antenna ports |
|---|---|---|---|---|---|---|
| Connect EZ 16 | EZ16-A100 | | 16 | 2 | 2 | X |
| Connect EZ 16 MEI | EZ16-C100 | X | 16 | 2 | 2 | X |
| Connect EZ 32 | EZ32-A100 | | 32 | 2 | 2 | X |
| Connect EZ 32 MEI | EZ32-C100 | X | 32 | 2 | 2 | X |

## DAL OS Vulnerability Patch Policy

Digi has created a vulnerability patch policy to document the guidelines and procedures we plan to take to identify, assess, and remediate security vulnerabilities in our DAL OS firmware integrated into Enterprise (EX), Industrial (IX) and Transportation routers (TX), device and serial servers (Connect EZ), console servers and USB-connected devices. Specifically, this policy outlines how quickly and effectively patches need to be applied to mitigate risks from potential threats. The policy protects against cyberattacks but also ensures that out firmware is in compliance with regulatory standards.

The DAL Vulnerability Patch Policy is documented on the digi.com website, and covers the following topics:

- Objective
- Scope
- Audience
- Introduction
- Reporting Potential Vulnerabilities
- Assessing Potential Vulnerabilities
- Information and Resolution Timelines
- Resolution of Potential Vulnerabilities
- Receiving Information on Potential Vulnerabilities

# Get started with Connect EZ 16/32

This section explains what comes with each Connect EZ model, how to install the necessary software, and how to connect the hardware.

For a list of the Connect EZ 16/32 variants, see the applicable hardware list.

## Before you begin: Register your Connect EZ 16/32

Welcome to the Digi family! Register your new Connect EZ 16/32 today and start enjoying a suite of exclusive benefits, including centralized management and 24/7 technical support. Click here to register now!

## Step 1: Open the box and remove components needed for the initial install

You will need:

| Equipment | Description |
|---|---|
| **Connect EZ 16 OR Connect EZ 32** | <br>**Note** This image is of Connect EZ 32. The Connect EZ 16 has a blank panel covering the top row of serial ports. |

| Equipment | Description |
|---|---|
| **Ethernet cable** | Ethernet cable/RJ45 straight-through.<br>**Note** One Ethernet cable is included in the box, but you will need two Ethernet cables to complete the initial set up.<br> |
| **Loopback plug** | RJ45M serial loopback plug is included for use with testing.<br> |
| **Welcome card** | The password used to log into the web UI for the device is printed on the back of the card. |

For information about all of the Connect EZ 16/32 components, see Connect EZ 16/32 component list.

In addition to the components in the box, you will need to supply the following:

| Equipment | Description |
|---|---|
| **Power cord** | A national mains power cord. Depending on the device variant ordered, a power cord may be supplied. At least one power cord is required to power the device. If your device is dual-powered, a second power cord is recommended.<br>For AC power supplies: Use an appropriate power cable meeting national standards to connect to a standard outlet.<br>▪ **EU/International**: VDE Mark, conforming to IEC 60083, IEC 60227, or IEC 60320, with C13 to the appropriate national mains connector rated for 16A at 250V.<br>▪ **USA/Canada**: UR or UL Mark, conforming to UL 62, UL 817, or CSA-C22.2, with C13 to 5-15P, or NEMA locking connector rated for 10A at 125V. |

# Step 2: Connect the power supply

1. Orient the device so the back of the device is facing you.

2. Connect the power cord to at least one power supply on the device.
3. Plug the other end of the power cord to a main power supply.
4. If your device is dual-powered, repeat the process for the second power supply.

**Note** If your device is single-powered, you can purchase and install an additional power supply unit. See Install an additional power supply unit.

# Step 3: Connect to site network using an Ethernet LAN

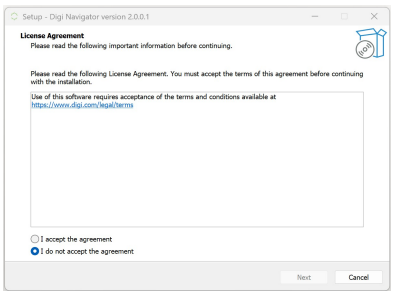
1. Orient the device so the front of the device is facing you
2. Connect one end of an Ethernet cable to your site network.
3. Connect the other end of the Ethernet cable to the **ETH 1** port on the Connect EZ.

# Step 4: Configure RealPort using the Digi Navigator

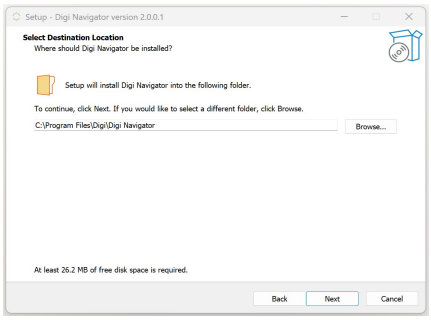
In this step, you will download and install Digi Navigator and configure RealPort.

1. Connect one end of the second Ethernet cable to the **ETH 2** port on your device and the other end to your computer or local network.

2. Download the **Digi Navigator**.
   a. Navigate to the Digi Navigator support page.
   b. Scroll down to the **Product Resources** tab, and in the **Drivers & Patches** section, click **Digi Navigator**.
   c. From the list box, select the appropriate Microsoft Windows option from the list of driver options.
   d. Click the **download** link to download the **Digi Navigator** application.
3. When the download is complete, click on the downloaded .exe file. The **Digi Navigator Setup** wizard displays.
4. In the **License Agreement** page, review the agreement and select the **I accept the agreement** option.

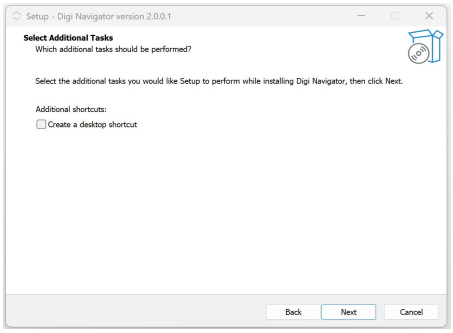



5. Click **Next**. The **Select Destination Location** page displays. You can leave the installation location as the default, or click **Browse** to select a different location.

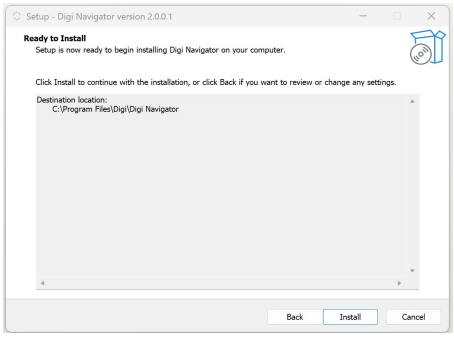



6. Click **Next**. The **Select Additional Tasks** page displays.

   If you want to create a shortcut for the Digi Navigator, select the **Create a desktop shortcut** option.

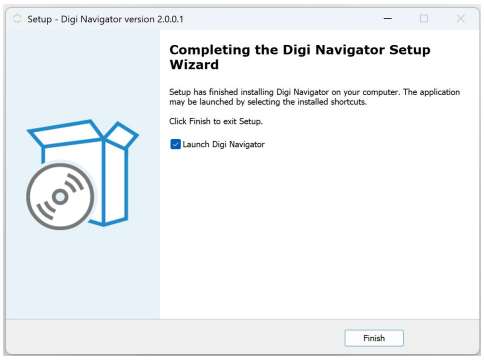



7. Click **Next**. The **Ready to Install** page displays.

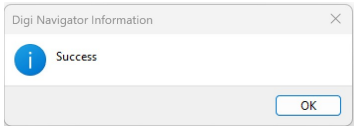



8. Click **Install** to start the installation. When complete, the **Completing the Digi Navigator Setup Wizard** page displays.

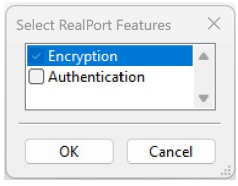
   The **Launch Digi Navigator** option is selected by default. De-select this option if you don't want the Digi Navigator to automatically launch each time you boot your computer.




9. Click **Finish** to complete the installation process. If the **Launch Digi Navigator** option was selected, the Digi Navigator launches.
10. Configure RealPort on the device.
    a. Click **Configure Device for RealPort**. The **Enter Device Credentials** page displays.
    b. In the **Enter Device Credentials** page, enter the device's default user name and password in the **Username** and **Password** fields. The default user name is **admin** and the default password is the unique password printed on the label packaged with your device. If the defaults do not work, they may have been changed. Verify with your system administrator.
    c. Click **OK**.
    d. When RealPort configuration is complete, the **Success** message displays.

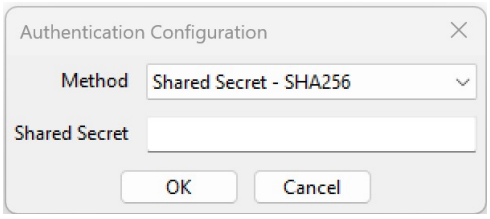



    e. Click **OK** to close the message.
11. Configure RealPort on your computer. The RealPort service is installed during this process.
    a. Click **Configure this PC for RealPort**. The **Select RealPort Features** dialog displays.
    b. Configure features in the **Select RealPort Features** dialog.




        i. Enable **Encryption** to enable encryption of data. This is enabled by default.
        ii. Enable **Authentication** to configure the authentication method the RealPort server uses to authenticate clients. The **Authentication Configuration** dialog displays.
            - From the **Method** list box, select the **Shared Secret - SHA256** option.
            - For **Shared Secret**, enter the authentication password to ensure secure

communication. Leave this field blank to disable authentication.




iii. Click **OK**.

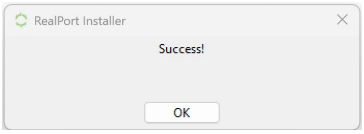
c. The **Select Ports** dialog displays. By default, all of the ports on the device are selected to be configured for RealPort. De-select the ports that you don't want to configure for RealPort.

d. Click **OK**. The **COM Selection** dialog displays.

e. From the **Select starting COM** list box, select the first COM port that should be configured for RealPort. The first available COM port is selected by default. The number of COM ports configured matches the number of serial ports on the device.

f. Click **OK**. A series of progress messages displays.

g. When the configuration is complete, a message displays.

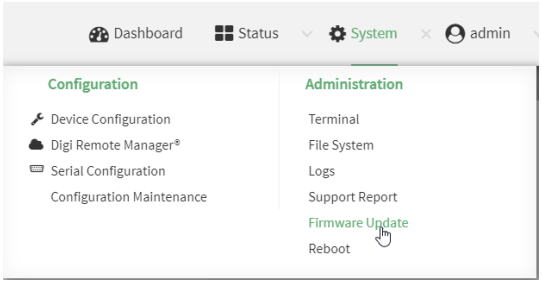



h. Click **OK** to close the message.

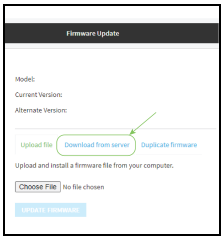
# Step 5: Connect to the web UI and update the firmware

1. From the **Digi Navigator**, find and expand your device to display the IP address for the device. Information about the device's IP address displays in the right-hand pane.
2. Click on an active service button: **HTTPS**, **HTTP**, or **SSH**. The login screen for the web UI launches.
3. Enter the user name and password for the Connect EZ 16/32 in the **Username** and **Password** fields. The default user name is **admin** and the default password is the unique password printed on the label packaged with your device. If the defaults do not work, they may have been changed. Verify with your system administrator.
4. Click **Login**.

5. On the main menu, click **System** > **Administration** > **Firmware Update**.




Click **Download from server**.




6. For **Version:**, select the most recent version of the device firmware.
7. Click **Update Firmware**.

# Step 6: Validate RealPort connection

You can test your connection to a serial port using the loopback plug.

**Note** Before you begin, make sure a terminal emulator is installed on your laptop.

1. Insert the loopback plug into one of the serial ports on the Connect EZ 16/32.

2. Open your terminal emulator.
3. Select the serial port to which the loopback plug is connected. The port description includes the name of the device, the port number on the device, and related COM port. For example: "COM1: EZ01-E00028-Port 1 (COM1)"
4. Open the port. When the connection has been make, the serial port LED is solid green.
5. Type data (such as "Hello" or "test") into the terminal emulator. The yellow serial port LED flashes as you type.
   - When the loopback plug is inserted, the data will echo back to you.
   - If you remove the loopback plug, the data will not echo back to you.

# Optional actions

The actions below are optional set-up items.

| Action | Description |
|---|---|
| **Power supply unit** | If desired, you can order an additional power supply unit and install it. This enables you to have two power supplies for one device.<br>▪ **EZPS-AC**: Connect EZ 16/32 power supply kit, port-side intake. The thumb screws used to connect the items to the Connect EZ are red.<br>See Install an additional power supply unit. |
| **Cellular connection** | If you want to use a cellular connection to the Connect EZ 16/32, you can connect the Digi CORE module and cellular antennas to the Connect EZ hardware.<br>See Create a cellular connection using the CORE module. |
| **Mount the device** | You can mount the device on a rack.<br>See Mount the Connect EZ 16/32 on a rack. |
| **Connect to Digi Remote Manager** | Connect to Digi Remote Manger to remotely manage a large number of devices.<br>See Central management. |
| **AnywhereUSB ports** | Your Connect EZ 16/32 includes two USB ports, which act as an AnywhereUSB 2 Plus Hub. The USB ports can only be used in conjunction with the **AnywhereUSB Manager**, which must be installed separately.<br>See AnywhereUSB 2 Plus USB ports on a Connect EZ 16/32. |

# Hardware

## Connect EZ 16/32 component list

Verify that you have the following included equipment.

### Included equipment for Connect EZ 16/32

These components are included in the box.

| Equipment | Description |
|---|---|
| **Connect EZ 16**<br>**Connect EZ 32** | <br>**Note** This image is of Connect EZ 32. The Connect EZ 16 has a blank panel covering the top row of serial ports.<br>For detailed information about the panels, see:<br>■ Front panel and LEDs<br>■ Back panel |
| **Ethernet cable** | Ethernet cable/RJ45 straight-through<br>Connect to a site network using an Ethernet cable. See Connect to site network using an Ethernet LAN. |
| **Console Adapter** | RJ45F to DB9F RS232 Serial adapter.<br>Connect the console adapter to a straight-through RJ45 cable, and then connect that cable to the **Console** port on the front of the device. |
| **Mounting bracket** | The Connect EZ 16/32 ships with rack mount ears pre-attached.<br>For mounting instructions, see Mount the Connect EZ 16/32 on a rack. |
| **Loopback** | RJ45M serial loopback cable is included for use with testing. |

| Equipment | Description |
|---|---|
| **cable** | |
| **Device label sticker** | A label sticker that includes information about the device is attached to the Welcome card. You should retain this label sticker and card with your hardware records. For more information about the label, see Device label sticker sample.<br><br>**Note** This label includes the unique default password for the device. This unique password will be needed if the device is factory reset and you want to access the web UI on the device. |

## Additional required equipment

| Equipment | Description |
|---|---|
| **Power cord** | A national mains power cord. Depending on the device variant ordered, a power cord may be supplied. At least one is required to power the device. If your device is dual-powered, a second power cord is recommended.<br>For AC power supplies: Use an appropriate power cable meeting national standards to connect to a standard outlet.<br><br>■ **EU/International**: VDE Mark, conforming to IEC 60083, IEC 60227, or IEC 60320, with C13 to the appropriate national mains connector rated for 16A at 250V.<br>■ **USA/Canada**: UR or UL Mark, conforming to UL 62, UL 817, or CSA-C22.2, with C13 to 5-15P, or NEMA locking connector rated for 10A at 125V.<br><br>For information about connecting the power supply, see Power the Connect EZ 16/32. |

## Optional additional equipment

| Equipment | Description |
|---|---|
| **Power supply unit** | Each Connect EZ 16/32 has one power supply installed by default. You can order a dual-powered device with two power supplies installed by default, or you can purchase a second power supply unit and install it.<br><br>■ **EZPS-AC**: Connect EZ 16/32 power supply unit, port-side intake. The thumb screws used to connect the items to the Connect EZ are red.<br><br>See Install an additional power supply unit. |

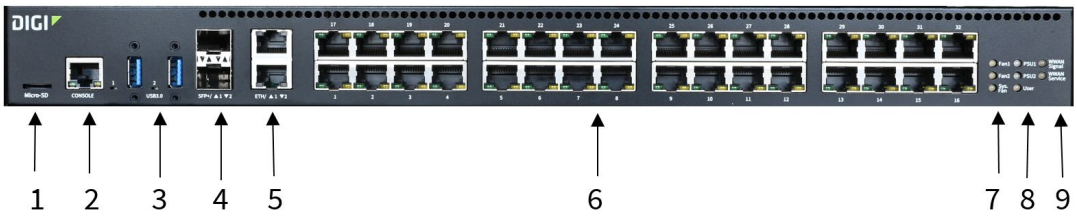
## Optional additional cellular equipment

These items are only needed if you are using a CORE module to connect to a cellular network.

For more information, see Create a cellular connection using the CORE module.

| Equipment | Description |
|---|---|
| **CORE module** | <br>**Note** A SIM card is also required. |
| **SIM card** | An activated SIM card provided by your cellular network operator. You can insert up to two SIM cards in the CORE module. See Create a cellular connection using the CORE module.<br>The CORE module supports the standard mini-SIM cards (2FF). |
| **LTE Antenna** (2) | Up to two LTE antennas can be attached. See Create a cellular connection using the CORE module. |

# Front panel and LEDs

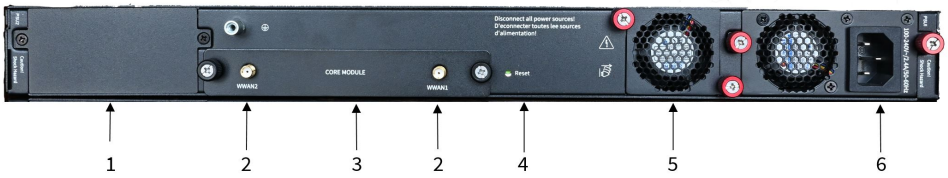



| Item | Name | Description |
|---|---|---|
| 1 | **Micro-SD** | Insert an SD card. |
| 2 | **Console** | Connect the RJ45F to DB9F RS232 console adapter to the **Console** port. |
| 3 | **USB 3.0 1**<br>**USB 3.0 2** | The two USB 3.0 (USB 3.1 Gen 1) ports act as an AnywhereUSB 2 Plus Hub. The USB ports can only be used in conjunction with the **AnywhereUSB Manager**, which must be installed separately.<br>You can use the **AnywhereUSB Manager** connect to and monitor the devices connected to the USB ports. You can configure the AnywhereUSB service and **AnywhereUSB Manager** from the Connect EZ 16/32 web UI.<br>See AnywhereUSB 2 Plus USB ports on a Connect EZ 16/32.<br>**Note** The USB Implementers Forum (USB-IF) renamed USB 3.0 to USB 3.1 Gen 1. There is no change in performance, functionality, or electrical characteristics between USB 3.0 and USB 3.1 Gen 1. |

| Item | Name | Description |
|---|---|---|
| 4 | **SFP+ 1**<br>**SFP+ 2** | Connect an SFP+ transceiver module for fiber connection, such as Finisar Network FTLX8574D3BCL SFP+.<br>For more information, see Configure an SFP+ port.<br><br>**Note** Connect EZ 16/32 can support both a copper port and an SFP+ port at the same time. If an SFP+ port is enabled, the SFP+ port LED will illuminate if an SPF+ transceiver is installed, regardless of whether the optical/fiber cable is connected end-to-end. |
| 5 | **ETH 1** | Use the **ETH 1** port to connect the device to your local network using an Ethernet cable. See Connect to site network using an Ethernet LAN.<br>The **ETH 1** LED shows the status of the connection.<br>■ **Yellow** (right): There is activity on the port.<br>■ **Green** (left): The port is in use. |
| 5 | **ETH 2** | Use the **ETH 2** port to connect to a second Ethernet port. This is useful for redundancy or if you have more than one network.<br>The **ETH 2** LED shows the status of the connection.<br>■ **Yellow** (right): There is activity on the port.<br>■ **Green** (left): The port is in use. |
| 6 | **Serial ports 1-16 OR 1-32** | Use the serial ports to connect to devices and equipment to the Connect EZ 16/32. See Connect equipment to the Connect EZ serial port.<br>The serial port LED shows the status of the connection.<br>■ **Green**: The LED is solid green when a device is connected to the port.<br>■ **Yellow**: The LED is linked directly to the serial transmit pin. During serial transmit, the specific LED blink pattern is very dependent on the bit rate and amount of traffic. At higher baud rates the flicker rate may be difficult to detect. |
| 7 | **Fan1** LED | The LED shows the status of **Fan1** that is included with **PSU1**, which is on the right side of the back of the device.<br>**Solid green**: The fan is running within normal range of use.<br>**Solid red**: The fan slows down or the device is overheating. |
| 7 | **Fan2** LED | The LED shows the status of **Fan2** that is included with **PSU2**, which is on the lft side of the back of the device.<br>■ **Solid green**: The fan is running within normal range of use.<br>■ **Solid red**: The fan slows down or the device is overheating. |
| 7 | **Sys. Fan** LED | The LED shows the status of **Sys. Fan**, which is the fan on the back of the device that is not associated with a PSU (power supply unit).<br>■ **Solid green**: The fan is running within normal range of use.<br>■ **Solid red**: The fan slows down or the device is overheating. |

| Item | Name | Description |
|---|---|---|
| 8 | **PSU1** LED | The LED shows the status of power supply and fan unit on the left. This power supply and fan unit is factory-installed.<br>■ **Solid blue**: The device is powered on.<br>■ **Solid red**: The device is not powered or the supply has failed. |
| 8 | **PSU2** LED | The LED shows the status of power supply and fan unit on the right. This power supply and fan unit is optional.<br>■ **Solid blue**: The device is powered on.<br>■ **Solid red**: The device is not powered or the supply has failed. |
| 8 | **User** LED | LED used for the Find Me feature. When this feature is activated, the LED blinks orange and then green. |
| 9 | **WWAN Signal** LED | Shows the strength of the WWAN signal. |
| 9 | **WWAN Service** LED | Shows the status of the WWAN service. |

# Back panel




| Item | Name | Description |
|---|---|---|
| 1 | **PSU2** | A location for an optional second power supply for devices that are dual-powered.<br>Your device may have a second power supply installed from the factory, but if not you can purchase a second power supply unit and install it.<br>See Install an additional power supply unit.<br>The second power supply allows for additional power for the device.<br>See Power the Connect EZ 16/32. |
| 2 | **WWAN1**<br>**WWAN2** | Attach cellular antennas if the CORE module is used to complete a cellular connection. The antenna mounts are covered with a black button that can be removed.<br>See Create a cellular connection using the CORE module. |
| 3 | **Core Module** | Insert a Digi Core Modem to complete a cellular connection.<br>Use these thumb screws to remove the CORE module plate so that you can insert the CORE module.<br>See Create a cellular connection using the CORE module. |

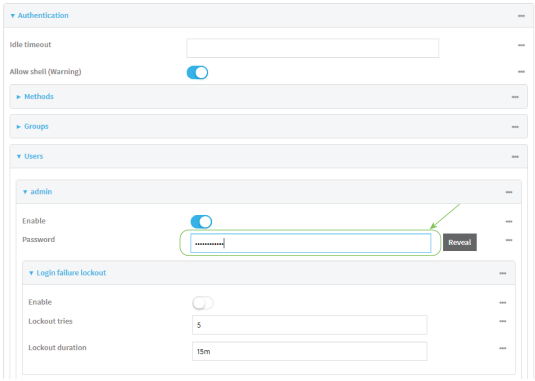
| Item | Name | Description |
|---|---|---|
| 4 | **Reset** | Press the **Reset** button to reset the device to the factory default settings. See Use the RESET button to reset your device to the factory defaults. |
| 5 | **System Fan** | Provides air flow for the device. |
| 6 | **PSU1** | The power supply for a device.<br>See Power the Connect EZ 16/32. |

# Change the password on the Connect EZ

The unique, factory-assigned password for the default **admin** user account is printed on the bottom label of the device and on the loose label included in the package. For ease of use, you may want to change the password from the default.

If you erase the device configuration or reset the device to factory defaults, the password for the **admin** user will revert to the original, factory-assigned default password.

1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. On the menu, click **System** > **Device Configuration**. The **Configuration** window appears.
3. Click **Authentication** > **Users** > **Admin**.
4. For **Password**, enter the new password. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.




5. Click **Apply** to save the configuration and apply the change.

For more detailed information about this process, see Change the default password for the admin user.

# Create a cellular connection using the CORE module

This section explains how to connect the Digi CORE®module and cellular antennas to the Connect EZ hardware.

The CORE module has slots for two SIM cards: SIM 1 and SIM 2. Only one activated SIM card is needed to connect to the cellular network. The second card can be used for redundancy.

**Note** As an alternative, you can also use an Ethernet LAN connection. See Connect to site network using an Ethernet LAN.

### Prerequisites

- Activated SIM card from your cellular network provider.
- Digi CORE module. This is purchased separately.

To connect the hardware and connect to the cellular network:

1. Make sure that your device is **powered down** before removing or installing the module. **CORE modules are not hot-swappable**.
2. Insert your activated SIM card into the CORE module. The notched end of SIM card should be inserted first, with the gold metal contacts facing down. You will hear a click once the SIM is completely inserted.

   **Note** If one SIM card is being used, insert the SIM card into the SIM 1 slot.

3. Insert the CORE module into the device.
   a. Orient the device so the front of the device is facing you.
   b. Unscrew the CORE module slot cover from the back of the device.
   c. Insert the CORE module into the slot. Make sure the pin holes on the back of the module match the location of the pins in the slot.
   d. Push the module into the slot.
   e. Push the white handle down until you hear it click.
   f. Optionally, you can screw one of the CORE module cover screws into the center of the handle.
   g. Place the CORE module cover over the end of the device. Make sure that the antenna labels are oriented correctly.
   h. Push the cover in place.
4. Attach both of the cellular antennas. While gripping the metal connector section with your thumb and forefinger, tighten until secure. Do not tighten the antenna by holding any part of the plastic antenna housing.
5. Plug the power supply cord into at least one of the power supplies on the back of the device.
6. Plug the power supply unit into an AC power outlet to power up the Connect EZ.

## Connect to site network using an Ethernet LAN

This section explains how to connect to a site network using an Ethernet cable.

1. Connect one end of an Ethernet cable to your site network.
2. Connect the other end of the Ethernet cable to either the **ETH 1** or the **ETH 2** port on the Connect EZ. By default a DHCP request will be sent to the local Ethernet network.

**Note** If you do not have a DHCP server on your network, you can connect locally over 192.168.210.1. See Using the local web interface.

# Connect equipment to the Connect EZ serial port

After your device is connected and powered up, you can connect equipment to the device using the serial ports.

The serial port on the Connect EZ provides console access to connected critical equipment through a connected Ethernet LAN. Connect your network device to the Connect EZ serial port. For pinout information, see Serial connector pinout.

You must use a cable with an RJ45 (10 pin) connector to connect to a serial port on the Connect EZ . Consult the user guide for the device you are connecting to the Connect EZ to determine the connector type, cable type, and pinout positions for your specific device.

The serial port is enabled by default. The network devices connected to the serial port may be accessed using RealPort, Digi Remote Manager, the local web user interface, TCP, telnet, or SSH connections. TCP, telnet and SSH connections to serial ports are disabled by default and must be enabled by a device-specific configuration.

## Connect equipment to a serial port

You can connect equipment to a serial port on the Connect EZ 16/32, and access it using a terminal emulator program, such as Tera Term or Putty.

**Note** Before you begin, make sure a terminal emulator is installed on your laptop and you have a serial cable.

1. Connect one end of a serial cable to a serial port on the Connect EZ 16/32.

2. Connect the other end of the serial cable to your equipment.
3. Verify the connection between the Connect EZ 16/32 and the equipment.
   a. Open your terminal emulator.
   b. Press **Enter**.
   c. When the connection has been make, the serial port LED is solid green.

## Serial connector pinout

The Connect EZ has an RJ45 (10 pin) serial connector. The table below contains the pinout information.

**Altpin**

If you enable **Altpin** in EIA-232 mode, the DCD and DSR signals are swapped. This allows use of DCD with 8-wire cables. **Altpin** has no impact on 422 or 485 mode.

**Data+/Data- pins (in RS 485 half duplex mode)**

For RS 485 cables in half duplex mode, you only need to connect one each of the Data+ and Data- pins.

| 10-pin | 8-pin | EIA-232 Signals (DTE) | MEI models only<br>EIA-422/485 Full-duplex | MEI models only<br>EIA-485 Half-duplex |
|---|---|---|---|---|
| 1 | | RI | TxD- | Data- |
| 2 | 1 | DSR (DCD*)<br>*When Altpin is enabled | RxD- | Data- |
| 3 | 2 | RTS | RTS+ | N/A |
| 4 | 3 | GND | GND | GND |
| 5 | 4 | TxD | TxD+ | Data+ |
| 6 | 5 | RxD | RxD+ | Data+ |
| 7 | 6 | SG | SG | SG |
| 8 | 7 | CTS | CTS+ | N/A |
| 9 | 8 | DTR | RTS- | N/A |
| 10 | | DCD (DSR*)<br>*When Altpin is enabled | CTS- | N/A |

# Mount the Connect EZ 16/32 on a rack

The Connect EZ 16/32 can be mounted on a rack using the pre-attached ears. Refer to your rack installation guide to determine the type of screws required by your rack for secure installation.

1. Place the device on the rack and line up the oval holes on the pre-attached ear with your rack.
2. Using the screws recommended by your rack installation guide, attach the device to the rack. Carefully tighten the screws so that the device is firmly attached to your mounting rack.

# Power the Connect EZ 16/32

Each device is single-powered by default. If theConnect EZ 16/32 is dual-powered, you can use two power cords to power the device.

1. Orient the device so the back of the device is facing you.

2. Connect the power cord to at least one power supply. The power supply on the right is available by default.

3. Plug the other end of the power cord to a main power supply.
4. If your device is dual-powered, repeat the process for the second power supply.

## Power loss and Connect EZ 16/32 configuration

The Connect EZ 16/32 retains its configuration if power is lost and then power is restored when the device is plugged into a main power supply, or if the device is commanded to restart automatically or interactively.

## Install an additional power supply unit

If you have a single-powered device, you can purchase and install a second power supply unit.

The following part can be purchased: **EZ-PSIK**: Connect EZ 16/32cpower supply kit, port-side intake.

You will need a screwdriver to complete the installation.

To install a power supply:

1. Orient the device so the back of the device is facing you.
2. Using a screwdriver, remove the plate on the left side of the device.

3. Orient the power supply unit so that the exhaust is on the left and the power point is on the right.
4. Insert the unit into the slot on the left side of the device.
5. Turn the red thumb screws to securely attach the unit to the device case.

## Use the RESET button to reset your device to the factory defaults

You can reset the Connect EZ to the factory default settings. Resetting the device to factory defaults performs the following actions:

- Clears all configuration settings.
- Deletes all user files.
- Regenerates SSH keys.
- Clears event and system log files.
- Creates a new event in the event log, indicating a factory reset.

**Note** While the settings are reset, the device's firmware version remains the same.

1. Make sure that the Connect EZ has been powered on for at least 30 seconds.
2. Locate the **RESET** button on the back of the device.
3. Using a pinhole tool, press and hold the **RESET** button. The **RESET** button has the following modes:

- **Configuration reset**:
  - Press and release the **RESET** button for **10** seconds.
  - The device reboots automatically and resets to factory defaults. This does not remove any automatically generated certificates and keys.
- **Full device reset**:
  - After the device reboots from the first button press, immediately press and release the **RESET** button for **10** seconds again.
  - The device reboots again and resets to factory defaults, as well as also removing generated certificates and keys.

# Discover the IP address using the Digi Navigator

You can use the Digi Navigator to quickly discover the IP address for the Connect EZ 16/32.

1. To ensure that your computer and device are connected to each other and your local network, make the following connections:
   - Connect the device to your computer with an Ethernet cable.
   - Connect the device to your local network with an Ethernet cable.
   - Connect your computer to your local network with an Ethernet cable.
2. Download and install the **Digi Navigator**.
3. Launch the **Digi Navigator**.
4. The tool discovers the Connect EZ 16/32 devices that are powered on and connected to your network. When the process is complete, a list of the devices appears.
   - **Connected to a network**: By default, the HTTPS service is enabled and used to find an IP address for the Connect EZ 16/32. Other services can be enabled if needed from the **Filters** section. See Services used to discover a device when connected to a network.
   - **Connected directly to a device or on a network with no DHCP server**: In either of these situations, a setup IP address is assigned to the device. You can specify the filters used to assign an IP address. See Use the autodiscovery protocol to discover a device and Assign a generic IP address to the device.
5. Expand a device to display the IP address.

# Discover the device's IP address: Additional methods

The IP address is used to log in to the Web UI for the device. If you do not have access to the Digi Navigator, you can use either of these methods to discover the IP address.

- Manually configure the PC and assign an IP address to the device
- Connect to the local Web UI on the Connect EZ

## Manually configure the PC and assign an IP address to the device

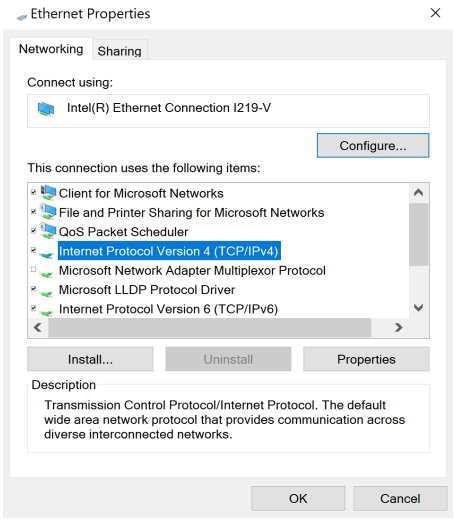
You can manually assign an IP address to the device.

**Prerequisites**

- An Ethernet cable must be connected to the device and your network.
- A power supply must be connected to the device and the device powered on.
- Determine the IP address that you want to assign to the device.

To configure your laptop and assign an IP address:

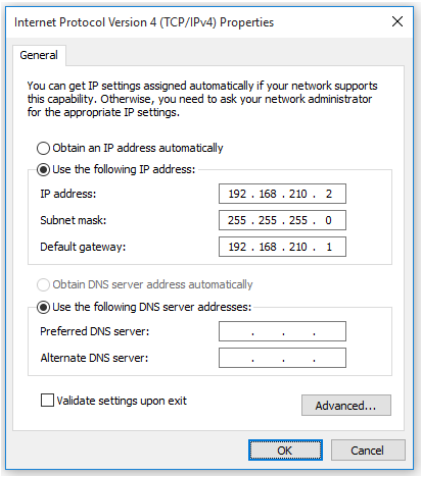
1. On your PC, navigate to the Ethernet network settings dialog.
2. Click the **Internet Protocol Version 4 (TCP/IPv4)** parameter.




3. Click **Properties**. The **Internet Protocol Version 4 (TCP/IPv4) Properties** dialog appears.
4. Select **Use the following IP address**.

> Note **IMPORTANT**: Make note of the current IP address entries for **IP address**, **Subnet mask**, and **Default gateway**. You will need this information to complete the final step of the process.

5. Configure with the following details:
   - **IP address** for PC: 192.168.210.2
   - **Subnet**: 255.255.255.0
   - **Gateway**: 192.168.210.1




6. Click **OK**.
7. Open a browser window.
8. Enter the default gateway IP address: 192.168.210.1
9. Log into the device using the default user name and password. The default user name is **admin** and the default password is the unique password printed on the label packaged with your device. For more detailed instructions, see Connect to the local Web UI on the Connect EZ.
10. Update the IP address for the device.
11. On your PC, revert the IP address information to the original entries.
    a. Return to the **Internet Protocol Version 4 (TCP/IPv4) Properties** dialog.
    b. Enter the original IP address entries for **IP address**, **Subnet mask**, and **Default gateway**.
    c. Click **OK**.

## Connect to the local Web UI on the Connect EZ

Once you are connected to the local Web UI, you can configure your device.

---

**Note** You can also use the **Digi Navigator** to access the web UI and configure the device. See Access a device's web UI from the Digi Navigator.

---

1. Make sure that an Ethernet cable is connected to the Connect EZ 16/32's **ETH 1** port and to a laptop or PC.
2. Open a browser and enter the IP address for the device.
3. Log into the device using the default user name and password. The default user name is **admin** and the default password is the unique password printed on the label packaged with your device.
4. After logging in, the local web admin dashboard is displayed.

The dashboard shows the current state of the device.

| Dashboard area | Description |
|---|---|
| **Network activity** | Summarizes network statistics: the total number of bytes sent and received over all configured bridges and Ethernet devices. |
| **Digi Remote Manager** | Displays the device connection status for Digi Remote Manager, the amount of time the connection has been up, and the Digi Remote Manager device ID.<br>See Using Digi Remote Manager. |
| **Device** | Displays the Connect EZ 16/32 device's status, statistics, and identifying information. |
| **Network Interfaces** | Displays the status of the network interfaces configured on the device. |

For more information, see Using the local web interface.

# Device label sticker sample

A device label sticker that includes information about the device is included in the box. You should retain this label sticker with your hardware records.

| | Item | Description |
|---|---|---|
| 1 | QR code | Scan the QR code to display a semicolon separated list of: ProductName;DeviceID;Password;SerialNumber;SKUPartNumber SKUPartRevision<br><br>**Note** Note the space between SKUPartNumber and SKUPartRevision<br><br>Example: Connect EZ 02;00000000-00000000-112233FF-FF445566;PW1234567890;EZ02-123456;EZ02-C000 B |

| | Item | Description |
|---|---|---|
| 2 | Label part number | Label part number and revision level. |
| 3 | Product name | Product name, such as Connect EZ Mini, Connect EZ 2, or Connect EZ 8. |
| 4 | Device part number (SKU) and revision | Device part number (SKU number) and revision. For example, EZ02-C000 A |
| 5 | Password | The unique default password for the device. This unique default password will be needed if the device is factory reset and you want to access the web UI on the device. |
| 6 | MAC address | The MAC address for the device. |
| 7 | Serial number | The unique serial number assigned to the device. The SN is needed when submitting a Digi support ticket. |
| 8 | Device kit part number and revision level | The part number and revision level of the device kit. |

# Firmware configuration

This chapter contains the following topics: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Change the default password for the admin user ..... 51
Configuration methods ..... 52
Using Digi Remote Manager ..... 53
Access Digi Remote Manager ..... 53
Using the local web interface ..... 54
Review the dashboard ..... 55
Use the local REST API to configure the Connect EZ 16/32 device ..... 56
Access the terminal screen from the web UI ..... 60
Using the command line ..... 62

# Review Connect EZ 16/32 default settings

You can review the default settings for your Connect EZ 16/32 device by using the local WebUI or Digi Remote Manager:

## Local WebUI

1. Log into the Connect EZ 16/32 WebUI as a user with Admin access.
2. On the menu, click **System** > **Device Configuration**.

## Digi Remote Manager

1. If you have not already done so, connect to your Digi Remote Manager account.
2. Click **Device Management** to display a list of your devices.
3. Locate and select your device as described in Use Digi Remote Manager to view and manage your device.
4. Click **Configure**.

The following tables list important factory default settings for the Connect EZ 16/32.

## Default interface configuration

| Interface type | Preconfigured interfaces | Devices | Default configuration |
|---|---|---|---|
| **Wide Area Networks (WANs)** | ▪ Modem | ▪ WWAN1 cellular modem | ▪ Firewall zone: External<br>▪ WAN priority: Metric=3<br>▪ SIM failover after 5 attempts |
| **Ethernet Network** | ▪ ETH1 | ▪ Ethernet: ETH1 | ▪ Firewall zone: Edge<br>▪ DHCP client enabled |
| | ▪ ETH2 | ▪ Ethernet: ETH2 | ▪ Firewall zone: Edge<br>▪ DHCP client enabled |
| | ▪ Loopback | ▪ Ethernet: Loopback | ▪ Firewall zone: Loopback<br>▪ IP address: 127.0.0.1/8 |
| | ▪ Setup IP | ▪ Ethernet: ETH1 | ▪ Firewall zone: Setup<br>▪ IP address 192.168.210.1/24 |
| | ▪ Setup Link-local IP | ▪ Ethernet: ETH1 | ▪ Firewall zone: Setup<br>▪ IP address 169.254.100.100/16 |

### Other default configuration settings

| Feature | Configuration |
|---|---|
| Central management | ■ Digi Remote Manager enabled as the central management service. |
| Security policies | ■ Packet filtering allows all outbound traffic.<br>■ SSH and web administration:<br>• Enabled for local administration<br>• Firewall zone: Set up |
| Monitoring | ■ Device heath metrics uploaded to Digi Remote Manager at 60 minute interval.<br>■ SNMP: Disabled |

## Change the default password for the admin user

The unique, factory-assigned password for the default **admin** user account is printed on the bottom label of the device and on the loose label included in the package.

If you erase the device configuration or reset the device to factory defaults, the password for the **admin** user will revert to the original, factory-assigned default password.

To change the default password for the admin user:

### Web

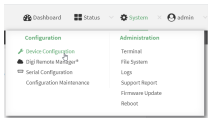
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

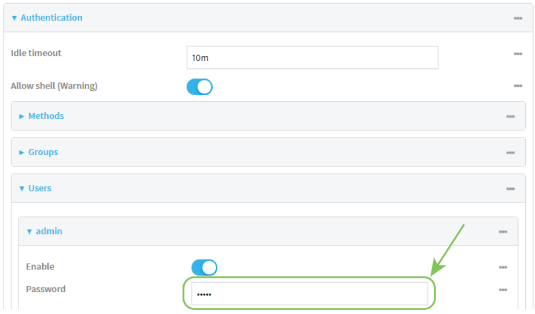
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Authentication** > **Users** > **admin**.

4. Enter a new password for the admin user.The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.




5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set a new password for the admin user. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.

```
(config)> auth user admin password new-password
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Configuration methods

There are two primary methods for configuring your Connect EZ 16/32 device:

- Web interface.

  The web interface can be accessed in two ways:

- Central management using the Digi Remote Manager, a cloud-based device management and data enablement platform that allows you to connect any device to any application, anywhere. With the Remote Manager, you can configure your Connect EZ 16/32 device and use the configuration as a basis for a Remote Manager configuration which can be applied to other similar devices. See Central management for more information about using the Remote Manager to manage and configure your Connect EZ 16/32 device.
- The local web interface. See Using the local web interface for more information about using the local web interface to manage and configure your Connect EZ 16/32 device.

  **Note** Changes made to the device's configuration by using the local web interface will not be automatically reflected in Digi Remote Manager. You must manually refresh Remote Manager for the changes to be displayed.

  Web-based instructions in this guide are applicable to both the Remote Manager and the local web interface.

- Command line.

  A robust command line allows you to perform all configuration and management tasks from within a command shell. Both the Remote Manager and the local web interface also have the option to open a terminal emulator for executing commands on your Connect EZ 16/32 device. See Using the command line for more information about using the command line to manage and configure your Connect EZ 16/32 device.

In this guide, task topics show how to perform tasks:

**Web**

Shows how to perform a task by using the local web interface.

**Command line**

Shows how to perform a task by using the command line interface.

## Using Digi Remote Manager

By default, your Connect EZ 16/32 device is configured to use Digi Remote Manager as its central management server. Devices must be registered with Remote Manager using one of the following options:

- As part of the getting started process. See the for information.
- If you have not registered the device already, you can do so using the Device ID, MAC address, IMEI, or your Remote Manager login credentials. See Add a device to Remote Manager.

For information about configuring central management for your Connect EZ 16/32 device, see Central management.

## Access Digi Remote Manager

To access Digi Remote Manager:

1. If you have not already done so, go to https://myaccount.digi.com/ to sign up for a Digi Remote Manager account.
2. Check your email for Digi Remote Manager login instructions.

3. Go to remotemanager.digi.com.
4. Enter your user name and password. The Digi Remote Manager Dashboard appears.

# Using the local web interface

To connect to the Connect EZ 16/32 local Web UI:

1. Use an Ethernet cable to connect the Connect EZ 16/32's **ETH2** port to a laptop or PC.
2. Open a browser and go to **192.168.2.1**.
3. Log into the device using a configured user name and password.

   The default user name is **admin** and the default password is the unique password printed on the label packaged with your device.

## Review the dashboard

After logging in, the local web admin dashboard is displayed.

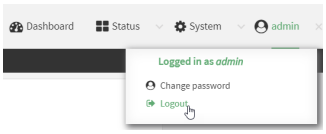
The dashboard shows the current state of the device.

| Dashboard area | Description |
|---|---|
| **Network activity** | ■ Summarizes network statistics: the total number of bytes sent and received over all configured bridges and Ethernet devices.<br>■ Displays the status of the network interfaces configured on the device.<br>■ Provides information about the signal strength and technology of the cellular modem(s). |
| **Digi Remote Manager** | Displays the device connection status for Digi Remote Manager, the amount of time the connection has been up, and the Digi Remote Manager device ID.<br>See Using Digi Remote Manager.<br>The links in this section enable you to do the following:<br>■ **Launch Digi Remote Manager**: Click **Go To Digi Remote Manager** to open the Digi Remote Manager login page.<br>■ **Add a device to Remote Manager**: Click **Register device in new account** to add a device to Remote Manager using your Remote Manager login credentials. |
| **Device** | Displays the Connect EZ 16/32 device's status, statistics, and identifying information. |
| **AnywhereUSB Service** | Displays information about the AnywhereUSB service that is used with the AnywhereUSB USB ports.<br>■ **Status**: Shows whether the AnywhereUSB service is enabled or disabled.<br>■ **USB Devices**: The number of USB devices connected to the Hub.<br>■ **Groups**: The number of AnywhereUSB groups connected to the Hub.<br>■ **Clients**: The number of client IDs connected to the Hub.<br>Click Show Details to navigate to the **AnywhereUSB Status** page for more detailed information. |

| Dashboard area | Description |
|---|---|
| **Serial Ports** | Displays information about the serial ports on the Connect EZ 16/32. Each serial port is identified by port name or number, followed by the serial port mode configured for the port.<br>The icons next to the port name or number shows the serial port status:<br>■ **Empty circle**: Port is not connected.<br>■ **Green circle**: Active connection on the port.<br>■ **Red X**: No signal, which is an error state where the port is not available.<br>■ **Down arrow**: One of the control signals is not active. This icon may display For for ports configured in **Remote Access** serial port mode and that have a signal monitor enabled (CTS or DCD) in the **Monitoring Settings** section.<br>You can click the icons at the top of the section to access other pages:<br>■ **Blue "i"**: Click to access the Serial Status page.<br>■ **Blue wrench**: Click to access the Serial Configuration page. |
| **Services** | Displays an option for the Watchdog service if it has been enabled. |

## Log out of the web interface

- On the main menu, click your user name. Click **Log out**.




# Review the dashboard

After logging in, the local web admin dashboard is displayed.

The dashboard shows the current state of the device.

| Dashboard area | Description |
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| **Digi Remote Manager** | Displays the device connection status for Digi Remote Manager, the amount of time the connection has been up, and the Digi Remote Manager device ID. See Using Digi Remote Manager.<br>The links in this section enable you to do the following:<br>■ **Launch Digi Remote Manager**: Click **Go To Digi Remote Manager** to open |

| Dashboard area | Description |
|---|---|
| | the Digi Remote Manager login page.<br>▪ **Add a device to Remote Manager**: Click **Register device in new account** to add a device to Remote Manager using your Remote Manager login credentials. |
| **Device** | Displays the Connect EZ 16/32 device's status, statistics, and identifying information. |
| **AnywhereUSB Service** | Displays information about the AnywhereUSB service that is used with the AnywhereUSB USB ports.<br>▪ **Status**: Shows whether the AnywhereUSB service is enabled or disabled.<br>▪ **USB Devices**: The number of USB devices connected to the Hub.<br>▪ **Groups**: The number of AnywhereUSB groups connected to the Hub.<br>▪ **Clients**: The number of client IDs connected to the Hub.<br>Click Show Details to navigate to the **AnywhereUSB Status** page for more detailed information. |
| **Serial Ports** | Displays information about the serial ports on the Connect EZ 16/32. Each serial port is identified by port name or number, followed by the serial port mode configured for the port.<br>The icons next to the port name or number shows the serial port status:<br>▪ **Empty circle**: Port is not connected.<br>▪ **Green circle**: Active connection on the port.<br>▪ **Red X**: No signal, which is an error state where the port is not available.<br>▪ **Down arrow**: One of the control signals is not active. This icon may display For for ports configured in **Remote Access** serial port mode and that have a signal monitor enabled (CTS or DCD) in the **Monitoring Settings** section.<br>You can click the icons at the top of the section to access other pages:<br>▪ **Blue "i"**: Click to access the Serial Status page.<br>▪ **Blue wrench**: Click to access the Serial Configuration page. |
| **Services** | Displays an option for the Watchdog service if it has been enabled. |

# Use the local REST API to configure the Connect EZ 16/32 device

Your Connect EZ 16/32 device includes a REST API that can be used to return information about the device's configuration and to make modifications to the configuration. You can view the REST API specification from your web browser by opening the URL:

**https://*ip-address*/cgi-bin/config.cgi**

For example:

**https://192.168.210.1/cgi-bin/config.cgi**

## Use the GET method to return device configuration information

To return device configuration, issue the **GET** method. For example, using **curl**:

```
$ curl -k -u admin https://ip-address/cgi-bin/config.cgi/value/path -X GET
```

where:

- *ip-address* is the IP address of the Connect EZ 16/32 device.
- *path* is the path location in the configuration for the information being returned.

  To determine allowed values for *path* from the Admin CLI:

  1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

     Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
  2. At the command line, type **config** to enter configuration mode:

     ```
     > config
     (config)>
     ```
  3. At the config prompt, type **?** (question mark):

     ```
     (config)> ?
     auth                    Authentication
     cloud                   Central management
     firewall                Firewall
     monitoring              Monitoring
     network                 Network
     serial                  Serial
     service                 Services
     system                  System
     vpn                     VPN

     (config)>
     ```

     The allowed values for *path* are listed in the first (left) column.
  4. To determine further allowed path location values by using the **?** (question mark) with the path name:

     ```
     (config> service ?

     Services

      Additional Configuration
      ------------------------------------------------------------------
     ------------
      dns                     DNS
      iperf                   IPerf
      location                Location
      mdns                    Service Discovery (mDNS)
      modbus_gateway          Modbus Gateway
     ```

```
multicast                Multicast
ntp                      NTP
ping                     Ping responder
snmp                     SNMP
ssh                      SSH
telnet                   Telnet
web_admin                Web administration

(config)> service
```

For example, to use **curl** to return the ssh configuration:

```
$ curl -k -u admin https://192.168.210.1/cgi-bin/config.cgi/value/service/ssh -
X GET
Enter host password for user 'admin':
{
ok": true,
       "result": {
               "type": "object",
               "path": "service.ssh"
,              "collapsed": {
"acl.zone.0": "internal"
,
"acl.zone.1": "edge"
,
"acl.zone.2": "ipsec"
,
"acl.zone.3": "setup"
,
"enable": "true"
,
"key": ""
,
"mdns.enable": "true"
,
"mdns.name": ""
,
"mdns.type": "_ssh._tcp."
,
"port": "22"
,
"protocol.0": "tcp"
               }
       }
}
$
```

You can also use the **GET** method to return the configuration parameters associated with an item:

```
curl -k -u admin https://192.168.210.1/cgi-bin/config.cgi/keys/service/ssh -X
GET
Enter host password for user 'admin':
{ "ok": true, "result": [ "acl", "custom", "enable", "key", "mdns", "port",
"protocol" ] }
$
```

## Use the POST method to modify device configuration parameters and list arrays

### *Use the POST method to modify device configuration parameters*

To modify configuration parameters, use the **POST** method with the **path** and **value** parameters.

```
$ curl -k -u admin "https://ip-address/cgi-
bin/config.cgi/value?path=path&value=new_value" -X POST
```

where:

- *path* is the path to the configuration parameter, in dot notation (for example, **ssh.service.enable**).
- *new_value* is the new value for the parameter.

For example, to disable the ssh service using **curl**:

```
$ curl -k -u admin "https://192.168.210.1/cgi-
bin/config.cgi/value?path=service.ssh.enable&value=false" -X POST
Enter host password for user 'admin':
{ "ok": true }
$
```

### *Use the POST method to add items to a list array*

To add items to a list array, use the **POST** method with the **path** and **append** parameters. For example, to add the external firewall zone to the ssh service:

```
$ curl -k -u admin "https://192.168.210.1/cgi-
bin/config.cgi/value?path=service.ssh.acl.zone&append=true&value=external" -X
POST
Enter host password for user 'admin':
{ "ok": true, "result": "service.ssh.acl.zone.4" }
$
```

### *Use the POST method to add objects to a list array*

Objects in an array that require one or more underlying values can be set using the **collapsed** URI parameter. We recommend including the -g option as well, to instruct curl to turn off globbing. The below example would add a new static route for the WAN interface for the 1.2.4.0/24 destination network:

```
$ curl -g -k -u admin "https://192.168.210.1/cgi-
bin/config.cgi/value?path=network.route.static&append=true&collapsed
[dst]=1.2.4.0/24&collapsed[interface]=/network/interface/wan" -X POST
Enter host password for user 'admin':
{ "ok": true, "result": "network.route.static.1" }
$
```

## Use the DELETE method to remove items from a list array

To remove items from a list array, use the **DELETE** method. For example, using **curl**:

```
$ curl -k -u admin "https://192.168.210.1/cgi-bin/config.cgi/value?path=path
```

where *path* is the path to the list item, including the list number, in dot notation (for example, **service.ssh.acl.zone.4**).

For example, to remove the external firewall zone to the ssh service:

1. Use the **GET** method to determine the SSH service's list number for the external zone:

```
$ curl -k -u admin "https://192.168.210.1/cgi-
bin/config.cgi/value?path=service/ssh/acl/zone -X GET
{
       "ok": true,
       "result": {
               "type": "array",
               "path": "service.ssh.acl.zone"
,              "collapsed": {
"0": "internal"
,
"1": "edge"
,
"2": "ipsec"
,
"3": "setup"
,
"4": "external"
               }
       }
}
$
```

2. Use the **DELETE** method to remove the external zone (list item 4).

```
$ curl -k -u admin https://192.168.210.1/cgi-
bin/config.cgi/value?path=service.ssh.acl.zone.4 -X DELETE
Enter host password for user 'admin':
{ "ok": true }
$
```

# Access the terminal screen from the web UI

A user can log into a terminal screen and use CLI commands to access features.

**Note** You can also access the terminal screen from a port listed in the Serial Status page.

1. Log in to the web UI.
2. Click **System** > **Terminal**. The **Terminal** screen displays.
3. When prompted, enter your user name and password.
4. Enter the number of the port that you want to access.
5. Information about the port you are connected to displays, as well as commands.

```
Connecting to port5:
Settings: 9600, 8, 1, none, none
```

```
Type '~b.' to disconnect from port
Type '~b?' to list commands
```

6. Enter **~b?** to display additional commands.

| Command | Description |
|---|---|
| ~b. | Disconnect from the port. |
| ~bB | Send a BREAK sequence. |
| ~bc | Clear the history buffer. |
| ~br | Send a DTR reset sequence. |
| ~b? | Display a list of commands. |

7. Enter **~b.** to disconnect from the port.

# Using the command line

The Digi Connect EZ 16/32 device provides a command-line interface that you can use to configure the device, display status and statistics, update firmware, and manage device files.

See Command line interface for detailed instructions on using the command line interface and see Command line reference for information on available commands.

## Access the command line interface

You can access the Connect EZ 16/32 command line interface using an SSH connection, a telnet connection, or a serial connection. You can use an open-source terminal software, such as PuTTY or TeraTerm, to access the device through one of these mechanisms.

You can also access the command line interface in the WebUI by using the **Terminal**, or the Digi Remote Manager by using the **Console**.

To access the command line, your device must be configured to allow access, and you must log in as a user who has been configured for the appropriate access.

For further information about configuring access to these services, see:

- Serial: Serial port
- WebUI: Configure the web administration service
- SSH: Configure SSH access
- Telnet: Configure telnet access

## Log in to the command line interface

### Command line

1. Connect to the Connect EZ 16/32 device by using a serial connection, SSH or telnet, or the **Terminal** in the WebUI or the **Console** in the Digi Remote Manager. See Access the command line interface for more information.
   - For serial connections, the default configuration is:
     - **9600** baud rate
     - **8** data bits
     - **no** parity
     - **1** stop bit
     - **no** flow control
   - For SSH and telnet connections, the Setup IP address of the device is **192.168.2.1** on the .
2. At the login prompt, enter the username and password of a user with Admin access:

   ```
   login: admin
   Password: **********
   ```

   The default username is **admin**. The default unique password for your device is printed on the device label.
3. Depending on the device configuration, you may be presented with another menu, for example:

```
Access selection menu:

       a: Admin CLI
       q: Quit

Select access or quit [admin] :
```

Type **a** or **admin** to access the Connect EZ 16/32 command line.

You will now be connected to the Admin CLI:

```
Connecting now...
 Press Tab to autocomplete commands
 Press '?' for a list of commands and details
 Type 'help' for details on navigating the CLI
 Type 'exit' to disconnect from the Admin CLI

>
```

See Command line interface for detailed instructions on using the command line interface.

## Exit the command line interface

### Command line

1. At the command prompt, type **exit**.

```
> exit
```

2. Depending on the device configuration, you may be presented with another menu, for example:

```
Access selection menu:

       a: Admin CLI
       q: Quit

Select access or quit [admin] :
```

Type **q** or **quit** to exit.

# Interfaces

Connect EZ devices have several physical communications interfaces. These interfaces can be bridged in a Local Area Network (LAN) or assigned to a Wide Area Network (WAN).

This chapter contains the following topics:

Wide Area Networks (WANs) ..... 65
Local Area Networks (LANs) ..... 159
Virtual LANs (VLANs) ..... 203
Bridging ..... 209
Show SureLink status and statistics ..... 213
Configure a TCP connection timeout ..... 217
Configure an SFP+ port ..... 217

# Wide Area Networks (WANs)

The Connect EZ 16/32 device is preconfigured with one Wide Area Network (WAN), named **ETH1**, and one Wireless Wide Area Network (WWAN), named **Modem**.

You can modify configuration settings for the existing WAN and WWANs, and you can create new WANs and WWANs.

This section contains the following topics:

Wide Area Networks (WANs) and Wireless Wide Area Networks (WWANs) ..... 66
Configure WAN/WWAN priority and default route metrics ..... 66
WAN/WWAN failover ..... 69
Configure SureLink active recovery to detect WAN/WWAN failures ..... 70
Configure the device to reboot when a failure is detected ..... 86
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Example: Use a ping test for WAN failover from Ethernet to cellular ..... 108
Using Ethernet devices in a WAN ..... 110
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Configure a Wide Area Network (WAN) ..... 135
Configure a Wireless Wide Area Network (WWAN) ..... 143
Show WAN and WWAN status and statistics ..... 155
Delete a WAN or WWAN ..... 157
Default outbound WAN/WWAN ports ..... 158

# Wide Area Networks (WANs) and Wireless Wide Area Networks (WWANs)

A Wide Area Network (WAN) provides connectivity to the internet or a remote network. A WAN configuration consists of the following:

- A physical device, such as an Ethernet device or a cellular modem.
- Several networking parameters for the WAN, such as firewall configuration and IPv4 and IPv6 support.
- Several parameters controlling failover.

## Configure WAN/WWAN priority and default route metrics

The Connect EZ 16/32 device is preconfigured with one Wide Area Network (WAN), named **ETH1**, and one Wireless Wide Area Network (WWAN), named **Modem**. You can also create additional WANs and WWANs.

When a WAN is initialized, the Connect EZ 16/32 device automatically adds a Setup IP route for the WAN. The priority of the WAN is based on the metric of the default route, as configured in the WAN's IPv4 and IPv6 metric settings.

### *Assigning priority to WANs*

By default, the Connect EZ 16/32 device's WAN (**ETH1**) is configured with the lowest metric (**1**), and is therefor the highest priority WAN. By default, the Wireless WAN (**Modem**) is configured with a metric of **3**, which means it has a lower priority than **ETH1**. You can assign priority to WANs based on the behavior you want to implement for primary and backup WAN interfaces. For example, if you want a cellular connection to be your primary WAN, with an Ethernet interface as backup, configure the metric of the WWAN to be lower than the metric of the WAN.

### *Example: Configure cellular connection as the primary WAN, and the Ethernet connection as backup*

**Required configuration items**

- Configured WAN and WWAN interfaces. This example uses the preconfigured **ETH1** and **Modem** interfaces.
- The metric for each WAN.

#### Web

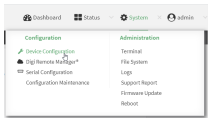
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

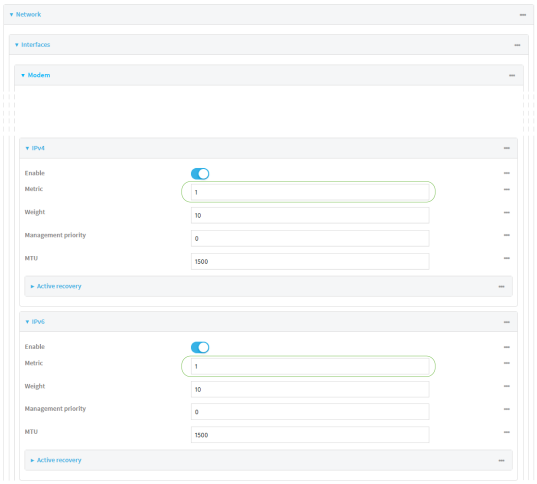
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

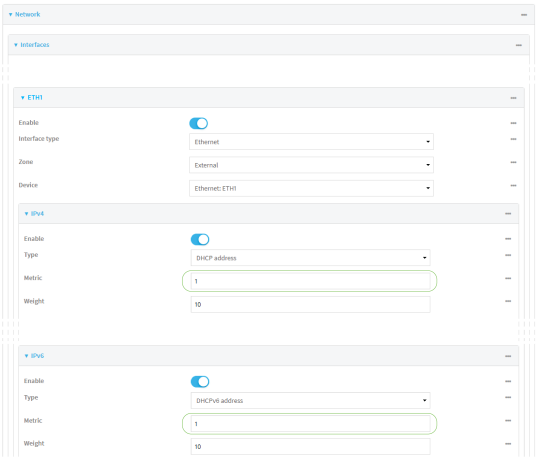



The **Configuration** window is displayed.

3. Set the metrics for **Modem**:
   a. Click **Network** > **Interfaces** > **Modem** > **IPv4**.
   b. For **Metric**, type **1**.
   c. Click **IPv6**.
   d. For **Metric**, type **1**.




4. Set the metrics for **ETH1**:
   a. Click **Network** > **Interfaces** > **ETH1** > **IPv4**.
   b. For **Metric**, type **2**.
   c. Click **IPv6**.
   d. For **Metric**, type **2**.




5. Click **Apply** to save the configuration and apply the change.

The Connect EZ 16/32 device is now configured to use the cellular modem WWAN, **Modem**, as its highest priority WAN, and its Ethernet WAN, **ETH1**, as its secondary WAN.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set the metrics for **Modem**:
   a. Set the IPv4 metric for **Modem** to **1**. For example:

```
(config)> network interface modem ipv4 metric 1
(config)>
```

   b. Set the IPv6 metric for **Modem** to **1**:

```
(config)> network interface modem ipv6 metric 1
(config)>
```

4. Set the metrics for **ETH1**:
   a. Set the IPv4 metric for **ETH1** to **2**:

```
(config)> network interface eth1 ipv4 metric 2
(config)>
```

   b. Set the IPv6 metric for **ETH1** to **1**:

```
(config)> network interface eth1 ipv6 metric 2
(config)>
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

The Connect EZ 16/32 device is now configured to use the cellular modem WWAN, **Modem**, as its highest priority WAN, and its Ethernet WAN, **ETH1**, as its secondary WAN.

## WAN/WWAN failover

If a connection to a WAN interface is lost for any reason, the Connect EZ 16/32 device will immediately fail over to the next WAN or WWAN interface, based on WAN priority. See Configure WAN/WWAN priority and default route metrics for more information about WAN priority.

### *Active vs. passive failure detection*

There are two ways to detect WAN or WWAN failure: active detection and passive detection.

- Active detection uses Digi SureLink™ technology to send probe tests to a target host or to test the status of the interface. The WAN/WWAN is considered to be down if there are no responses for a configured amount of time. See Configure SureLink active recovery to detect WAN/WWAN failures for more information about active failure detection.
- Passive detection involves detecting the WAN going down by monitoring its link status by some means other than active detection. For example, if an Ethernet cable is disconnected or the state of a cellular interface changes from **on** to **off**, the WAN is down.

### *Default Digi SureLink configuration*

Surelink is enabled by default for IPv4 on all WAN and WWAN interfaces, and is configured to perform two tests on these interfaces:

- Interface connectivity.
- DNS query to the DNS servers for interface's the network connection.

  DNS servers are typically received as part of the interface's DHCP client connection, although you can manually configure the DNS servers that will be used by SureLink.

  **Note** If your device is operating on a private APN or on wired network with firewall restrictions, ensure that the DNS servers on your private network allow DNS lookups for https://remotemanager.digi.com; otherwise, the SureLink DNS query test will fail and the Connect EZ 16/32 device will determine that the interface is down.

By default, these tests will be performed every 15 minutes, with a response timeout of 15 seconds. If the tests fail three consecutive times, the device will reset the network interface to attempt to recover the connection.

## Configure SureLink active recovery to detect WAN/WWAN failures

Problems can occur beyond the immediate WAN/WWAN connection that prevent some IP traffic from reaching its destination. Normally this kind of problem does not cause the Connect EZ 16/32 device to detect that the WAN has failed, because the connection continues to work while the core problem exists somewhere else in the network.

Using Digi SureLink, you can configure the Connect EZ 16/32 device to regularly probe connections through the WAN to determine if the WAN has failed, and to perform recovery actions, such as changing the interface metric to use a new default gateway.

**Required configuration items**

- Enable SureLink.

  By default, SureLink is enabled for the preconfigured WAN (**ETH1**) and WWAN (**Modem**). The default configuration tests the DNS servers configured for the interface.

  When SureLink is configured for Wireless WANs, SureLink tests are only run if the cellular modem is connected and has an IP address. Use the **SIM failover** options to configure the Connect EZ 16/32 device to automatically recover the modem in the event that it cannot obtain an IP address. See Configure a Wireless Wide Area Network (WWAN) for details about **SIM failover**.
- The type of tests to be performed:
  - **Ping test**: Uses ICMP to determine connectivity. The default behavior is to ping the interface gateway, which means that an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
  - **DNS test**: Performs a DNS query to the named DNS server.
  - **HTTP test**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.
  - **Test DNS servers configured for this interface**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
  - **Test the interface status**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.
  - **Custom test**: Tests the interface with custom commands.
  - **TCP connection test**: Tests that the interface can reach a destination port on the configured host.
  - **Test another interface's status**: Tests the status of another interface.
- The actions to take to recover connectivity in the event of failed tests:
  - **Change default gateway**: Increases the interface's metric to change the default gateway. This recovery action is enabled by default for the preconfigured WAN and WWAN interfaces.
  - **Restart interface**This recovery action is enabled by default for the preconfigured WAN and WWAN interfaces.
  - **Reset modem**: This recovery action is enabled by default for the preconfigured WWAN interface.
  - **Switch to alternate SIM**: Switches to an alternate SIM. This recovery action is enabled by default for the preconfigured WWAN interface.

- **Reboot device**.
- Execute custom **Recovery commands**.
- **Powercycle the modem**. This recovery action is enabled by default for the preconfigured WWAN interface.
- Two options also apply to every type of action:
  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

**Additional configuration items**

- The **Test interval** between connectivity tests.
- If more than one tests is configured, determine whether the interface should fail over based on the failure of one of the tests, or all of the tests.
- The number of test that must pass before the interface is considered to be working and its default route and DNS servers are reinstated.
- The amount of time that the device should wait for a response from an individual test before considering it to have failed.
- Advanced configuration items:
  - **Delayed Start**: The amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.
  - **Backoff interval**: The time to add to the test interval when restarting the list of actions.
  - **Test interface gateway by pinging**: Used by the **Interface gateway Ping test** as the endpoint for traceroute to use to determine the interface gateway.

**Order of precedence for SureLink actions**

SureLink recovery actions are preformed in the order that they are configured. As a result, if you include the **Reboot Device** with other SureLink recovery actions, it should be the last action in the recovery action list. Otherwise, the device will reboot and all recovery actions listed after the **Reboot Device** action will be ignored.

### Web

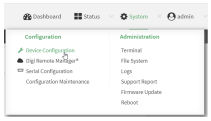
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

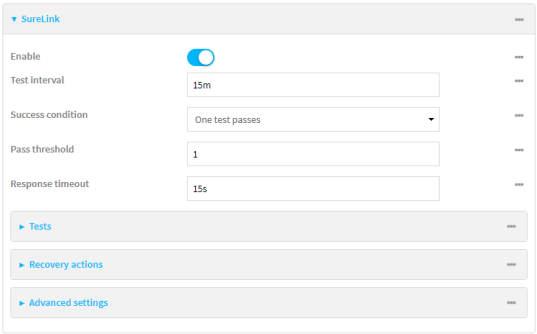
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network** > **Interfaces**.
4. Create a new WAN or WWAN or select an existing one:
   - To create a new WAN or WWAN, see Configure a Wide Area Network (WAN) or Configure a Wireless Wide Area Network (WWAN).
   - To edit an existing WAN or WWAN, click to expand the appropriate WAN or WWAN.
5. After creating or selecting the WAN or WWAN, click **SureLink**.




By default, SureLink is enabled for the preconfigured WAN (**ETH1**) and WWAN (**Modem**). The default configuration tests the DNS servers configured for the interface.

When SureLink is configured for Wireless WANs, SureLink tests are only run if the cellular modem is connected and has an IP address. Use the **SIM failover** options to configure the Connect EZ 16/32 device to automatically recover the modem in the event that it cannot obtain an IP address. See Configure a Wireless Wide Area Network (WWAN) for details about **SIM failover**.

6. (Optional) Change the **Test interval** between connectivity tests.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

   For example, to set **Interval** to ten minutes, enter **10m** or **600s**.

   The default is 15 minutes.
7. (Optional) If more than one test target is configured, for **Success condition**, select either:
   - **One test passes**: Only one test needs to pass for Surelink to consider an interface to be up.
   - **All test pass**: All tests need to pass for SureLink to consider the interface to be up.
8. (Optional) For **Pass threshold**, type or select the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.
9. (Optional) For **Response timeout**, type the amount of time that the device should wait for a response to a test failure before considering it to have failed.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

For example, to set **Response timeout** to ten minutes, enter **10m** or **600s**.

The default is 15 seconds.

10. Click to expand **Tests**.

    By default, **Test DNS servers configured for this interface** is automatically configured and enabled. This test communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

    a. Click ✚.

    New tests are enabled by default. To disable, click to toggle off **Enable**.

    b. Type a **Label** for the test.

    c. Click to toggle on **IPv6** if the test should apply to both IPv6 rather than IPv4.

    d. Select the **Test type**.

    Available test types:

    - **Ping test**: Uses ICMP to determine connectivity.

      If **Ping test** is selected, complete the following:

      - **Ping target:** The type of target for the ping, one of:
        - **Hostname or IP address** of an external server.
          - **Ping host**: hostname or IP address of the server.
        - The **Interface gateway**. If **Interface gateway** is selected, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
        - The **Interface address**.
        - The **Interface DNS** server.
      - **Ping payload size:** The number of bytes to send as part of the ping payload.
    - **DNS test**: Performs a DNS query to the named DNS server.

      If **DNS test** is selected, complete the following:

      - **DNS server**: The IP address of the DNS server.
    - **HTTP test**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.

      If **HTTP test** is selected, complete the following:

      - **Web server**: The URL of the web server.
    - **Test DNS servers configured for this interface**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
    - **Test the interface status**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

If **Test the interface status** is selected, complete the following:

- **Down time**: The amount of time that the interface is down before the test can be considered to have failed.

  Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

  For example, to set **Down time** to ten minutes, enter **10m** or **600s**.
- **Initial connection time**: The amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

  Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

  For example, to set **Initial connection time** to ten minutes, enter **10m** or **600s**.

- **Custom test**: Tests the interface with custom commands.

  If **Custom test** is selected, complete the following:

  - The **Commands to run to test**.
- **TCP connection test**: Tests that the interface can reach a destination port on the configured host.

  If **TCP connection test** is selected, complete the following:

  - **TCP connect host**: The hostname or IP address of the host to create a TCP connection to.
  - **TCP connect port**: The TCP port to create a TCP connection to.
- **Test another interface's status**: Tests the status of another interface.

  If **Test another interface's status** is selected, complete the following:

  - **Test interface**: The interface to test.
  - **IP version**: The type of IP connection, one of:
    - **Any**: Either the IPv4 or IPv6 connection must be up.
    - **Both**: Both the IPv4 or IPv6 connection must be up.
    - **IPv4**: The IPv4 connection must be up.
    - **IPv6**: The IPv6 connection must be up.
  - **Expected status**: The status required for the test to past.
    - **Up**: The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
    - **Down**: The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

e. Repeat for each additional test.

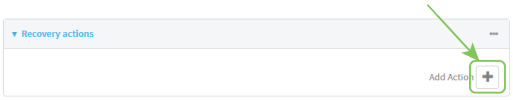
11. Add recovery actions:

    a. Click to expand **Recovery actions**.

    By default, there are two preconfigured recovery actions:

    - **Update routing**: Uses the **Change default gateway** action, which increases the interface's metric by 100 to change the default gateway.
    - **Restart interface**.

b. Click ✚.




New recovery actions are enabled by default. To disable, click to toggle off **Enable**.

c. Type a **Label** for the recovery action.

d. For **Recovery type**, select **Reboot device**.

e. For **Recovery type**, select the type of recovery action. If multiple recovery actions are configured, they are performed in the order that they are listed.

- **Change default gateway**: Increases the interface's metric to change the default gateway.

  If **Change default gateway** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Increase metric to change active default gateway**: Increase the interface's metric by this amount. This should be set to a number large enough to change the routing table to use another default gateway. The default is **100**.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Restart interface**.

  If **Restart interface** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Reset modem**: This recovery action is available for WWAN interfaces only.

  If **Reset modem** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Switch to alternate SIM**: Switches to an alternate SIM. This recovery action is available for WWAN interfaces only.

  If **Switch to alternate SIM** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Reboot device**.

  If **Reboot device** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- Execute custom **Recovery commands**.

  If **Recovery commands** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - The **Commands to run to recovery connectivity**.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Powercycle the modem**. This recovery action is available for WWAN interfaces only.

  If **Powercycle the modem** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

f. Repeat for each additional recovery action.

12. (Optional) Configure advanced SureLink parameters:

    a. Click to expand **Advanced settings**.

    b. For **Delayed Start**, type the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Delayed start** to ten minutes, enter **10m** or **600s**.

    The default is 300 seconds.

    c. For **Backoff interval**, type the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Backoff interval** to ten minutes, enter **10m** or **600s**.

    The default is 300 seconds.

    d. **Test interface gateway by pinging** is used by the **Interface gateway Ping test** as the endpoint for traceroute to use to determine the interface gateway. The default is 8.8.8.8, and should only be changed if this IP address is not accessible due to networking issues.

13. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new WAN or WWAN, or edit an existing one:
   - To create a new WAN or WWAN, see Configure a Wide Area Network (WAN) or Configure a Wireless Wide Area Network (WWAN).
   - To edit an existing WAN or WWAN, change to the WAN or WWAN's node in the configuration schema. For example, for a WAN or WWAN named **my_wan**, change to the **my_wan** node in the configuration schema:

```
(config)> network interface my_wan
(config network interface my_wan)>
```

4. Enable SureLink.

   By default, SureLink is enabled for the preconfigured WAN (eth1) and WWAN (modemwwan2). The default configuration tests the DNS servers configured for the interface.

   When SureLink is configured for Wireless WANs, SureLink tests are only run if the cellular modem is connected and has an IP address. Use the **SIM failover** options to configure the Connect EZ 16/32 device to automatically recover the modem in the event that it cannot obtain an IP address. See Configure a Wireless Wide Area Network (WWAN) for details about **SIM failover**.

```
(config network interface my_wan)> surelink enable true
(config network interface my_wan)>
```

5. By default, the **Test DNS servers configured for this interface** test is automatically configured and enabled. This tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

   To add additional tests:

   a. Add a test:

```
(config network interface my_wan)> add surelink tests end
(config network interface my_wan surelink tests 1)>
```

   b. New tests are enabled by default. To disable:

```
(config network interface my_wan surelink tests 1)> enable false
(config network interface my_wan surelink tests 1)>
```

c. Create a label for the test:

```
(config network interface my_wan surelink tests 1)> label string
(config network interface my_wan surelink tests 1)>
```

d. if the test should apply to both IPv6 rather than IPv4, enable IPv6:

```
(config network interface my_wan surelink tests 1)> ipv6 true
(config network interface my_wan surelink tests 1)>
```

e. Set the test type:

```
(config network interface my_wan surelink tests 1)> test value
(config network interface my_wan surelink tests 1)>
```

where *value* is one of:

- **ping**: Uses ICMP to determine connectivity.

  If **ping** is selected, complete the following:

  - Set the **ping_method**:

    ```
    (config network interface my_wan surelink tests 1)> ping_
    method value
    (config network interface my_wan surelink tests 1)>
    ```

    where *value* is one of:

    - **hostname**: The hostname or IP address of an external server.
      - Set **ping_host** to the hostname or IP address of the server:

        ```
        (config network interface my_wan surelink tests 1)> ping_
        host hostname/IP_address
        (config network interface my_wan surelink tests 1)>
        ```

    - **interface_gateway**. If set, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
    - **interface_address**.
    - **interface_dns**: The interface's DNS server.

  - Set the number of bytes to send as part of the ping payload:

    ```
    (config network interface my_wan ipsec tunnel ipsec_example
    surelink tests 1)> ping_size int
    (config network interface my_wan surelink tests 1)>
    ```

- **dns**: Performs a DNS query to the named DNS server.

  If **dns** is set, set the IPv4 or IPv6 address of the DNS server:

  ```
  (config network interface my_wan surelink tests 1)> dns_server
  IP_address
  (config network interface my_wan surelink tests 1)>
  ```

- **http**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.

  If **http** is set, set the URL of the web server.

  ```
  (config network interface my_wan surelink tests 1)> http url
  (config network interface my_wan surelink tests 1)>
  ```

- **dns_configured**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **interface_up**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

  If **interface_up** is set, complete the following:

  - Set the amount of time that the interface is down before the test can be considered to have failed.

    ```
    (config network interface my_wan surelink tests 1)>
    interface_down_time value
    (config network interface my_wan surelink tests 1)>
    ```

    where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

    For example, to set **interface_down_time** to ten minutes, enter either **10m** or **600s**:

    ```
    (config network interface my_wan surelink tests 1)>
    interface_down_time 600s
    (config)>
    ```

  - Set the amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

    ```
    (config network interface my_wan surelink tests 1)>
    interface_timeout value
    (config network interface my_wan surelink tests 1)>
    ```

    where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

    For example, to set **interface_timeout** to ten minutes, enter either **10m** or **600s**:

    ```
    (config network interface my_wan surelink tests 1)>
    interface_timeout 600s
    (config)>
    ```

- **custom_test**: Tests the interface with custom commands.

  If **custom_test** is set, set the commands to run to perform the test:

```
(config network interface my_wan  surelink tests 1)> custom_
test_commands "string"
(config network interface my_wan surelink tests 1)>
```

- **tcp_connection**: Tests that the interface can reach a destination port on the configured host.

  If **tcp_connection** is selected, complete the following:

  - Set the hostname or IP address of the host to create a TCP connection to:

    ```
    (config network interface my_wan surelink tests 1)> tcp_host
    hostname/IP_address
    (config network interface my_wan surelink tests 1)>
    ```

  - Set the TCP port to create a TCP connection to.

    ```
    (config network interface my_wan surelink tests 1)> tcp_port
    port
    (config network interface my_wan surelink tests 1)>
    ```

- **other**: Tests the status of another interface.

  If **other** is selected, complete the following:

  - Set the interface to test.
    i. Use the **?** to determine available interfaces:
    ii. Set the interface. For example:

    ```
    (config network interface my_wan surelink tests 1)> other_
    interface /network/interface/eth1
    (config network interface my_wan surelink tests 1)>
    ```

  - Set the type of IP connection:

    ```
    (config network interface my_wan surelink tests 1)> other_ip_
    version value
    (config network interface my_wan surelink tests 1)>
    ```

    where *value* is one of:

    - **any**: Either the IPv4 or IPv6 connection must be up.
    - **both**: Both the IPv4 or IPv6 connection must be up.
    - **ipv4** The IPv4 connection must be up.
    - **ipv6**: The IPv6 connection must be up.

  - The status required for the test to past.

    ```
    (config network interface my_wan surelink tests 1)> other_
    status value
    (config network interface my_wan surelink tests 1)>
    ```

    where *value* is one of:

- **up**: The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
- **down**: The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

f. Repeat for each additional test.

6. Add recovery actions:

a. Type **...** to return to the root of the configuration:

```
(config network interface my_wan surelink tests 1)> ...
(config)>
```

b. Add a recovery action:

```
(config)> add network interface my_wan surelink actions end
(config network interface my_wan surelink actions 0)>
```

c. New actions are enabled by default. To disable:

```
(config network interface my_wan surelink actions 0)> enable false
(config network interface my_wan surelink actions 0)>
```

d. Create a label for the action:

```
(config network interface my_wan surelink actions 0)> label string
(config network interface my_wan surelink actions 0)>
```

e. Set the type of recovery action. If multiple recovery actions are configured, they are performed in the order that they are listed. The command varies depending on whether the interface is a WAN or WWAN:

- WAN interfaces:

```
(config network interface my_wan surelink actions 0)> action
value
(config network interface my_wan surelink actions 0)>
```

- WWAN interfaces:

```
(config network interface my_wan surelink actions 0)> modem_
action value
(config network interface my_wan surelink actions 0)>
```

where *value* is one of:

- **update_routing_table**: Increases the interface's metric to change the default gateway.

  If **update_routing_table** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wan surelink actions 0)> test_
failures int
(config network interface my_wan surelink actions 0)>
```

The default is **3**.

- Set the amount that the interface's metric should be increased. This should be set to a number large enough to change the routing table to use another default gateway.

```
(config network interface my_wan surelink actions 0)> metric_
adjustment_modem int
(config network interface my_wan surelink actions 0)>
```

The default is **100**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wan surelink actions 0)>
override_interval int
(config network interface my_wan surelink actions 0)>
```

- **restart_interface**.

  If **restart_interface** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wan surelink actions 0)> test_
failures int
(config network interface my_wan surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wan surelink actions 0)>
override_interval int
(config network interface my_wan surelink actions 0)>
```

- **reset_modem**: This recovery action is available for WWAN interfaces only.

  If **reset_modem** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wan surelink actions 0)> test_
failures int
(config network interface my_wan surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wan surelink actions 0)>
override_interval int
(config network interface my_wan surelink actions 0)>
```

- **switch_sim**: Switches to an alternate SIM. This recovery action is available for WWAN interfaces only.

  If **switch_sim** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wan surelink actions 0)> test_
failures int
(config network interface my_wan surelink actions 0)>
```

    The default is **3**.

  - Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wan surelink actions 0)>
override_interval int
(config network interface my_wan surelink actions 0)>
```

- **modem_power_cycle**: This recovery action is available for WWAN interfaces only.

  If **modem_power_cycle** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wan surelink actions 0)> test_
failures int
(config network interface my_wan surelink actions 0)>
```

    The default is **3**.

  - Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wan surelink actions 0)>
override_interval int
(config network interface my_wan surelink actions 0)>
```

- **reboot_device**.

  If **reboot_device** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wan surelink actions 0)> test_
failures int
(config network interface my_wan surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wan surelink actions 0)>
override_interval int
(config network interface my_wan surelink actions 0)>
```

- **custom_action**: Execute custom recovery commands.

  If **custom_action** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wan surelink actions 0)> test_
failures int
(config network interface my_wan surelink actions 0)>
```

The default is **3**.

- Set the commands to run to attempt to recovery connectivity.

```
(config network interface my_wan surelink actions 0)> custom_
action_commands_modem "string"
(config network interface my_wan surelink actions 0)>
```

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wan surelink actions 0)>
override_interval int
(config network interface my_wan surelink actions 0)>
```

f. Repeat for each additional recovery action.

7. Optional SureLink configuration parameters:

a. Type **...** to return to the root of the configuration:

```
(config network interface my_wan surelink actions 0)> ...
(config)>
```

b. Set the test interval between connectivity tests:

```
(config)> network interface my_wan surelink interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wan surelink interval 600s
(config)>
```

The default is **15m**.

c. If more than one test target is configured, set the success condition:

```
(config)> network interface my_wan surelink success_condition value
(config)>
```

where *value* is either:

- **one**: Only one test needs to pass for Surelink to consider an interface to be up.
- **all**: All tests need to pass for SureLink to consider the interface to be up.

d. Set the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.

```
(config)> network interface my_wan surelink pass_threshold int
(config)>
```

The default is **1**.

e. Set the amount of time that the device should wait for a response to a test failure before considering it to have failed:

```
(config)> network interface my_wan surelink timeout value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wan surelink timeout 600s
(config)>
```

The default is **15s**.

f. Set the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.

```
(config)> network interface my_wan surelink advanced delayed_start
value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **delayed_start** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wan surelink advanced delayed_start
600s
(config)>
```

The default is **300s**.

g. Set the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.

```
(config)> network interface my_wan surelink advanced backoff_interval
value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **backoff_interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wan surelink advanced backoff_interval
600s
(config)>
```

The default is 300 seconds.

h. The **interface_gateway** parameter is used by the Interface gateway Ping test as the endpoint for traceroute to use to determine the interface gateway. The default is **8.8.8.8**, and should only be changed if this IP address is not accessible due to networking issues. To set to an alternate host:

```
(config)> network interface my_wan surelink advanced interface_gateway
hostname/IP_address
(config)>
```

8. Save the configuration and apply the change.

```
(config network interface my_wan ipv4 surelink)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure the device to reboot when a failure is detected

Using SureLink, you can configure the Connect EZ 16/32 device to reboot when it has determined that an interface has failed.

#### Required configuration items

- Enable SureLink.

  By default, SureLink is enabled for the preconfigured WAN (**ETH1**) and WWAN (**Modem**). The default configuration tests the DNS servers configured for the interface.

  When SureLink is configured for Wireless WANs, SureLink tests are only run if the cellular modem is connected and has an IP address. Use the **SIM failover** options to configure the Connect EZ 16/32 device to automatically recover the modem in the event that it cannot obtain an IP address. See Configure a Wireless Wide Area Network (WWAN) for details about **SIM failover**.

- Enable device reboot upon interface failure.

- The type of tests to be performed:
  - **Ping test**: Uses ICMP to determine connectivity. The default behavior is to ping the interface gateway, which means that an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
  - **DNS test**: Performs a DNS query to the named DNS server.
  - **HTTP test**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.
  - **Test DNS servers configured for this interface**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
  - **Test the interface status**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.
  - **Custom test**: Tests the interface with custom commands.
  - **TCP connection test**: Tests that the interface can reach a destination port on the configured host.
  - **Test another interface's status**: Tests the status of another interface.

**Additional configuration items**

- See Configure SureLink active recovery to detect WAN/WWAN failures for optional SureLink configuration parameters.

To configure the Connect EZ 16/32 device to reboot when an interface has failed:

## Web

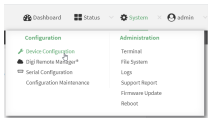
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

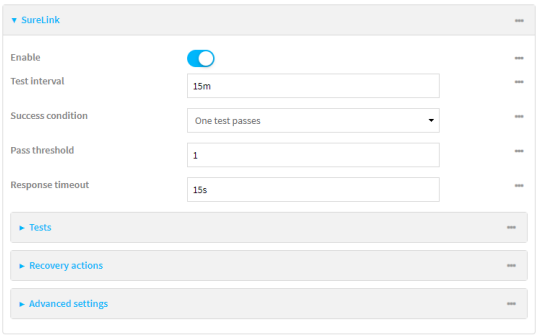
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces**.

4. Create a new interface or select an existing one:
   - To create a new interface, see Configure a Local Area Network (LAN), Configure a Wide Area Network (WAN), or Configure a Wireless Wide Area Network (WWAN).
   - To edit an existing interface, click to expand the appropriate interface.
5. After creating or selecting the interface, click **SureLink**.




   By default, SureLink is enabled for the preconfigured WAN (**ETH1**) and WWAN (**Modem**). The default configuration tests the DNS servers configured for the interface.

   When SureLink is configured for Wireless WANs, SureLink tests are only run if the cellular modem is connected and has an IP address. Use the **SIM failover** options to configure the Connect EZ 16/32 device to automatically recover the modem in the event that it cannot obtain an IP address. See Configure a Wireless Wide Area Network (WWAN) for details about **SIM failover**.
6. (Optional) Change the **Test interval** between connectivity tests.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

   For example, to set **Interval** to ten minutes, enter **10m** or **600s**.

   The default is 15 minutes.
7. (Optional) If more than one test target is configured, for **Success condition**, select either:
   - **One test passes**: Only one test needs to pass for Surelink to consider an interface to be up.
   - **All test pass**: All tests need to pass for SureLink to consider the interface to be up.
8. (Optional) For **Pass threshold**, type or select the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.
9. (Optional) For **Response timeout**, type the amount of time that the device should wait for a response to a test failure before considering it to have failed.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

   For example, to set **Response timeout** to ten minutes, enter **10m** or **600s**.

   The default is 15 seconds.
10. Click to expand **Tests**.

    By default, **Test DNS servers configured for this interface** is automatically configured and enabled. This test communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

a. Click ✚.

New tests are enabled by default. To disable, click to toggle off **Enable**.

b. Type a **Label** for the test.

c. Click to toggle on **IPv6** if the test should apply to both IPv6 rather than IPv4.

d. Select the **Test type**.

Available test types:

- **Ping test**: Uses ICMP to determine connectivity.

  If **Ping test** is selected, complete the following:

  - **Ping target:** The type of target for the ping, one of:
    - **Hostname or IP address** of an external server.
      - **Ping host**: hostname or IP address of the server.
    - The **Interface gateway**. If **Interface gateway** is selected, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
    - The **Interface address**.
    - The **Interface DNS** server.
  - **Ping payload size:** The number of bytes to send as part of the ping payload.
- **DNS test**: Performs a DNS query to the named DNS server.

  If **DNS test** is selected, complete the following:

  - **DNS server**: The IP address of the DNS server.
- **HTTP test**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.

  If **HTTP test** is selected, complete the following:

  - **Web server**: The URL of the web server.
- **Test DNS servers configured for this interface**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **Test the interface status**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

  If **Test the interface status** is selected, complete the following:

  - **Down time**: The amount of time that the interface is down before the test can be considered to have failed.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Down time** to ten minutes, enter **10m** or **600s**.
  - **Initial connection time**: The amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

For example, to set **Initial connection time** to ten minutes, enter **10m** or **600s**.

- **Custom test**: Tests the interface with custom commands.

  If **Custom test** is selected, complete the following:

  - The **Commands to run to test**.

- **TCP connection test**: Tests that the interface can reach a destination port on the configured host.

  If **TCP connection test** is selected, complete the following:

  - **TCP connect host**: The hostname or IP address of the host to create a TCP connection to.
  - **TCP connect port**: The TCP port to create a TCP connection to.

- **Test another interface's status**: Tests the status of another interface.

  If **Test another interface's status** is selected, complete the following:

  - **Test interface**: The interface to test.
  - **IP version**: The type of IP connection, one of:
    - **Any**: Either the IPv4 or IPv6 connection must be up.
    - **Both**: Both the IPv4 or IPv6 connection must be up.
    - **IPv4**: The IPv4 connection must be up.
    - **IPv6**: The IPv6 connection must be up.
  - **Expected status**: The status required for the test to past.
    - **Up**: The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
    - **Down**: The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

e. Repeat for each additional test.

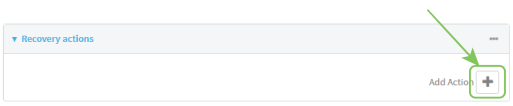
11. Add recovery actions:

a. Click to expand **Recovery actions**.

By default, there are two preconfigured recovery actions:

- **Update routing**: Uses the **Change default gateway** action, which increases the interface's metric by 100 to change the default gateway.
- **Restart interface**.

b. Click ✚.




New recovery actions are enabled by default. To disable, click to toggle off **Enable**.

c. Type a **Label** for the recovery action.

d. For **Recovery type**, select **Reboot device**.

e. For **Recovery type**, select the type of recovery action. If multiple recovery actions are configured, they are performed in the order that they are listed.

- **Change default gateway**: Increases the interface's metric to change the default gateway.

  If **Change default gateway** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Increase metric to change active default gateway**: Increase the interface's metric by this amount. This should be set to a number large enough to change the routing table to use another default gateway. The default is **100**.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Restart interface**.

  If **Restart interface** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Reset modem**: This recovery action is available for WWAN interfaces only.

  If **Reset modem** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Switch to alternate SIM**: Switches to an alternate SIM. This recovery action is available for WWAN interfaces only.

  If **Switch to alternate SIM** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Reboot device**.

  If **Reboot device** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- Execute custom **Recovery commands**.

  If **Recovery commands** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - The **Commands to run to recovery connectivity**.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
- **Powercycle the modem**. This recovery action is available for WWAN interfaces only.

  If **Powercycle the modem** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

f. Repeat for each additional recovery action.

12. (Optional) Configure advanced SureLink parameters:
    a. Click to expand **Advanced settings**.
    b. For **Delayed Start**, type the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.

       Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

       For example, to set **Delayed start** to ten minutes, enter **10m** or **600s**.

       The default is 300 seconds.
    c. For **Backoff interval**, type the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.

       Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

       For example, to set **Backoff interval** to ten minutes, enter **10m** or **600s**.

       The default is 300 seconds.
    d. **Test interface gateway by pinging** is used by the **Interface gateway Ping test** as the endpoint for traceroute to use to determine the interface gateway. The default is 8.8.8.8, and should only be changed if this IP address is not accessible due to networking issues.
13. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new interface, or edit an existing one:
   - To create a new interface, see Configure a Local Area Network (LAN), Configure a Wide Area Network (WAN), or Configure a Wide Area Network (WAN) or Configure a Wireless Wide Area Network (WWAN).
   - To edit an existing interface, change to the interface's node in the configuration schema. For example, for a interface named **my_wan**, change to the **my_wan** node in the configuration schema:

```
(config)> network interface my_wan
(config network interface my_wan)>
```

4. Enable SureLink.

   By default, SureLink is enabled for the preconfigured WAN (eth1) and WWAN (modemwwan2). The default configuration tests the DNS servers configured for the interface.

   When SureLink is configured for Wireless WANs, SureLink tests are only run if the cellular modem is connected and has an IP address. Use the **SIM failover** options to configure the Connect EZ 16/32 device to automatically recover the modem in the event that it cannot obtain an IP address. See Configure a Wireless Wide Area Network (WWAN) for details about **SIM failover**.

```
(config network interface my_wan)> surelink enable true
(config network interface my_wan)>
```

5. By default, the **Test DNS servers configured for this interface** test is automatically configured and enabled. This tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

   To add additional tests:

   a. Add a test:

```
(config network interface my_wan)> add surelink tests end
(config network interface my_wan surelink tests 1)>
```

   b. New tests are enabled by default. To disable:

```
(config network interface my_wan surelink tests 1)> enable false
(config network interface my_wan surelink tests 1)>
```

   c. Create a label for the test:

```
(config network interface my_wan surelink tests 1)> label string
(config network interface my_wan surelink tests 1)>
```

d. if the test should apply to both IPv6 rather than IPv4, enable IPv6:

```
(config network interface my_wan surelink tests 1)> ipv6 true
(config network interface my_wan surelink tests 1)>
```

e. Set the test type:

```
(config network interface my_wan surelink tests 1)> test value
(config network interface my_wan surelink tests 1)>
```

where *value* is one of:

- **ping**: Uses ICMP to determine connectivity.

  If **ping** is selected, complete the following:

  - Set the **ping_method**:

    ```
    (config network interface my_wan surelink tests 1)> ping_
    method value
    (config network interface my_wan surelink tests 1)>
    ```

    where *value* is one of:

    - **hostname**: The hostname or IP address of an external server.
      - Set **ping_host** to the hostname or IP address of the server:

        ```
        (config network interface my_wan surelink tests 1)> ping_
        host hostname/IP_address
        (config network interface my_wan surelink tests 1)>
        ```

    - **interface_gateway**. If set, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
    - **interface_address**.
    - **interface_dns**: The interface's DNS server.

  - Set the number of bytes to send as part of the ping payload:

    ```
    (config network interface my_wan ipsec tunnel ipsec_example
    surelink tests 1)> ping_size int
    (config network interface my_wan surelink tests 1)>
    ```

- **dns**: Performs a DNS query to the named DNS server.

  If **dns** is set, set the IPv4 or IPv6 address of the DNS server:

  ```
  (config network interface my_wan surelink tests 1)> dns_server
  IP_address
  (config network interface my_wan surelink tests 1)>
  ```

- **http**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.

  If **http** is set, set the URL of the web server.

```
(config network interface my_wan surelink tests 1)> http url
(config network interface my_wan surelink tests 1)>
```

- **dns_configured**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **interface_up**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

  If **interface_up** is set, complete the following:

  - Set the amount of time that the interface is down before the test can be considered to have failed.

    ```
    (config network interface my_wan surelink tests 1)>
    interface_down_time value
    (config network interface my_wan surelink tests 1)>
    ```

    where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number*{w|d|h|m|s}**.

    For example, to set **interface_down_time** to ten minutes, enter either **10m** or **600s**:

    ```
    (config network interface my_wan surelink tests 1)>
    interface_down_time 600s
    (config)>
    ```

  - Set the amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

    ```
    (config network interface my_wan surelink tests 1)>
    interface_timeout value
    (config network interface my_wan surelink tests 1)>
    ```

    where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number*{w|d|h|m|s}**.

    For example, to set **interface_timeout** to ten minutes, enter either **10m** or **600s**:

    ```
    (config network interface my_wan surelink tests 1)>
    interface_timeout 600s
    (config)>
    ```

- **custom_test**: Tests the interface with custom commands.

  If **custom_test** is set, set the commands to run to perform the test:

```
(config network interface my_wan  surelink tests 1)> custom_
test_commands "string"
(config network interface my_wan surelink tests 1)>
```

- **tcp_connection**: Tests that the interface can reach a destination port on the configured host.

  If **tcp_connection** is selected, complete the following:

  - Set the hostname or IP address of the host to create a TCP connection to:

    ```
    (config network interface my_wan surelink tests 1)> tcp_host
    hostname/IP_address
    (config network interface my_wan surelink tests 1)>
    ```

  - Set the TCP port to create a TCP connection to.

    ```
    (config network interface my_wan surelink tests 1)> tcp_port
    port
    (config network interface my_wan surelink tests 1)>
    ```

- **other**: Tests the status of another interface.

  If **other** is selected, complete the following:

  - Set the interface to test.
    i. Use the **?** to determine available interfaces:
    ii. Set the interface. For example:

    ```
    (config network interface my_wan surelink tests 1)> other_
    interface /network/interface/eth1
    (config network interface my_wan surelink tests 1)>
    ```

  - Set the type of IP connection:

    ```
    (config network interface my_wan surelink tests 1)> other_ip_
    version value
    (config network interface my_wan surelink tests 1)>
    ```

    where *value* is one of:

    - **any**: Either the IPv4 or IPv6 connection must be up.
    - **both**: Both the IPv4 or IPv6 connection must be up.
    - **ipv4** The IPv4 connection must be up.
    - **ipv6**: The IPv6 connection must be up.

  - The status required for the test to past.

    ```
    (config network interface my_wan surelink tests 1)> other_
    status value
    (config network interface my_wan surelink tests 1)>
    ```

    where *value* is one of:

    - **up**: The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
    - **down**: The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

f. Repeat for each additional test.

6. Add recovery actions:
   a. Type **...** to return to the root of the configuration:

```
(config network interface my_wan surelink tests 1)> ...
(config)>
```

   b. Add a recovery action:

```
(config)> add network interface my_wan surelink actions end
(config network interface my_wan surelink actions 0)>
```

   c. New actions are enabled by default. To disable:

```
(config network interface my_wan surelink actions 0)> enable false
(config network interface my_wan surelink actions 0)>
```

   d. Create a label for the action:

```
(config network interface my_wan surelink actions 0)> label string
(config network interface my_wan surelink actions 0)>
```

   e. Set the type of recovery action to **reboot_device**:

```
(config network interface my_wan surelink actions 0)> action reboot_
device
(config network interface my_wan surelink actions 0)>
```

   - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config network interface my_wan surelink actions 0)> test_
failures int
(config network interface my_wan surelink actions 0)>
```

     The default is **3**.
   - Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config network interface my_wan surelink actions 0)> override_
interval int
(config network interface my_wan surelink actions 0)>
```

7. Optional SureLink configuration parameters:
   a. Type **...** to return to the root of the configuration:

```
(config network interface my_wan surelink actions 0)> ...
(config)>
```

   b. Set the test interval between connectivity tests:

```
(config)> network interface my_wan surelink interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wan surelink interval 600s
(config)>
```

The default is **15m**.

c. If more than one test target is configured, set the success condition:

```
(config)> network interface my_wan surelink success_condition value
(config)>
```

where *value* is either:

- **one**: Only one test needs to pass for Surelink to consider an interface to be up.
- **all**: All tests need to pass for SureLink to consider the interface to be up.

d. Set the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.

```
(config)> network interface my_wan surelink pass_threshold int
(config)>
```

The default is **1**.

e. Set the amount of time that the device should wait for a response to a test failure before considering it to have failed:

```
(config)> network interface my_wan surelink timeout value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wan surelink timeout 600s
(config)>
```

The default is **15s**.

f. Set the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.

```
(config)> network interface my_wan surelink advanced delayed_start
value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **delayed_start** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wan surelink advanced delayed_start
600s
(config)>
```

The default is **300s**.

g. Set the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.

```
(config)> network interface my_wan surelink advanced backoff_interval
value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **backoff_interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_wan surelink advanced backoff_interval
600s
(config)>
```

The default is 300 seconds.

h. The **interface_gateway** parameter is used by the Interface gateway Ping test as the endpoint for traceroute to use to determine the interface gateway. The default is **8.8.8.8**, and should only be changed if this IP address is not accessible due to networking issues. To set to an alternate host:

```
(config)> network interface my_wan surelink advanced interface_gateway
hostname/IP_address
(config)>
```

8. Save the configuration and apply the change.

```
(config network interface my_wan ipv4 surelink)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Disable SureLink

If your device uses a private APN with no Internet access or has a restricted WAN connection that doesn't allow DNS resolution, you can disable SureLink connectivity tests. You can also reconfigure SureLink to disable the DNS test and use one or more other tests.

### Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.

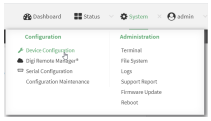
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

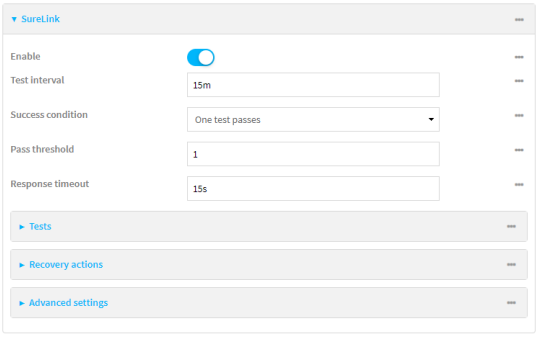
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.

3. Click **Network** > **Interfaces**.
4. Select the appropriate WAN or WWAN on which SureLink should be disabled..
5. After selecting the WAN or WWAN, click **SureLink**.




6. Toggle off **Enable** to disable SureLink.
7. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Change to the WAN or WWAN's node in the configuration schema. For example, to disable SureLink for the Modem interface:

```
(config)> network interface modem
(config network interface modem)>
```

4. Disable SureLink:

```
(config network interface modem> surelink enable false
(config network interface modem)>
```

5. Save the configuration and apply the change.

```
(config network interface my_wwan surelink)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### *Disable the default DNS test*

Alternatively, you can disable the default DNS test for devices that use a private APN with no Internet access, or that have restricted wired WAN connections that do not allow DNS resolution, and configure alternate test.

## Web

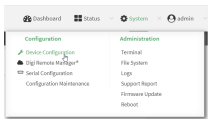
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

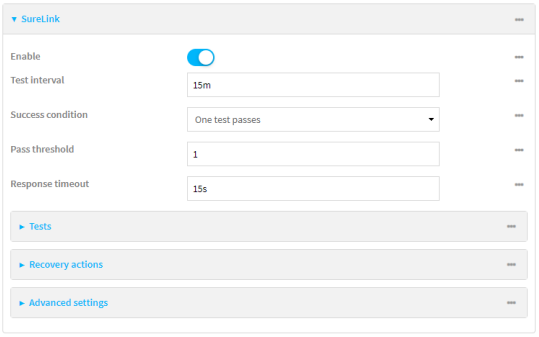
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

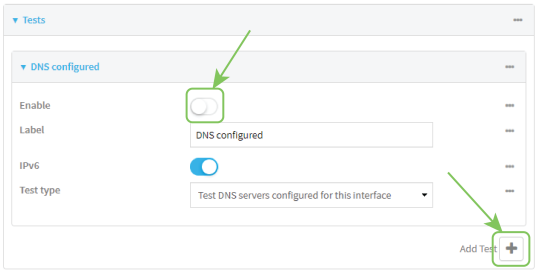
   

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces**.
4. Select the appropriate WAN or WWAN on which the default DNS test should be disabled..

5. After selecting the WAN or WWAN, click **SureLink**.




6. Click to expand **Tests**.
7. Click to expand the default **DNS configured** test.
8. Click to toggle off **Enable**.
9. Click ✚ to add a new test.




10. Type a **Label** for the test.
11. Click to toggle on **IPv6** if the test should apply to both IPv6 rather than IPv4.
12. Select the **Test type**.

    Available test types:

    - **Ping test**: Uses ICMP to determine connectivity.

      If **Ping test** is selected, complete the following:

      - **Ping target:** The type of target for the ping, one of:
        - **Hostname or IP address** of an external server.
          - **Ping host**: hostname or IP address of the server.
        - The **Interface gateway**. If **Interface gateway** is selected, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
        - The **Interface address**.
        - The **Interface DNS** server.
      - **Ping payload size:** The number of bytes to send as part of the ping payload.
    - **DNS test**: Performs a DNS query to the named DNS server.

      If **DNS test** is selected, complete the following:

      - **DNS server**: The IP address of the DNS server.

- **HTTP test**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.

  If **HTTP test** is selected, complete the following:

  - **Web server**: The URL of the web server.
- **Test DNS servers configured for this interface**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **Test the interface status**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

  If **Test the interface status** is selected, complete the following:

  - **Down time**: The amount of time that the interface is down before the test can be considered to have failed.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Down time** to ten minutes, enter **10m** or **600s**.
  - **Initial connection time**: The amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Initial connection time** to ten minutes, enter **10m** or **600s**.
- **Custom test**: Tests the interface with custom commands.

  If **Custom test** is selected, complete the following:

  - The **Commands to run to test**.
- **TCP connection test**: Tests that the interface can reach a destination port on the configured host.

  If **TCP connection test** is selected, complete the following:

  - **TCP connect host**: The hostname or IP address of the host to create a TCP connection to.
  - **TCP connect port**: The TCP port to create a TCP connection to.
- **Test another interface's status**: Tests the status of another interface.

  If **Test another interface's status** is selected, complete the following:

  - **Test interface**: The interface to test.
  - **IP version**: The type of IP connection, one of:
    - **Any**: Either the IPv4 or IPv6 connection must be up.
    - **Both**: Both the IPv4 or IPv6 connection must be up.
    - **IPv4**: The IPv4 connection must be up.
    - **IPv6**: The IPv6 connection must be up.
  - **Expected status**: The status required for the test to past.
    - **Up**: The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).

- **Down**: The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

13. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Change to WAN or WWAN's node in the configuration schema. For example, to disable the default DNS test for an interface named my_wan:

```
(config)> network interface my_wan
(config network interface my_wan)>
```

4. Disable the default DNS test:

```
(config network interface my_wan)> surelink tests 0 enable false
(config network interface my_wan)>
```

5. Add a new test:

   a. Add a test:

```
(config network interface my_wan)> add surelink tests end
(config network interface my_wan surelink tests 1)>
```

   b. Create a label for the test:

```
(config network interface my_wan surelink tests 1)> label string
(config network interface my_wan surelink tests 1)>
```

   c. if the test should apply to both IPv6 rather than IPv4, enable IPv6:

```
(config network interface my_wan surelink tests 1)> ipv6 true
(config network interface my_wan surelink tests 1)>
```

   d. Set the test type:

```
(config network interface my_wan surelink tests 1)> test value
(config network interface my_wan surelink tests 1)>
```

   where *value* is one of:

   - **ping**: Uses ICMP to determine connectivity.

     If **ping** is selected, complete the following:

- Set the **ping_method**:

```
(config network interface my_wan surelink tests 1)> ping_
method value
(config network interface my_wan surelink tests 1)>
```

where *value* is one of:

- **hostname**: The hostname or IP address of an external server.
  - Set **ping_host** to the hostname or IP address of the server:

```
(config network interface my_wan surelink tests 1)> ping_
host hostname/IP_address
(config network interface my_wan surelink tests 1)>
```

- **interface_gateway**. If set, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
- **interface_address**.
- **interface_dns**: The interface's DNS server.

- Set the number of bytes to send as part of the ping payload:

```
(config network interface my_wan ipsec tunnel ipsec_example
surelink tests 1)> ping_size int
(config network interface my_wan surelink tests 1)>
```

- **dns**: Performs a DNS query to the named DNS server.

  If **dns** is set, set the IPv4 or IPv6 address of the DNS server:

```
(config network interface my_wan surelink tests 1)> dns_server
IP_address
(config network interface my_wan surelink tests 1)>
```

- **http**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.

  If **http** is set, set the URL of the web server.

```
(config network interface my_wan surelink tests 1)> http url
(config network interface my_wan surelink tests 1)>
```

- **dns_configured**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **interface_up**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

  If **interface_up** is set, complete the following:

  - Set the amount of time that the interface is down before the test can be considered to have failed.

```
(config network interface my_wan surelink tests 1)>
interface_down_time value
(config network interface my_wan surelink tests 1)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number*{w|d|h|m|s}**.

For example, to set **interface_down_time** to ten minutes, enter either **10m** or **600s**:

```
(config network interface my_wan surelink tests 1)>
interface_down_time 600s
(config)>
```

- Set the amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

```
(config network interface my_wan surelink tests 1)>
interface_timeout value
(config network interface my_wan surelink tests 1)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number*{w|d|h|m|s}**.

For example, to set **interface_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config network interface my_wan surelink tests 1)>
interface_timeout 600s
(config)>
```

- **custom_test**: Tests the interface with custom commands.

  If **custom_test** is set, set the commands to run to perform the test:

```
(config network interface my_wan  surelink tests 1)> custom_
test_commands "string"
(config network interface my_wan surelink tests 1)>
```

- **tcp_connection**: Tests that the interface can reach a destination port on the configured host.

  If **tcp_connection** is selected, complete the following:

  - Set the hostname or IP address of the host to create a TCP connection to:

```
(config network interface my_wan surelink tests 1)> tcp_host
hostname/IP_address
(config network interface my_wan surelink tests 1)>
```

- Set the TCP port to create a TCP connection to.

```
(config network interface my_wan surelink tests 1)> tcp_port
port
(config network interface my_wan surelink tests 1)>
```

- **other**: Tests the status of another interface.

  If **other** is selected, complete the following:

  - Set the interface to test.
    i. Use the **?** to determine available interfaces:
    ii. Set the interface. For example:

```
(config network interface my_wan surelink tests 1)> other_
interface /network/interface/eth1
(config network interface my_wan surelink tests 1)>
```

  - Set the type of IP connection:

```
(config network interface my_wan surelink tests 1)> other_ip_
version value
(config network interface my_wan surelink tests 1)>
```

    where *value* is one of:

    - **any**: Either the IPv4 or IPv6 connection must be up.
    - **both**: Both the IPv4 or IPv6 connection must be up.
    - **ipv4** The IPv4 connection must be up.
    - **ipv6**: The IPv6 connection must be up.

  - The status required for the test to past.

```
(config network interface my_wan surelink tests 1)> other_
status value
(config network interface my_wan surelink tests 1)>
```

    where *value* is one of:

    - **up**: The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
    - **down**: The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

6. Save the configuration and apply the change.

```
(config network interface my_wan ipv4 surelink)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Example: Use a ping test for WAN failover from Ethernet to cellular

In this example configuration, the **ETH1** interface serves as the primary WAN, while the cellular **Modem** interface serves as the backup WAN.

In this example configuration, SureLink is used over for the **ETH1** interface to send a probe packet of size **256** bytes to the IP host **43.66.93.111** every **10** seconds. If there are three consecutive failed responses, the default **Update Routing** recovery action will increase the metric for the **ETH1** interface by 100, which will cause the Connect EZ 16/32 device to start using the **Modem** interface as the default route. It continues to regularly test the connection to **ETH1**, and when tests on **ETH1** succeed, the device falls back to that interface.

To achieve this WAN failover from the **ETH1** to the **Modem** interface, the WAN failover configuration is:

### Web

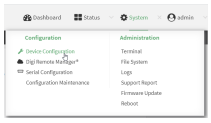
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

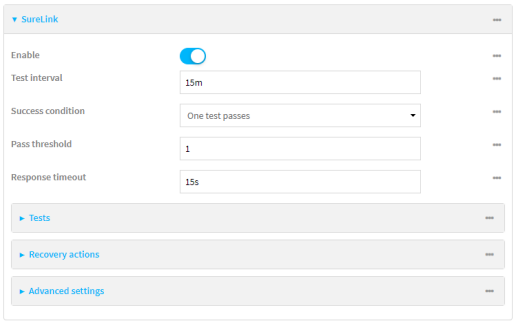
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Configure active recovery on **ETH1**:

   a. Click **Network** > **Interface** > **ETH1** > **SureLink**.

   b. For **Test interval**, type **10s**.

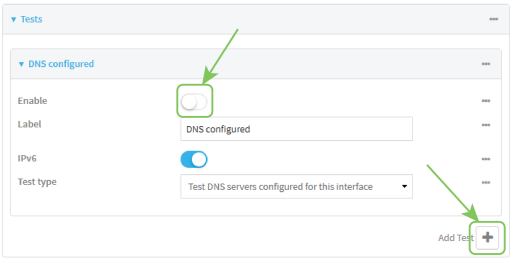
c. Click to expand **Tests**.

d. Disable the default DNS test:

   i. Click to expand the default **DNS configured** test.

   ii. Click to toggle off **Enable**.

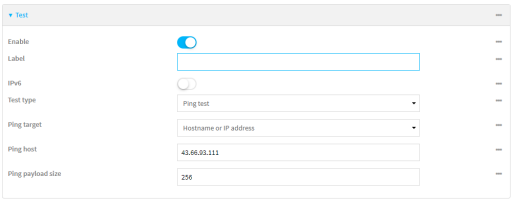
e. Click ✚ to add a new test.




f. For **Test type**, select **Ping test**.

g. For **Ping host**, type **43.66.93.111**.

h. For **Ping payload size**, type **256**.




4. Repeat the above step for **Modem** to enable SureLink on that interface.

5. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Configure SureLink on **ETH1**:

   a. Set the interval to ten seconds:

```
(config)> network interface eth1 surelink interval 10s
(config)>
```

   b. Disable the default DNS test:

```
(config)> network interface eth1 surelink tests 0 enable false
(config)>
```

c. Add a test:

```
(config)> add network interface eth1 surelink tests end
(config network interface eth1 surelink tests 1)>
```

d. Set the probe type to ping:

```
(config network interface eth1 ipv4 surelink tests 1)> test ping
(config network interface eth1 ipv4 surelink tests 1)>
```

e. Set the packet size to 256 bytes:

```
(config network interface eth1 ipv4 surelink tests 1)> ping_size 256
(config network interface eth1 ipv4 surelink tests 1)>
```

f. Set the host to ping:

```
(config network interface eth1 ipv4 surelink tests 1)> ping_host
43.66.93.111
(config network interface eth1 ipv4 surelink tests 1)>
```

1. Repeat the above step for the cellular **Modem** (modem) interface to enable SureLink on that interface. Note that this will cause the interface to send a ping every 10 seconds, which will incur data costs.
4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Using Ethernet devices in a WAN

The Connect EZ 16/32 device has two Ethernet devices, named **ETH1** and **ETH2**. You can use these Ethernet interfaces as a WAN when connecting to the Internet, through a device such as a cable modem:

By default, the **ETH1** Ethernet device is configured as a WAN, named **ETH1**, with both DHCP and NAT enabled and using the **External** firewall zone. This means you should be able to connect to the Internet by connecting the **ETH1** Ethernet port to another device that already has an internet connection.

The **ETH2** device is configured as a LAN interface, named **ETH2**, which uses the **Internal** firewall zone.

## Using cellular modems in a Wireless WAN (WWAN)

The Connect EZ 16/32 supports one cellular modem, named **Modem**, which is included in a preconfigured Wireless WAN, also named **Modem**.

The cellular modem can have only one active SIM slot at any one time. For example, **Modem** can have either SIM1 or SIM2 up at one time.

Typically, you configure SIM1 of the cellular modem as the primary cellular interface, and SIM2 as the backup cellular interface. In this way, if the Connect EZ 16/32 device cannot connect to the network using SIM1, it automatically fails over to SIM2. Connect EZ 16/32 devices automatically use the correct cellular module firmware for each carrier when switching SIMs.

### *Configure cellular modem*

To configure your Connect EZ 16/32's cellular modem, you need to modify the network and SIM settings.

**Required configuration items**

- Enable the cellular modem.

  The cellular modem is enabled by default.
- Determine the SIM slot that will be used when connecting to the cellular network.
- Configure the maximum number of interfaces that can use the modem.
- Enable carrier switching, which allows the modem to automatically match the carrier for the active SIM.

  Carrier switching is enabled by default.
- Configure the access technology.
- Determine which cellular antennas to use.

**Additional configuration items**

- If **Active SIM slot** is set to **Any**, by default the device uses the SIM slot that was last used or was operational. As an alternative, you can specify a preferred SIM slot.

  In the event of a failover to a non-preferred SIM, or if manual SIM switching is used to switch to a non-preferred SIM, the modem will attempt to reconnect to the SIM in the preferred SIM slot.

To configure the modem:

#### Web

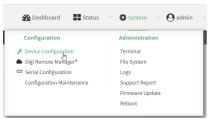
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. For single-cellular models, click **Network** > **Modems** > **WWAN cellular modem** or **Modem**.
4. Click **Network** > **Modems** > **Modem**.
5. Modem configurations are enabled by default. Click to toggle **Enable** to off to disable.
6. The **Active SIM slot** selection is used to determine which SIM slot the modem will attempt to connect with. For **Active SIM slot**, select one of the following options:
   - **Any**: Use the SIM slot that was last used or was last operational. The default is **Any**.
   - **SIM1**: Only use SIM slot 1 with the modem
   - **SIM2**: Only use SIM slot 2 with the modem
7. If you set the **Active SIM slot** to **Any**, the **Preferred SIM slot** option displays. Options for **Preferred SIM slot** are:
   - **None**: The modem attempts to connect to the SIM in the SIM slot that was last used or was last operational. **None** is the default.
   - **SIM slot**: Select the SIM slot that should be considered the preferred slot for this modem. If a preferred SIM is configured, the **Preferred SIM slot check schedule** displays in the configuration settings. In the event of a SIM failover, or if manual SIM switching is used to switch SIM slots, the modem attempts to reconnect to the preferred SIM at the interval or schedule configured in the **Preferred SIM slot check schedule** settings. If a **Preferred SIM slot** is selected, you can choose the type of schedule:
     - **On boot** - Runs task when device starts.
     - **Interval** - Runs task once per hour.
     - **Set time** - Runs task at a set time.
     - **During system maintenance window** - Runs task only during the period of time designated for system maintenance.
     - **Manual** - Task is not performed automatically.
     - **After** - Task runs for a fixed time interval on a different SIM and then goes back to the preferred SIM.
8. For **Maximum number of interfaces**, type the number of interfaces that can be configured to use this modem. This is used when using dual-APN SIMs. The default is **1**.
9. For **Signal strength query interval**, type or select the amount of time the system waits before polling the modem for signal information.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

   For example, to set **Signal strength query interval** to ten minutes, enter **10m** or **600s**.

   The default is **10s**.
10. Enable **Carrier switching** to allow the modem to automatically match the carrier for the active SIM. **Carrier switching** is enabled by default.

11. For **Access technology**, select the type of cellular technology that this modem should use to access the cellular network, or select **All technologies** to configure the modem to use the best available technology. The default is **All technologies**.
12. For **Antennas**, select whether the modem should use the main antenna, the auxiliary antenna, or both the main and auxiliary antennas.

Note For **4G bands**, specify the frequency bands you want to include or exclude. By default, all bands are used. To only use certain bands, separate each band in the list with a space (for example, *B1 B3 B5*). To exclude certain bands, separate each band in the list with a space and precede each band with an exclamation point (for example, *!B1 !B5*).

**CAUTION!** Make sure to confirm with your service provider that the bands you want to include or exclude are accurate. Connection issues may occur if a service provider changed any of the frequency bands they use for their network and you have set limitations on the bands to which the Connect EZ 16/32 can connect.

13. (Optional) For **4G bands**, specify the 4G bands.
14. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Modem configurations are enabled by default. To disable:

```
(config)> network modem modem enable false
(config)>
```

4. Set the SIM slot that should be used by the modem:

```
(config)> network modem modem sim_slot value
(config)>
```

   where *value* is one of the following:

   - **any**: Uses either SIM slot.
   - **1**: Uses the first SIM slot.
   - **2**. Uses the second SIM slot.

   The default is **any**.
5. If **sim_slot** is set to **any**, set the SIM slot that should be considered the preferred slot for this modem:

```
(config)> network modem modem sim_slot_preference value
(config)>
```

where *value* is one of the following:

- **none**: Does not consider either SIM slot to be the preferred slot.
- **1**: Configures the first SIM slot as the preferred SIM slot.
- **2**. Configures the second SIM slot as the preferred SIM slot.

In the event of a failover to a non-preferred SIM, or if manual SIM switching is used to switch to a non-preferred SIM, the modem will attempt to reconnect to the SIM in the preferred SIM slot. The default is **none**.

6. To set the preferred SIM slot check schedule:

```
(config)> network modem modem sim_slot_preference_value
```

where *value* is one of the following:

- **1**: SIM slot 1.
- **2**. SIM slot 2.

```
(config)> ...run-time when value
```

where *value* is one of the following:

- after
- boot
- interval
- maintenance_window
- manual
- set_time

The default is **set_time**.

7. Set the amount of time the system waits before polling the modem for signal information:

```
(config)> network modem modem query_interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **query_interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> network modem wan query_interval  600s
(config)>
```

The default is **10s**.

8. Set the maximum number of interfaces. This is used when using dual-APN SIMs. The default is **1**.

```
(config)> network modem modem max_intfs int
(config)>
```

9. Carrier switching allows the modem to automatically match the carrier for the active SIM. Carrier switching is enabled by default. To disable:

```
(config)> network modem modem carrier_switch false
(config)>
```

10. Set the type of cellular technology that this modem should use to access the cellular network:

```
(config)> network modem modem access_tech value
(config)>
```

Available options for *value* vary depending on the modem type. To determine available options:

```
(config)> network modem modem access_tech ?

Access technology: The cellular network technology that the modem may
use.
Format:
    2G
    3G
    4G
    4GM
    4GT
    all
Default value: all
Current value: all

(config)>
```

The default is **all**, which uses the best available technology.

11. Set whether the modem should use the main antenna, the auxiliary antenna, or both the main and auxiliary antennas:

```
(config)> network modem modem antenna value
(config)>
```

where *value* is one of the following:

- **main**
- **aux**
- **both**

12. (Optional) To specify the 4G bands you want to include or exclude:

```
(config)> network modem modem 4g_bands
(config)>
```

13. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

14. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### Cellular modem APNs

The Connect EZ 16/32 device uses a preconfigured list of Access Point Names (APNs) when attempting to connect to a cellular carrier for the first time. You can find the `serviceproviders-local.txt` and `serviceproviders.txt` files in the filesystem of the Connect EZ 16/32. The order of the APNs for a specific carrier in these text files corresponds to the order in which the Connect EZ 16/32 will try those APNS until it makes a successful connection. After the device has successfully connected, it will remember the correct APN. As a result, it is not necessary to configure APNs. However, you can configure the system to use a specified APN if you choose to do so.

### Configure cellular modem APNs

To configure the APN:

#### Web

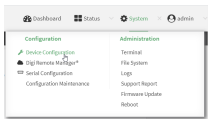
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

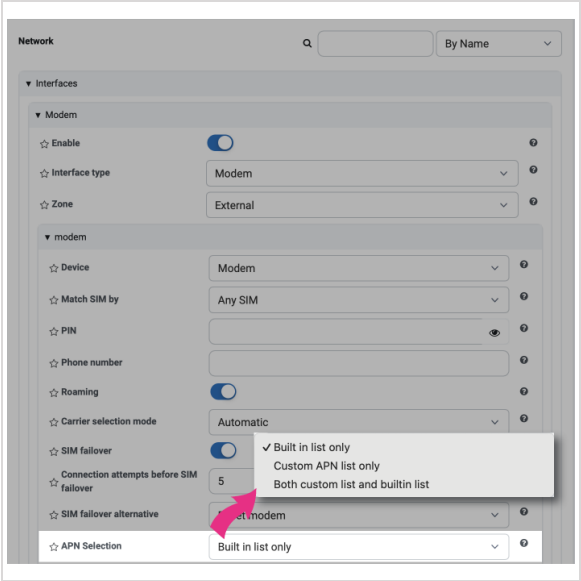
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. For your single-cellular Connect EZ 16/32, click **Network** > **Interfaces** > **Modem** > **modem** > **APN Selection**.




4. For **APN Selection**, select whether you want your Connect EZ 16/32 to use the preconfigured APNs, custom APNs, or both.
   a. If you selected either the *Custom APN list only* or the *Both custom list and builtin list*, click ✚ to add an APN.
   b. (Optional) For **APN**, add a name.
   c. (Optional) For **IP version**, select one of the following settings:
      - **Automatic**: Requests both IPv4 and IPv6 address.
      - **IPv4**: Requests only an IPv4 address.
      - **IPv6**: Requests only an IPv6 address.

      The default is **Automatic**.
   d. (Optional) For **Authentication method**, select one of the following settings:
      - **None**: No authentication is required.
      - **Automatic**: The device will attempt to connect using CHAP first, and then PAP.
      - **CHAP**: Uses the Challenge Handshake Authentication Profile (CHAP) to authenticate.
      - **PAP**: Uses the Password Authentication Profile (PAP) to authenticate.

      If **Automatic**, **CHAP**, or **PAP** is selected, enter the **Username** and **Password** required to authenticate.

      The default is **None**.
   e. (Optional)For **PDP context index**, type the number for the index of the SIM card that the APN is programmed into. The default is **0** so the index is set automatically.
   f. **Lightweight M2M support** is enabled by default. Disable if you are using an AT&T SIM that does not support AT&T lightweight M2M.
   g. Repeat these steps to add additional APNs, if needed.
5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> network interface modem modem apn 0 apn value
(config)>
```

   where *value* is the APN for the SIM card.
4. (Optional) To add additional APNs:
   a. Use the **add** command to add a new APN entry. For example:

```
(config)> add network interface modem modem apn end
(config network interface modem modem apn 1)>
```

   b. Set the value of the APN:

```
(config network interface modem modem apn 1)> apn value
(config network interface modem modem apn 1)>
```

      where value is the APN for the SIM card.
5. (Optional) Set the IP version:

```
(config)> network interface modem modem apn 0 ip_version version
(config)>
```

   where *version* is one of the following:
   - **auto**: Requests both IPv4 and IPv6 address.
   - **ipv4**: Requests only an IPv4 address.
   - **ipv6**: Requests only an IPv6 address.

   The default is **auto**.
6. (Optional) Set the PDP context index:

```
(config network interface wwan1 modem apn 0) > cid value
(config network interface wwan1 modem apn 0) >
```

   where *value* is the index number of the SIM that the APN is programmed into. *0* means the index will be automatically set.
7. (Optional) Set the authentication method:

```
(config)> network interface modem modem apn 0 auth method
(config)>
```

where *method* is one of the following:

- **none**: No authentication is required.
- **auto**: The device will attempt to connect using CHAP first, and then PAP.
- **chap**: Uses the Challenge Handshake Authentication Profile (CHAP) to authenticate.
- **pap**: Uses the Password Authentication Profile (PAP) to authenticate.

If **auto**, **chap**, or **pap** is selected, enter the **Username** and **Password** required to authenticate:

```
(config)> network interface modem modem apn 0 username name
(config)> network interface modem modem apn 0 password pwd
(config)>
```

The default is **none**.

8. Disable Lightweight M2M support if you are using an AT&T SIM that does not support AT&T lightweight M2M:

```
(config)> network interface modem modem apn 0 attm2mglobal false
(config)>
```

9. (Optional) To configure the device to use either the preconfigured APNs, custom APNs, or both:

```
(config)> network interface modem modem apn_selection value
(config)>
```

Where *value* is one of the following:

- apn_list_only
- both_lists
- built-in-list-only

10. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### *Configure dual APNs*

Some cellular carriers offer a dual APN feature that allows a SIM card to be provisioned with two separate APNs that can be used simultaneously. For example, Verizon offers this service as its Split Data Routing feature. This feature provides two separate networking paths through a single cellular modem and SIM card, and allows for configurations such as:

- Segregating public and private traffic, including policy-based routes to ensure that your internal network traffic always goes through the private connection.
- Separation of untrusted Internet traffic from trusted internal network traffic.
- Secure connection to internal customer network without using a VPN.

- Separate billing structures for public and private traffic.
- Site-to-site networking, without the overhead of tunneling for each device.

In the following example configuration, all traffic on LAN1 is routed through the public APN to the internet, and all traffic on LAN2 is routed through the private APN to the customer's data center:

To accomplish this, we will create separate WWAN interfaces that use the same modem but use different APNs, and then use routing roles to forward traffic to the appropriate WWAN interface.

**Note** Dual-APN connections with the Telit LE910-NAv2 module when using a Verizon SIM are not supported. Using an AT&T SIM with the Telit LE910-NAv2 module is supported. The Telit LE910-NAv2 module is used in the 1002-CM04 CORE modem.

## Web

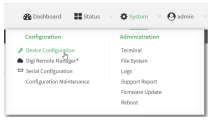
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

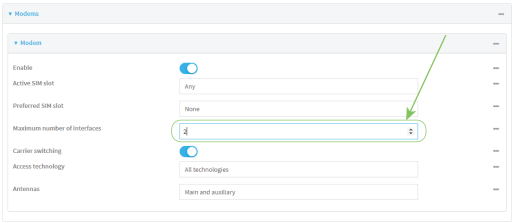
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

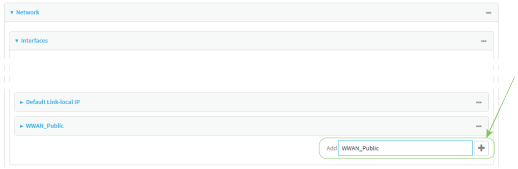
   The **Configuration** window is displayed.
3. Increase the maximum number of interfaces allowed for the modem:
   a. Click **Network** > **Modems** > **Modem**.
   b. For **Maximum number of interfaces**, type **2**.

   
4. Create the WWAN interfaces:

   In this example, we will create two interfaces named **WWAN_Public** and **WWAN_Private**.

a. Click **Network** > **Interfaces**.

b. For **Add Interface**, type **WWAN_Public** and click ✚.



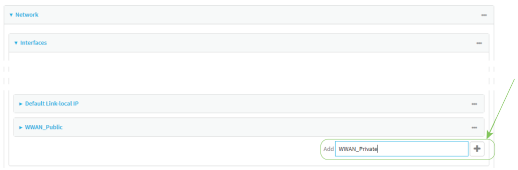
c. For **Interface type**, select **Modem**.

d. For **Zone**, select **External**.

e. For **Device**, select **Modem** .

f. (Optional) For **APN selection**, select whether you want to configure the device to use the preconfigured APNs, custom APNs, or both.

g. For **Add Interface**, type **WWAN_Private** and click ✚.



h. For **Interface type**, select **Modem**.

i. For **Zone**, select **External**.

j. For **Device**, select **Modem** .

This should be the same modem selected for the **WWAN_Public** WWAN.

k. For **APN selection**, select whether you want to configure the device to use the preconfigured APNs, custom APNs, or both.

5. Create the routing policies. For example, to route all traffic from LAN1 through the public APN, and LAN2 through the private APN:

a. Click **Network** > **Routes** > **Policy-based routing**.

b. Click the ✚ to add a new route policy.

c. For **Label**, enter **Route through public APN**.

d. For **Interface**, select **Interface: WWAN_Public**.

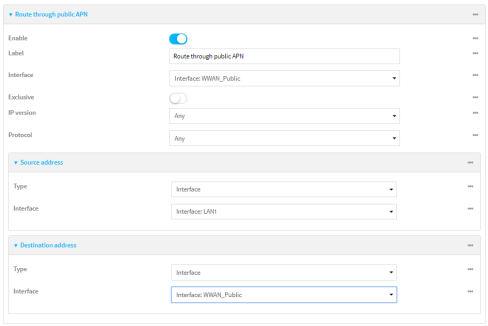
e. Configure the source address:

i. Click to expand **Source address**.

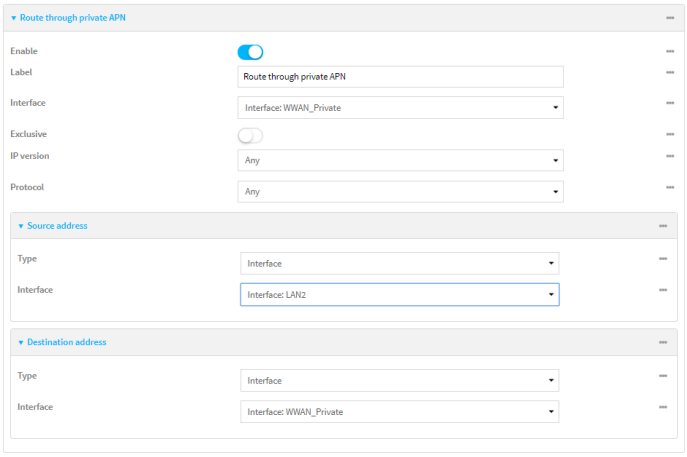
ii. For **Type**, select **Interface**.

iii. For **Interface**, select **LAN1**.

f. Configure the destination address:
   i. Click to expand **Destination address**.
   ii. For **Type**, select **Interface**.
   iii. For **Interface**, select **Interface: WWAN_Public**.




g. Click the ✚ to add another route policy.
h. For **Label**, enter **Route through private APN**.
i. For **Interface**, select **Interface: WWAN_Private**.
j. Configure the source address:
   i. Click to expand **Source address**.
   ii. For **Type**, select **Interface**.
   iii. For **Interface**, select **LAN2**.
k. Configure the destination address:
   i. Click to expand **Destination address**.
   ii. For **Type**, select **Interface**.
   iii. For **Interface**, select **Interface: WWAN_Private**.




6. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set the maximum number of interfaces for the modem:

```
(config)> network modem modem max_intfs 2
(config)>
```

4. Create the WWAN interfaces:
   a. Create the **WWANPublic** interface:

```
(config)> add network interface WWANPublic
(config network interface WWANPublic)>
```

   b. Set the interface type to modem:

```
(config network interface WWANPublic)> type modem
(config network interface WWANPublic)>
```

   c. Set the modem device:

```
(config network interface WWANPublic)> modem device modem
(config network interface WWANPublic)>
```

   d. Configure whether you want the device to use the preconfigured APNs, custom APNs, or both. For more information, see Cellular modem APNs.

```
(config network interface WWANPublic)> modem apn public_apn
(config network interface WWANPublic)>
```

   e. Use to periods (**..**) to move back one level in the configuration:

```
(config network interface WWANPublic)> ..
(config network interface)>
```

   f. Create the **WWANPrivate** interface:

```
(config network interface)> add WWANPrivate
(config network interface WWANPrivate)>
```

   g. Set the interface type to modem:

```
(config network interface WWANPrivate)> type modem
(config network interface WWANPrivate)>
```

   h. Set the modem device:

```
(config network interface WWANPrivate)> modem device modem
(config network interface WWANPrivate)>
```

i. Enable **APN list only**:

```
(config network interface WWANPrivate)> modem apn_selection apn_list_
only
(config network interface WWANPrivate)>
```

j. Set the private APN:

```
(config network interface WWANPublic)> modem apn private_apn
(config network interface WWANPublic)>
```

5. Create the routing policies. For example, to route all traffic from LAN1 through the public APN, and LAN2 through the private APN:
   a. Add a new routing policy:

```
(config)> add network route policy end
(config network route policy 0)>
```

   b. Set the label that will be used to identify this route policy:

```
(config network route policy 0)> label "Route through public apn"
(config network route policy 0)>
```

   c. Set the interface:

```
(config network route policy 0)> interface
/network/interface/WWANPublic
(config network route policy 0)>
```

   d. Configure the source address:
      i. Set the source type to **interface**:

```
(config network route policy 0)> src type interface
(config network route policy 0)>
```

      ii. Set the interface to **LAN1**:

```
(config network route policy 0)> src interface LAN1
(config network route policy 0)>
```

   e. Configure the destination address:
      i. Set the type to **interface**:

```
(config network route policy 0)> dst type interface
(config network route policy 0)>
```

ii. Set the interface to **WWANPublic** :

```
(config network route policy 0)> interface
/network/interface/WWANPublic
(config network route policy 0)>
```

f. Use to periods (**..**) to move back one level in the configuration:

```
(config nnetwork route policy 0)> ..
(config nnetwork route policy)>
```

g. Add a new routing policy:

```
(config network route policy )> add end
(config network route policy 1)>
```

h. Set the label that will be used to identify this route policy:

```
(config network route policy 1)> label "Route through private apn"
(config network route policy 1)>
```

i. Set the interface:

```
(config network route policy 1)> interface
/network/interface/WWANPrivate
(config network route policy 1)>
```

j. Configure the source address:

i. Set the source type to **interface**:

```
(config network route policy 1)> src type interface
(config network route policy 1)>
```

ii. Set the interface to **LAN2**:

```
(config network route policy 1)> src interface LAN2
(config network route policy 1)>
```

k. Configure the destination address:

i. Set the type to **interface**:

```
(config network route policy 1)> dst type interface
(config network route policy 1)>
```

ii. Set the interface to **WWANPrivate** :

```
(config network route policy 1)> interface
/network/interface/WWANPrivate
(config network route policy 1)>
```

6. Save the configuration and apply the change.

```
(config network route policy 1)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### *Configure manual carrier selection*

By default, your Connect EZ 16/32 automatically selects the most appropriate cellular carrier based on the SIM that is in use and the status of available carriers in your area.

Alternatively, you can configure the devices to manually select the carrier, based on the Network PLMN ID. You can also configure the device to use manual carrier selection and fall back to automatic carrier selection if connecting to the manually-configured carrier fails.

You can use also use the modem scan command at the command line to scan for available carriers and determine their PLMN ID.

#### Required configuration items

- Select **Manual** or **Manual/Automatic** carrier selection mode.
- The **Network PLMN ID**.

#### Web

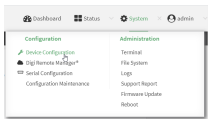
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

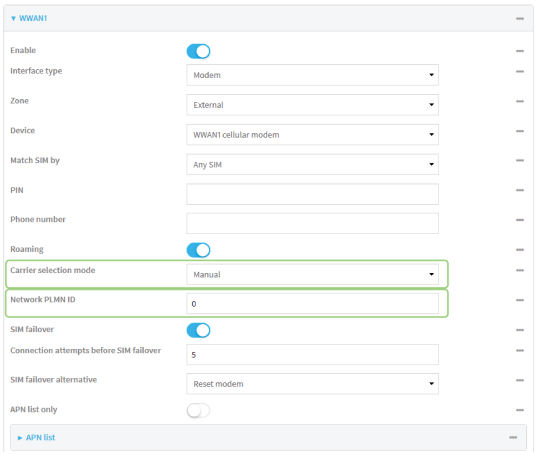
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces** > **Modem**.

4. For **Carrier selection mode**, select one of the following:
   - **Automatic**—The device automatically selects the carrier based on your SIM and cellular network status.
   - **Manual**—The device will only connect to the carrier identified in the **Network PLMN ID**. If the carrier is not available, no cellular connection will be established.
   - **Manual/Automatic**—The device will attempt to connect to the carrier identified in the **Network PLMN ID**. If the carrier is not available, the device will fall back to using automatic carrier selection.
5. If **Manual** or **Manual/Automatic** are selected for **Carrier section mode**, enter the **Network PLMN ID**.




**Note** You can use the modem scan command at the Admin CLI to scan for available carriers and determine their PLMN ID. See Scan for available cellular carriers for details.

6. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> network interface modem modem operator_mode value
(config)>
```

   where *value* is one of:
   - **automatic**—The device automatically selects the carrier based on your SIM and cellular network status.

- **manual**—The device will only connect to the carrier identified in the **Network PLMN ID**. If the carrier is not available, no cellular connection will be established.
- **manual_automatic**—The device will attempt to connect to the carrier identified in the **Network PLMN ID**. If the carrier is not available, the device will fall back to using automatic carrier selection.

4. If carrier section mode is set to **manual** or **manual_automatic**, set the network PLMN ID:

```
(config)> network interface modem modem operator plmn_ID
(config)>
```

**Note** You can use the modem scan command at the Admin CLI to scan for available carriers and determine their PLMN ID. See Scan for available cellular carriers for details.

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### Scan for available cellular carriers

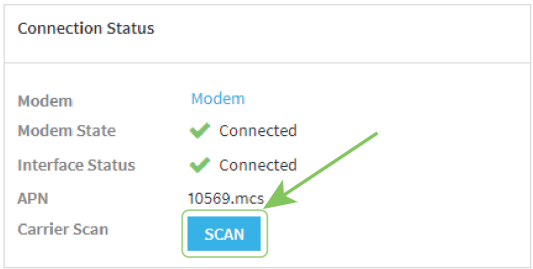
You can scan for available carriers and determine their network PLMN ID by using the modem scan command at the Admin CLI.

**Note** For devices using Unitac modems (such as devices with the 1002-CM45 core module), carrier scanning will not work if the modem has an active cellular connection.

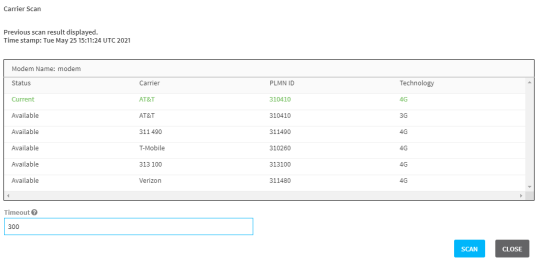
## Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. From the main menu, click **Status** > **Modems**.
2. croll to the **Connection Status** section and click **SCAN**.

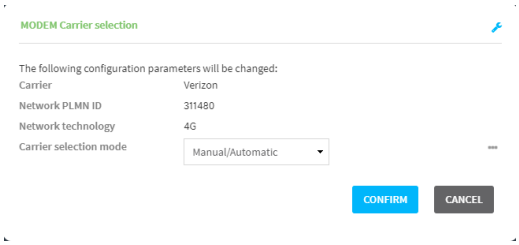



The **Carrier Scan** window opens.




3. (Optional) Change the **Timeout** for the carrier scan. The default is **300** seconds.
4. When the **Carrier Scan** window opens, the results of the most recent previous scan are displayed. If there is no previous scan available, or to refresh the list, click **SCAN**.
5. The current carrier is highlighted in green. To switch to a different carrier:
   a. Highlight the appropriate carrier and click **SELECT**.

      The **Carrier selection** dialog opens.




   b. For Carrier selection mode, select one of the following:
      - **Manual/Automatic**: The device will use automatic carrier selection if this carrier is not available.
      - **Manual**: Does not allow the device to use automatic carrier selection if this carrier is not available.

      > Note If **Manual** is selected, your modem must support the **Network technology** or the modem will lose cellular connectivity. If you are using a cellular connection to perform this procedure, you may lose your connection and the device will no longer be accessible.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type:

```
> modem scan

Issuing network scan, this may take some time...

 Status     Carrier   PLMN ID  Technology
```

```
---------  --------  -------  ----------
Available  T-Mobile  310260   4G
Available  T-Mobile  310260   3G
Available  AT&T      310410   4G
Available  Verizon   311480   4G
Available  311 490   311490   4G
Available  313 100   313100   4G

>
```

### *Show cellular status and statistics*

You can view a summary status for all cellular modems, or view detailed status and statistics for a specific modem.

#### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, click **Status**.
2. Under **Connections**, click **Modems**.

   The modem status window is displayed

#### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the show modem command:
   - To view a status summary for the modem:

     ```
     > show modem

     Modem  SIM            Status     APN        Signal Strength
     -----  -------------  ---------  ---------  --------------------
     modem  1 (ready)      connected  1234       Good (-84 dBm)

     >
     ```

   - To view detailed status and statistics, use the show modem name *name* command:

     ```
     > show modem name modem

      modem: [Telit] LM940
      ------------------------------------------------------------------------
     -----------
      IMEI                    : 781154796325698
      Model                   : LM940
      FW Version              : 24.01.541_ATT
      Revision                : 24.01.541
     ```

```
Status
------
State                     : connected
Signal Strength           : Good (-85 dBm)
Bars                      : 2/5
Access Mode               : 4G
Network Technology (CNTI): LTE
Band                      : B2
Temperature               : 34C

wwan1 Interface
---------------
APN                       : 1234
IPv4 surelink             : passing
IPv4 address              : 189.232.229.47
IPv4 gateway              : 189.232.229.1
IPv4 MTU                  : 1500
IPv4 DNS server(s)        : 245.144.162.207, 245.144.162.208

IPv6 surelink             : passing
IPv6 address              : 11f6:4680:0d67:59d2:552b:3429:81a8:f1ea
IPv6 gateway              : ff50:d95d:7e98:abe8:3030:9138:4f25:f51b
IPv6 MTU                  : 1500

TX bytes                  : 127941
RX bytes                  : 61026
Uptime                    : 10 hrs, 56 mins (39360s)

SIM
---
SIM Slot                  : 1
SIM Status                : ready
IMSI                      : 61582122197895
ICCID                     : 26587628655003992180
SIM Provider              : AT&T

4G
--
RSRQ                      : Good (-11.0 dB)
RSRP                      : Good (-93.0 dBm)
RSSI                      : Excellent (-64.0 dBm)
SNR                       : Good (6.4 dB)

>
```

### Unlock a SIM card

A SIM card can be locked if a user tries to set an invalid PIN for the SIM card too many times. In addition, some cellular carriers require a SIM PIN to be added before the SIM card can be used. If the SIM card is locked, the Connect EZ device cannot make a cellular connection.

#### Command line

To unlock a SIM card:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, use the modem puk unlock command to set a new PIN for the SIM card:

   ```
   > modem puk unlock puk_code new_pin modem_name
   >
   ```

   For example, to unlock a SIM card in the modem named **modem** with PUK code **12345678**, and set the new SIM PIN to **1234**:

   ```
   > modem puk unlock 12345678 1234 modem
   >
   ```
3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

**Note** If the SIM remains in a locked state after using the unlock command, contact your cellular carrier.

## *Signal strength for cellular connections*

See Show cellular status and statistics for procedures to view this information.

### Signal strength for 4G connections

For 4G connections, the **RSRP** value determines signal strength.

- **Excellent**: > **-90 dBm**
- **Good**: **-90 dBm** to **-105 dBm**
- **Fair**: **-106 dBm** to **-115 dBm**
- **Poor**: **-116 dBm** to **-120 dBm**
- **No service**: **< -120 dBm**

### Signal strength for 3G and 2G connections

For 3G and 2G cellular connections, the current **RSSI** value determines signal strength.

- **Excellent**: > **-70 dBm**
- **Good**: **-70 dBm** to **-85 dBm**
- **Fair**: **-86 dBm** to **-100 dBm**
- **Poor**: **< -100 dBm** to **-109 dBm**
- **No service**: **-110 dBm**

## *Tips for improving cellular signal strength*

If the signal strength LEDs or the signal quality for your device indicate **Poor** or **No service**, try the following things to improve signal strength:

- Move the Connect EZ 16/32 device to another location.
- Try connecting a different set of antennas, if available.
- Purchase a Digi Antenna Extender Kit:
  - Antenna Extender Kit, 1m

### AT command access

To run AT commands from the Connect EZ 16/32 command line:

#### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type **modem at-interactive** and press **Enter**. Type **n** if you do not want exclusive access. This allows you to send AT commands to the device while still allowing the device to connect, disconnect, and/or reconnect to the cellular network.
3. At the Admin CLI prompt, use the modem at-interactive command to begin an interactive AT command session:

```
> modem at-interactive


Do you want exclusive access to the modem?  (y/n) [y]:
```

4. Type **n** if you do not want exclusive access. This allows you to send AT commands to the device while still allowing the device to connect, disconnect, and/or reconnect to the cellular network.

   The following is an example interactive AT command:

```
> modem at-interactive

Do you want exclusive access to the modem? (y/n) [y]: n
Starting terminal access to modem AT commands.
Note that the modem is still in operation.

To quit enter '~.' ('~~.' if using an ssh client) and press ENTER

Connected
ati
Manufacturer: Sierra Wireless, Incorporated
Model: MC7455
Revision: SWI9X30C_02.24.03.00 r6978 CARMD-EV-FRMWR2 2017/03/02 13:36:45
MEID: 35907206045169
IMEI: 359072060451693
IMEI SV: 9
FSN: LQ650551070110
```

```
+GCAP: +CGSM
OK
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure a Wide Area Network (WAN)

Configuring a Wide Area Network (WAN) involves configuring the following items:

### *Required configuration items*

- A name for the interface.

  **Note** If the interface name is more than eight characters, the name will be truncated in the underlying network interface to the first six characters followed by three digits, incrementing from 000. This affects any custom scripts or firewall rules that may be trying to adjust the interface or routing table entries.

- The interface type: **Ethernet**.
- The firewall zone: **External**.
- The network device or bridge that is used by the WAN.
- Configure the WAN as a DHCP client.

### *Additional configuration items*

- Active recovery configuration. See Configure SureLink active recovery to detect WAN/WWAN failures for further information.
- Additional IPv4 configuration:
  - The type being the way to control how the modem in the Digi device obtains an IP address from the cellular network.
  - The metric for IPv4 routes associated with the WAN.
  - The relative weight for IPv4 routes associated with the WAN.
  - The IPv4 management priority of the WAN. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
  - The IPv4 Maximum Transmission Unit (MTU) of the WAN.
  - Whether to assign a static IPv4 address to the WAN.
  - When to use DNS: always, never, or only when this interface is the primary default route.
  - When to use DNS servers for this interface.
  - Whether to include the Connect EZ 16/32 device's hostname in DHCP requests.
- IPv6 configuration:
  - The type being the way to control how the modem in the Digi device obtains an IP address from the cellular network.
  - The metric for IPv6 routes associated with the WAN.
  - The relative weight for IPv6 routes associated with the WAN.
  - The IPv6 management priority of the WAN. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
  - The IPv6 Maximum Transmission Unit (MTU) of the WAN.

- Whether to assign a static IPv6 address to the WAN.
- When to use DNS: always, never, or only when this interface is the primary default route.
- When to use DNS servers for this interface.
- Whether to include the Connect EZ 16/32 device's hostname in DHCP requests.

- MAC address denylist and allowlist.

To create a new WAN or edit an existing WAN:

### Web

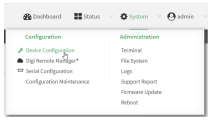
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

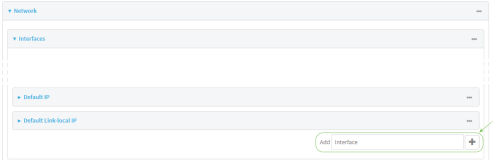
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

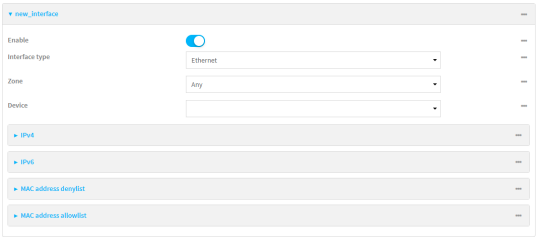
   

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces**.
4. Create the WAN or select an existing WAN:
   - To create a new WAN, for **Add interface**, type a name for the WAN and click ✚.

   - To edit an existing WAN, click to expand the WAN.

   The Interface configuration window is displayed.




New WANs are enabled by default. To disable, toggle off **Enable**.

5. For **Interface type**, leave at the default setting of **Ethernet**.
6. For **Zone**, select **External**.
7. For **Device**, select an Ethernet device or a bridge. See Bridging for more information about bridging.
8. (Optional) Click to expand **802.1x** to configure 802.1x port based network access control.

   The Connect EZ 16/32 can function as an 802.1x authenticator; it does not function as an 802.1x supplicant.

   a. Click to expand **Authentication**.
   b. Click **Enable server** to enable the 802.1x authenticator on the Connect EZ 16/32 device.
   c. Set the **Reauth** period.
9. Configure IPv4 settings:
   a. Click to expand **IPv4**.

      IPv4 support is enabled by default.
   b. For **Type**, select **DHCP address**.
   c. Optional IPv4 configuration items:
      i. Set the **Metric**.

         See Configure WAN/WWAN priority and default route metrics for further information about metrics.
      ii. For **Weight**, type the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, **Weight** is used to load balance traffic to the interfaces.
      iii. Set the **Management priority**. This determines which interface will have priority for central management activity. The interface with the highest number will be used.
      iv. Set the **MTU**.
      v. For **Use DNS**, select one of the following:
         - **Always**: DNS will always be used for this WAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
         - **When primary default route**: Only use the DNS servers provided for this interface when the interface is the primary route.
         - **Never**: Never use DNS servers for this interface.
      vi. Enable **DHCP Hostname** to instruct the Connect EZ 16/32 device to include the device's system name with DHCP requests as the Client FQDN option. The DHCP server can then be configured to register the device's hostname and IP address with

an associated DNS server.

- See RFC4702 for further information about DHCP server support for the Client FQDN option.
- See Configure system information for information about setting the Connect EZ 16/32 device's system name.

d. Enable **Force link** to keep the network interface active even when the device link is down.

10. (Optional) Configure IPv6 settings:
    a. Click to expand **IPv6**.
    b. **Enable** IPv6 support.
    c. For **Type**, select **DHCPv6 address**.
    d. For **Prefix length**, type the minimum length of the prefix to assign to this LAN. If the minimum length is not available, then a longer prefix will be used.
    e. For **Prefix ID**, type the identifier used to extend the prefix to the assigned length. Leave blank to use a random identifier.
    f. Set the **Metric**.

    See Configure WAN/WWAN priority and default route metrics for further information about metrics.
    g. For **Weight**, type the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, **Weight** is used to load balance traffic to the interfaces.
    h. Set the **Management priority**. This determines which interface will have priority for central management activity. The interface with the highest number will be used.
    i. Set the **MTU**.
    j. For **Use DNS**:
        - **Always**: DNS will always be used for this WAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
        - **When primary default route**: Only use the DNS servers provided for this interface when the interface is the primary route.
        - **Never**: Never use DNS servers for this interface.
    k. Enable **DHCP Hostname** to instruct the Connect EZ 16/32 device to include the device's system name with DHCP requests as the Client FQDN option. The DHCP server can then be configured to register the device's hostname and IP address with an associated DNS server.
        - See RFC4702 for further information about DHCP server support for the Client FQDN option.
        - See Configure system information for information about setting the Connect EZ 16/32 device's system name.
    l. (Optional) To assign a static address to a network interface, click to expand **Static address**.
        i. Click the slider to enable.
        ii. For **Address**, type the name of the static address you want to use (for example, *tree::squirrel:tail/64*).

11. (Optional) Click to expand **MAC address denylist**.

    Incoming packets will be dropped from any devices whose MAC addresses is included in the **MAC address denylist**.

    a. Click to expand **MAC address denylist**.
    b. For **Add MAC address**, click ✚.
    c. Type the **MAC address**.

12. (Optional) Click to expand **MAC address allowlist**.

    If allowlist entries are specified, incoming packets will only be accepted from the listed MAC addresses.

    a. Click to expand **MAC address allowlist**.
    b. For **Add MAC address**, click ✚.
    c. Type the **MAC address**.

1. See Configure SureLink active recovery to detect WAN/WWAN failures for information about configuring **SureLink**.

13. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new WAN or edit an existing one:

   - To create a new WAN named **my_wan**:

```
(config)> add network interface my_wan
(config network interface my_wan)>
```

   - To edit an existing WAN named **my_wan**, change to the **my_wan** node in the configuration schema:

```
(config)> network interface my_wan
(config network interface my_wan)>
```

4. Set the appropriate firewall zone:

```
(config network interface my_wan)> zone zone
(config network interface my_wan)>
```

   See Firewall configuration for further information.

5. Select an Ethernet device or a bridge. See Bridging for more information about bridging.
   a. Enter **device ?** to view available devices and the proper syntax.

```
(config network interface my_wan)> device ?

Current value:

(config network interface my_wan)> device
```

   b. Set the device for the LAN:

```
(config network interface my_wan)> device device
(config network interface my_wan)>
```

6. Configure IPv4 settings:
   - IPv4 support is enabled by default. To disable:

```
(config network interface my_wan)> ipv4 enable false
(config network interface my_wan)>
```

   - Configure the WAN to be a DHCP client:

```
(config network interface my_wan)> ipv4 type dhcp
(config network interface my_wan)>
```

   a. Optional IPv4 configuration items:
      i. Set the IP metric:

```
(config network interface my_wan)> ipv4 metric num
(config network interface my_wan)>
```

      See Configure WAN/WWAN priority and default route metrics for further information about metrics.

      ii. Set the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, the weight is used to load balance traffic to the interfaces.

```
(config network interface my_wan)> ipv4 weight num
(config network interface my_wan)>
```

      iii. Set the management priority. This determines which interface will have priority for central management activity. The interface with the highest number will be used.

```
(config network interface my_wan)> ipv4 mgmt num
(config network interface my_wan)>
```

      iv. Set the MTU:

```
(config network interface my_wan)> ipv4 mtu num
(config network interface my_wan)>
```

v. Configure how to use DNS:

```
(config network interface my_wan)> ipv4 use_dns value
(config network interface my_wan)>
```

where *value* is one of:

- **always**: DNS will always be used for this WAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
- **primary**: Only use the DNS servers provided for this interface when the interface is the primary route.
- **never**: Never use DNS servers for this interface.

vi. Enable DHCP Hostname to instruct the Connect EZ 16/32 device to include the device's system name with DHCP requests as the Client FQDN option. The DHCP server can then be configured to register the device's hostname and IP address with an associated DNS server.

```
(config network interface my_wan)> ipv4 dhcp_hostname true
(config network interface my_wan)>
```

- See RFC4702 for further information about DHCP server support for the Client FQDN option.
- See Configure system information for information about setting the Connect EZ 16/32 device's system name.

b. See Configure WAN priority and default route metrics for further information about metrics.

7. (Optional) Configure IPv6 settings:

a. Enable IPv6 support:

```
(config network interface my_wan)> ipv6 enable true
(config network interface my_wan)>
```

b. Set the IPv6 type to DHCP:

```
(config network interface my_wan)> ipv6 type dhcpv6
(config network interface my_wan)>
```

c. Generally, the default settings for IPv6 support are sufficient. You can view the default IPv6 settings by using the question mark (**?**):

```
(config network interface my_wan)> ipv6 ?

IPv6

 Parameters                Current Value
 ------------------------------------------------------------------------
----------
 dhcp_hostname             false             DHCP Hostname
 enable                    true              Enable
```

```
 metric                    0                 Metric
 mgmt                      0                 Management priority
 mtu                       1500              MTU
 type                      dhcpv6            Type
 use_dns                   always            Use DNS
 weight                    10                Weight

 Additional Configuration
 ------------------------------------------------------------------------
----------
 connection_monitor        Active recovery

(config network interface my_wan)>
```

d. Modify any of the remaining default settings as appropriate. For example, to change the metric:

```
(config network interface my_wan)> ipv6 metric 1
(config network interface my_wan)>
```

If the minimum length is not available, then a longer prefix will be used.

See Configure WAN/WWAN priority and default route metrics for further information about metrics.

e. (Optional) To assign a static address to a network interface:

```
>config
(config)> network interfacemy_wan ipv6 static ?

Static address: IPv6 static address.


Parameters          Current value
------------------------------------------------------------------------
address                                          Address
enable                      false              Enable

(config)> network interface my_wan ipv6 static address ?

Address: The IPv6 address to use.

Format: IPv6_address/prefix_length

Current value:

(config)>
```

8. (Optional) To configure 802.1x port based network access control:

**Note** The Connect EZ 16/32 can function as an 802.1x authenticator; it does not function as an 802.1x supplicant.

a. Enable the 802.1x authenticator on the Connect EZ 16/32 device:

```
(config network interface my_wan)> 802_1x authentication enable true
(config network interface my_wan)>
```

b. Set the frequency period for reauthorization:

```
(config network interface my_wan)> 802_1x authentication reauth_period
value
(config network interface my_wan)>
```

where *value* is an integer between **0** and **86400**. The default is **3600**.

9. (Optional) Configure the MAC address deny list.

   Incoming packets will be dropped from any devices whose MAC addresses is included in the MAC address denylist.

   a. Add a MAC address to the denylist:

   ```
   (config network interface my_wan)> add mac_denylist end mac_address
   (config network interface my_wan)>
   ```

   where *mac_address* is a hyphen-separated MAC address, for example, 32-A6-84-2E-81-58.

   b. Repeat for each additional MAC address.

10. (Optional) Configure the MAC address allowlist.

    If allowlist entries are specified, incoming packets will only be accepted from the listed MAC addresses.

    a. Add a MAC address to the allowlist:

    ```
    (config network interface my_wan)> add mac_allowlist end mac_address
    (config network interface my_wan)>
    ```

    where *mac_address* is a hyphen-separated MAC address, for example, 32-A6-84-2E-81-58.

    b. Repeat for each additional MAC address.

11. See Configure SureLink active recovery to detect WAN/WWAN failures for information about configuring SureLink for active recovery.

12. Save the configuration and apply the change.

    ```
    (config network interface my_wan)> save
    Configuration saved.
    >
    ```

13. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure a Wireless Wide Area Network (WWAN)

Configuring a Wireless Wide Area Network (WWAN) involves configuring the following items:

**Required configuration items**

- The interface type: **Modem**.
- The firewall zone: **External**.
- The cellular modem that is used by the WWAN.

**Additional configuration items**

- SIM selection for this WWAN.
- The SIM PIN.
- The SIM phone number for SMS connections.
- Enable or disable roaming.
- SIM failover configuration.
- APN configuration.
- The custom gateway/netmask.
- IPv4 configuration:
  - The type being the way to control how the modem in the Digi device obtains an IP address from the cellular network.
  - The metric for IPv4 routes associated with the WAN.
  - The relative weight for IPv4 routes associated with the WAN.
  - The IPv4 management priority of the WAN. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
  - The IPv4 Maximum Transmission Unit (MTU) of the WAN.
  - Whether to assign a static IPv4 address to the WAN.
  - When to use DNS: always, never, or only when this interface is the primary default route.
  - SureLink active recovery configuration. See Configure SureLink active recovery to detect WAN/WWAN failures for further information.
- IPv6 configuration:
  - The type being the way to control how the modem in the Digi device obtains an IP address from the cellular network.
  - The metric for IPv6 routes associated with the WAN.
  - The relative weight for IPv6 routes associated with the WAN.
  - The IPv6 management priority of the WAN. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
  - The IPv6 Maximum Transmission Unit (MTU) of the WAN.
  - Whether to assign a static IPv6 address to the WAN.
  - When to use DNS: always, never, or only when this interface is the primary default route.
  - SureLink active recovery configuration. See Configure SureLink active recovery to detect WAN/WWAN failures for further information.

### Web

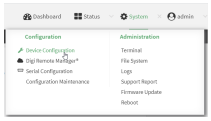
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

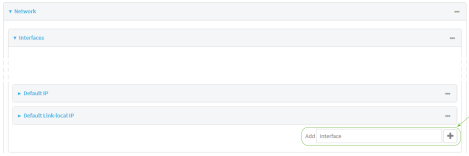
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

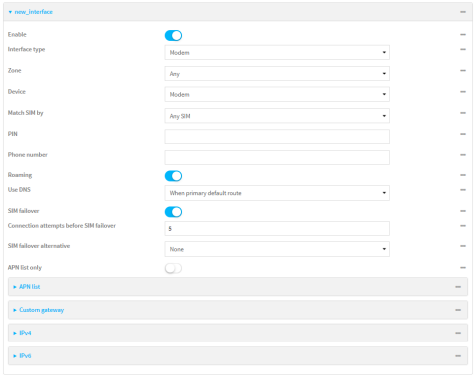
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces**.
4. Create the WWAN or select an existing WWAN:
   - To create a new WWAN:
     a. For **Add interface**, type a name for the WWAN and click ✚.

     b. For **Interface type**, select **Modem**.

     New WWANs are enabled by default. To disable, toggle off **Enable**.
   - To edit an existing WWAN, click to expand the WWAN.
5. For **Zone**, select **External**.

6. For **Device**, select the cellular modem.
7. For **Match SIM by**, select a SIM matching criteria to determine when this WWAN should be used:
   - If **SIM slot** is selected, for **Match SIM slot**, select which SIM slot must be in active for this WWAN to be used.
   - If **Carrier** is selected, for **Match SIM carrier**, select which cellular carrier must be in active for this WWAN to be used.
   - If **PLMN identifier** is selected, for **Match PLMN identifier**, type the PLMN id that must be in active for this WWAN to be used.
   - If **IMSI** is selected, for **Match IMSI**, type the International Mobile Subscriber Identity (IMSI) that must be in active for this WWAN to be used.
   - If **ICCID** is selected, for **Match ICCID**, type the unique SIM card ICCID that must be in active for this WWAN to be used.
8. Type the **PIN** for the SIM. Leave blank if no PIN is required.
9. Type the **Phone number** for the SIM, for SMS connections.

   Normally, this should be left blank. It is only necessary to complete this field if the SIM does not have a phone number or if the phone number is incorrect.
10. **Roaming** is enabled by default. Click to disable.
11. For **Carrier selection mode**, select one of the following:
    - **Automatic**: The cellular carrier is selected automatically by the device.
    - **Manual**: The cellular carrier must be manually configured. If the configured network is not available, no cellular connection will be established.
    - **Manual/Automatic**: The carrier is manually configured. If the configured network is not available, automatic carrier selection is used.

    If **Manual** or **Manual/Automatic** is selected:

    a. For **Network PLMN ID**, type the PLMN ID for the cellular network.

    b. For **Network technology**, select the technology that should be used. The default is **All technologies**, which means that the best available technology will be used.

    Note If **Manual** is configured for **Carrier selection mode** and a specific network technology is selected for the **Network technology**, your modem must support the selected technology or no cellular connection will be established. If you are using a cellular connection to perform this procedure, you may lose your connection and the device will no longer be accessible.
12. **SIM failover** is enabled by default, which means that the modem will automatically fail over from the active SIM to the next available SIM when the active SIM fails to connect. If enabled:

    a. For **Connection attempts before SIM failover**, type the number of times that the device should attempt to connect to the active SIM before failing over to the next available SIM.

    b. For **SIM failover alternative**, configure how SIM failover will function if automatic SIM switching is unavailable:
       - **None**: The device will perform no alternative action if automatic SIM switching is unavailable.

- **Reset modem**: The device will reset the modem if automatic SIM switching is unavailable.
- **Reboot device**: The device will reboot if automatic SIM switching is unavailable.

13. For **APN Selection**, select whether you want to configure the Connect EZ 16/32 to use the preconfigured APNs, custom APNs, or both. See Cellular modem APNs for information and instructions for setting an APN.
14. (Optional) To configure the IP address of a custom gateway or a custom netmask:
    a. Click **Custom gateway** to expand.
    b. Click **Enable**.
    c. For **Gateway/Netmask**, enter the IP address and netmask of the custom gateway. To override only the gateway netmask, but not the gateway IP address, use all zeros for the IP address. For example, **0.0.0.0./32** will use the network-provided gateway, but with a /32 netmask.
15. Optional IPv4 configuration items:
    a. Click **IPv4** to expand.
    b. IPv4 support is **Enabled** by default. Click to disable.
    c. Set the **Type**.
    - Static IP address - Digi device obtains the static IP address from the cellular network.
    - DHCP address - Digi device obtains IP address through a DHCP server on the cellular network.

    a. Set the **Metric**.

    See Configure WAN/WWAN priority and default route metrics for further information about metrics.

    b. For **Weight**, type the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, **Weight** is used to load balance traffic to the interfaces.
    c. Set the **Management priority**. This determines which interface will have priority for central management activity. The interface with the highest number will be used.
    d. Set the **MTU**.
    e. For **Use DNS**:
    - **Always**: DNS will always be used for this WWAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
    - **When primary default route**: Only use the DNS servers provided for this WWAN when the WWAN is the primary route.
    - **Never**: Never use DNS servers for this WWAN.

    The default setting is **When primary default route**.
16. Optional IPv6 configuration items:
    a. Click **IPv6** to expand.
    b. IPv6 support is **Enabled** by default. Click to disable.
    c. Set the **Type**.
    - Static IP address - Digi device obtains the static IP address from the cellular network.

- DHCP address - Digi device obtains IP address through a DHCP server on the cellular network.

a. Set the **Metric**.

   See Configure WAN/WWAN priority and default route metrics for further information about metrics.

b. For **Weight**, type the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, **Weight** is used to load balance traffic to the interfaces.

c. Set the **Management priority**. This determines which interface will have priority for central management activity. The interface with the highest number will be used.

d. Set the **MTU**.

e. For **Use DNS**:

   - **Always**: DNS will always be used for this WWAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
   - **When primary default route**: Only use the DNS servers provided for this WWAN when the WWAN is the primary route.
   - **Never**: Never use DNS servers for this WWAN.

   The default setting is **When primary default route**.

1. See Configure SureLink active recovery to detect WAN/WWAN failures for information about configuring **SureLink**.

17. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new WWAN or edit an existing one:

   - To create a new WWAN named **my_wwan**:

```
(config)> add network interface my_wwan
(config network interface my_wwan)>
```

   - To edit an existing WWAN named **my_wwan**, change to the my_wwan node in the configuration schema:

```
(config)> network interface my_wwan
(config network interface my_wwan)>
```

4. Set the appropriate firewall zone:

```
(config network interface my_wwan)> zone zone
(config network interface my_wwan)>
```

See Firewall configuration for further information.

5. Select a cellular modem:
   a. Enter **modem device ?** to view available modems and the proper syntax.

```
(config network interface my_wwan)> modem device ?

Device: The modem used by this network interface.
Format:
  modem
Current value:

(config network interface my_wwan)> device
```

   b. Set the device:

```
(config network interface my_wwan)> modem device modem
(config network interface my_wwan)>
```

6. Set the SIM matching criteria to determine when this WWAN should be used:

```
(config network interface my_wwan)> modem match value
(config network interface my_wwan)>
```

Where *value* is one of:

- **any**
- **carrier**

  Set the cellular carrier must be in active for this WWAN to be used:

  a. Use **?** to determine available carriers:

```
(config network interface my_wwan)> modem carrier

Match SIM carrier: The SIM carrier match criteria. This
interface is applied when the SIM card is
provisioned from the carrier.
Format:
  AT&T
  Rogers
  Sprint
  T-Mobile
  Telstra
  Verizon
  Vodafone
  other
Default value: AT&T
Current value: AT&T
```

```
(config network interface my_wwan)>
```

b. Set the carrier:

```
(config network interface my_wwan)> modem carrier value
(config network interface my_wwan)>
```

- **iccid**

  Set the unique SIM card ICCID that must be in active for this WWAN to be used:

```
(config network interface my_wwan)> modem iccid ICCID
(config network interface my_wwan)>
```

- **imsi**

  Set the International Mobile Subscriber Identity (IMSI) that must be in active for this WWAN to be used:

```
(config network interface my_wwan)> modem imsi IMSI
(config network interface my_wwan)>
```

- **plmn_id**

  Set the PLMN id that must be in active for this WWAN to be used:

```
(config network interface my_wwan)> modem plmn_id PLMN_ID
(config network interface my_wwan)>
```

- **sim_slot**

  Set which SIM slot must be in active for this WWAN to be used:

```
(config network interface my_wwan)> modem sim_slot value
(config network interface my_wwan)>
```

  where *value* is either **1** or **2**.

7. Set the PIN for the SIM. Leave blank if no PIN is required.

```
(config network interface my_wwan)> modem pin value
(config network interface my_wwan)>
```

8. Set the phone number for the SIM, for SMS connections:

```
(config network interface my_wwan)> modem phone num
(config network interface my_wwan)>
```

   Normally, this should be left blank. It is only necessary to complete this field if the SIM does not have a phone number or if the phone number is incorrect.

9. Roaming is enabled by default. To disable:

```
(config network interface my_wwan)> modem roaming false
(config network interface my_wwan)>
```

10. Set the carrier selection mode:

```
(config network interface my_wwan)> modem operator_mode value
(config network interface my_wwan)>
```

where *value* is one of:

- **automatic**: The cellular carrier is selected automatically by the device.
- **manual**: The cellular carrier must be manually configured. If the configured network is not available, no cellular connection will be established.
- **manual_automatic**: The carrier is manually configured. If the configured network is not available, automatic carrier selection is used.

If **manual** or **manual_automatic** is set:

a. Set the Network PLMN ID:

```
(config network interface my_wwan)> modem operator PLMN_ID
(config network interface my_wwan)>
```

b. Set the cellular network technology:

```
(config network interface my_wwan)> modem operator_technology value
(config network interface my_wwan)>
```

where *value* is one of:

- **all**: The best available technology will be used.
- **2G**: Only 2G technology will be used.
- **3G**: Only 3G technology will be used.
- **4G**: Only 4G technology will be used.
- **NR5G-NSA**: Only 5G non-standalone technology will be used.
- **NR5G-SA**: Only 5G standalone technology will be used.

The default is **all**.

**Note** If **manual** is configured for the carrier selection mode and a specific network technology is selected for the cellular network technology, your modem must support the selected technology or no cellular connection will be established. If you are using a cellular connection to perform this procedure, you may lose your connection and the device will no longer be accessible.

11. SIM failover is enabled by default, which means that the modem will automatically fail over from the active SIM to the next available SIM when the active SIM fails to connect. To disable:

```
(config network interface my_wwan)> modem sim_failover false
(config network interface my_wwan)>
```

If enabled:

a. Set the number of times that the device should attempt to connect to the active SIM before failing over to the next available SIM:

```
(config network interface my_wwan)> modem sim_failover_retries num
(config network interface my_wwan)>
```

The default setting is **5**.

b. Configure how SIM failover will function if automatic SIM switching is unavailable:

```
(config network interface my_wwan)> modem sim_failover_alt value
(config network interface my_wwan)>
```

where *value* is one of:

- **none**: The device will perform no alternative action if automatic SIM switching is unavailable.
- **reset**: The device will reset the modem if automatic SIM switching is unavailable.
- **reboot**: The device will reboot if automatic SIM switching is unavailable.

12. (Optional) To configure the device to use either the preconfigured APNs, custom APNs, or both:

```
(config)> network interface modem modem apn_selection value
(config)>
```

Where *value* is one of the following:

- apn_list_only
- both_lists
- built-in-list-only

13. (Optional) To configure the IP address of a custom gateway or a custom netmask:

a. Enable the custom gateway:

```
(config network interface my_wwan)> modem custom_gw enable true
(config network interface my_wwan)>
```

b. Set the IP address and netmask of the custom gateway:

```
(config network interface my_wwan)> modem custom_gw gateway ip_
address/netmask
(config network interface my_wwan)> modem custom_gw
```

To override only the gateway netmask, but not the gateway IP address, use all zeros for the IP address. For example, **0.0.0.0./32** will use the network-provided gateway, but with a /32 netmask.

14. Optional IPv4 configuration items:

a. IPv4 support is enabled by default. To disable:

```
(config network interface my_wwan)> ipv4 enable false
(config network interface my_wwan)>
```

b. Set the type, which determines how the modem in the device obtains an IP address from the cellular network.

```
(config network interface my_wwan)> ipv4 modem_type value
(config network interface my_wwan)>
```

Where *value* is one of:

- **static**: Digi device obtains the static IP address from the cellular network.
- **dhcp**: Digi device obtains IP address via a DHCP server on the cellular network.

c. Set the metric:

```
(config network interface my_wwan)> ipv4 metric num
(config network interface my_wwan)>
```

See Configure WAN/WWAN priority and default route metrics for further information about metrics.

d. Set the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, the weight is used to load balance traffic to the interfaces.

```
(config network interface my_wwan)> ipv4 weight num
(config network interface my_wwan)>
```

e. Set the management priority. This determines which interface will have priority for central management activity. The interface with the highest number will be used.

```
(config network interface my_wwan)> ipv4 mgmt num
(config network interface my_wwan)>
```

f. Set the MTU:

```
(config network interface my_wwan)> ipv4 mtu num
(config network interface my_wwan)>
```

g. Configure when the WWAN's DNS servers will be used:

```
(config network interface my_wwan)> ipv4  dns value
(config network interface my_wwan)>
```

Where *value* is one of:

- **always**: DNS will always be used for this WWAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
- **never**: Never use DNS servers for this WWAN.
- **primary**: Only use the DNS servers provided for this WWAN when the WWAN is the primary route.

The default setting is **primary**.

15. Optional IPv6 configuration items:

a. IPv6 support is enabled by default. To disable:

```
(config network interface my_wwan)> ipv4 enable false
(config network interface my_wwan)>
```

b. Set the type, which determines how the modem in the device obtains an IP address from the cellular network.

```
(config network interface my_wwan)> ipv4 modem_type value
(config network interface my_wwan)>
```

Where *value* is one of:

- **static**: Digi device obtains the static IP address from the cellular network.
- **dhcp**: Digi device obtains IP address via a DHCP server on the cellular network.

c. Set the metric:

```
(config network interface my_wwan)> ipv4 metric num
(config network interface my_wwan)>
```

See Configure WAN/WWAN priority and default route metrics for further information about metrics.

d. Set the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, the weight is used to load balance traffic to the interfaces.

```
(config network interface my_wwan)> ipv4 weight num
(config network interface my_wwan)>
```

e. Set the management priority. This determines which interface will have priority for central management activity. The interface with the highest number will be used.

```
(config network interface my_wwan)> ipv4 mgmt num
(config network interface my_wwan)>
```

f. Set the MTU:

```
(config network interface my_wwan)> ipv4 mtu num
(config network interface my_wwan)>
```

g. Configure when the WWAN's DNS servers will be used:

```
(config network interface my_wwan)> ipv4  dns value
(config network interface my_wwan)>
```

Where *value* is one of:

- **always**: DNS will always be used for this WWAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
- **never**: Never use DNS servers for this WWAN.

- **primary**: Only use the DNS servers provided for this WWAN when the WWAN is the primary route.

The default setting is **primary**.

16. See Configure SureLink active recovery to detect WAN/WWAN failures for information about configuring active recovery.
17. Save the configuration and apply the change.

```
(config network interface my_wan)> save
Configuration saved.
>
```

18. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show WAN and WWAN status and statistics

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. From the menu, click **Status**.
2. Under **Networking**, click **Interfaces**.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Enter the show network command at the Admin CLI prompt:

```
> show network

 Interface         Proto  Status   Address
 ----------------  -----  -------  --------------------------------
 setupip          IPv4   up       192.168.210.1/24
 setuplinklocalip  IPv4   up         169.254.100.100/16
 eth1              IPv4   up         10.10.10.10/24
 eth1              IPv6   up         fe00:2404::240:f4ff:fe80:120/64
 eth2              IPv4   up         192.168.2.1/24
 eth2              IPv6   up         fd00:2704::1/48
 loopback          IPv4   up         127.0.0.1/8
 modem             IPv4   up         10.200.1.101/30
 modem             IPv6   down

>
```

3. Additional information can be displayed by using the show network verbose command:

```
> show network verbose

 Interface         Proto  Status   Type    Zone      Device    Metric
Weight
 ----------------  -----  -------  ------  --------  --------  ------  --
----
 setupip          IPv4   up       static  setup     eth2      10      10
 setuplinklocalip  IPv4   up       static  setup     eth2      0       10
 eth1              IPv4   up       dhcp    external  eth1      1       10
 eth1              IPv6   up       dhcp    external  eth1      1       10
 eth2              IPv4   up       static  internal  eth2      5       10
 eth2              IPv6   up       static  internal  eth2      5       10
 loopback          IPv4   up       static  loopback  loopback  0       10
 modem             IPv4   up       modem   external  wwan1     3       10
 modem             IPv6   down     modem   external  wwan1     3       10

>
```

4. Enter **show network interface *name*** at the Admin CLI prompt to display additional information about a specific WAN. For example, to display information about ETH1, enter **show network interface *eth1***:

```
> show network interface eth1

 wan1 Interface Status
 ---------------------
 Device              : eth1
 Zone                : external

 IPv4 Status         : up
 IPv4 Type           : dhcp
 IPv4 Address(es)    : 10.10.10.10/24
 IPv4 Gateway        : 10.10.10.1
 IPv4 MTU            : 1500
 IPv4 Metric         : 1
 IPv4 Weight         : 10
 IPv4 DNS Server(s)  : 10.10.10.2, 10.10.10.3

 IPv6 Status         : up
 IPv6 Type           : dhcpv6
 IPv6 Address(es)    : fe00:2404::240:f4ff:fe80:120/64
 IPv6 Gateway        : ff80::234:f3ff:ff0e:4320
 IPv6 MTU            : 1500
 IPv6 Metric         : 1
 IPv6 Weight         : 10
 IPv6 DNS Server(s)  : fd00:244::1, fe80::234:f3f4:fe0e:4320

>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Delete a WAN or WWAN

Follow this procedure to delete any WANs and WWANs that have been added to the system. You cannot delete the preconfigured WAN, **ETH1**, or the preconfigured WWAN, **Modem**.

### Web

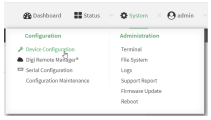
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

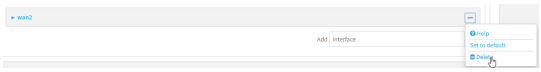
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces**.
4. Click the menu icon (**...**) next to the name of the WAN or WWAN to be deleted and select **Delete**.

   
5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **del** command to delete the WAN or WWAN. For example, to delete a WWAN named my_wwan:

```
(config)> del network interface my_wwan
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Default outbound WAN/WWAN ports

The following table lists the default outbound network communications for Connect EZ 16/32 WAN/WWAN interfaces:

| Description | TCP/UDP | Port number |
|---|---|---|
| Digi Remote Manager connection to edp12.devicecloud.com. | TCP | 3199 |
| NTP date/time sync to time.devicecloud.com. | UDP | 123 |
| DNS resolution using WAN-provided DNS servers. | UDP | 53 |
| HTTPS for modem firmware downloads from firmware.devicecloud.com. | TCP | 443 |

# Local Area Networks (LANs)

The Connect EZ 16/32 device is preconfigured with the following Local Area Networks (LANs):

You can modify configuration settings for **ETH2**, and you can create new LANs.

This section contains the following topics:

About Local Area Networks (LANs) ..... 160
Configure a Local Area Network (LAN) ..... 160
Configure the ETH1 port as a LAN or in a bridge ..... 168
Change the default LAN subnet ..... 174
Show LAN status and statistics ..... 175
Delete a LAN ..... 177
DHCP servers ..... 179
Default services listening on LAN ports ..... 196
Configure an interface to operate in passthrough mode ..... 197

## About Local Area Networks (LANs)

A Local Area Network (LAN) connects network devices together in a logical Layer-2 network.

The following diagram shows a LAN connected to the **ETH2** Ethernet device. Once the LAN is configured and enabled, the devices connected to the network interfaces can communicate with each other, as demonstrated by the **ping** commands.

## Configure a Local Area Network (LAN)

Configuring a Local Area Network (LAN) involves configuring the following items:

### *Required configuration items*

- A name for the interface.

  Note If the interface name is more than eight characters, the name will be truncated in the underlying network interface to the first six characters followed by three digits, incrementing from 000. This affects any custom scripts or firewall rules that may be trying to adjust the interface or routing table entries.

- The interface type: either **Ethernet**, **IP Passthrough**, or **PPPoE**.
- The firewall zone: **Internal**.
- The network device or bridge that is used by the LAN.
- The IPv4 address and subnet mask for the LAN. While it is not strictly necessary for a LAN to have an IP address, if you want to send traffic from other networks to the LAN, you must configure an IP address.

### *Additional configuration items*

- Additional IPv4 configuration:
  - The type being the way to control how the modem in the Digi device obtains an IP address from the cellular network.
  - The metric for IPv4 routes associated with the LAN.
  - The relative weight for IPv4 routes associated with the LAN.
  - The IPv4 management priority of the LAN. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
  - The IPv4 Maximum Transmission Unit (MTU) of the LAN.
  - Whether to assign a static IPv4 address to the LAN.
  - When to use DNS: always, never, or only when this interface is the primary default route.
  - IPv4 DHCP server configuration. See DHCP servers for more information.
- IPv6 configuration:
  - The type being the way to control how the modem in the Digi device obtains an IP address from the cellular network.
  - The metric for IPv6 routes associated with the LAN.
  - The relative weight for IPv6 routes associated with the LAN.

- The IPv6 management priority of the LAN. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
- The IPv6 Maximum Transmission Unit (MTU) of the LAN.
- Whether to assign a static IPv6 address to the LAN.
- When to use DNS: always, never, or only when this interface is the primary default route.
- The IPv6 prefix length and ID.
- IPv6 DHCP server configuration. See DHCP servers for more information.

- MAC address denylist and allowlist.

To create a new LAN or edit an existing LAN:

## Web

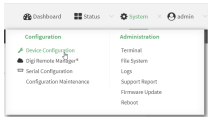
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

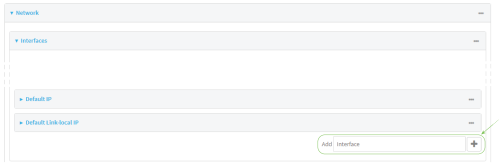
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

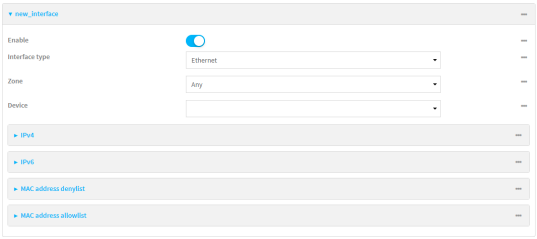
   

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces**.
4. Create the LAN or select an existing LAN:
   - To create a new LAN, for **Add interface**, type a name for the LAN and click ✚.

   - To edit an existing LAN, click to expand the LAN.

   The Interface configuration window is displayed.




New LANs are enabled by default. To disable, toggle off **Enable**.

5. For **Interface type**, leave at the default setting of **Ethernet**.
6. For **Zone**, select the appropriate firewall zone. See Firewall configuration for further information.
7. For **Device**, select an Ethernet device or a bridge. See Bridging for more information about bridging.
8. (Optional) Click to expand **802.1x** to configure 802.1x port based network access control.

   The Connect EZ 16/32 can function as an 802.1x authenticator; it does not function as an 802.1x supplicant.

   a. Click to expand **Authentication**.
   b. Click **Enable server** to enable the 802.1x authenticator on the Connect EZ 16/32 device.
   c. Set the **Reauth** period.
9. Configure IPv4 settings:
   a. Click to expand **IPv4**.

      IPv4 support is enabled by default.
   b. For **Type**, select **Static IP address**.
   c. For **Address**, type the IP address and subnet of the LAN interface. Use the format *IPv4_address/netmask*, for example, 192.168.2.1/24.
   d. Optional IPv4 configuration items:
      i. Set the **Metric**.
      ii. For **Weight**, type the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, **Weight** is used to load balance traffic to the interfaces.
      iii. Set the **Management priority**. This determines which interface will have priority for central management activity. The interface with the highest number will be used.
      iv. Set the **MTU**.
   e. Enable the DHCP server:
      i. Click to expand **DHCP server**.
      ii. Click **Enable**.

      See DHCP servers for information about configuring the DHCP server.
   f. Enable **Force link** to keep the network interface active even when the device link is down.
10. See Configure DHCP relay for information about configuring **DHCP relay**.
11. (Optional) Configure IPv6 settings:

a. Click to expand **IPv6**.
b. **Enable** IPv6 support.
c. For **Type**, select **IPv6 prefix delegration**.
d. For **Prefix length**, type the minimum length of the prefix to assign to this LAN. If the minimum length is not available, then a longer prefix will be used.
e. For **Prefix ID**, type the identifier used to extend the prefix to the assigned length. Leave blank to use a random identifier.
f. Set the **Metric**.
g. For **Weight**, type the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, **Weight** is used to load balance traffic to the interfaces.
h. Set the **Management priority**. This determines which interface will have priority for central management activity. The interface with the highest number will be used.
i. Set the **MTU**.
j. (Optional) To assign a static address to a network interface, click to expand **Static address**.
    i. Click the slider to enable.
    ii. For **Address**, type the name of the static address you want to use (for example, *tree::squirrel:tail/64*).

12. (Optional) Click to expand **MAC address denylist**.

    Incoming packets will be dropped from any devices whose MAC addresses is included in the **MAC address denylist**.

    a. Click to expand **MAC address denylist**.
    b. For **Add MAC address**, click ✚.
    c. Type the **MAC address**.

13. (Optional) Click to expand **MAC address allowlist**.

    If allowlist entries are specified, incoming packets will only be accepted from the listed MAC addresses.

    a. Click to expand **MAC address allowlist**.
    b. For **Add MAC address**, click ✚.
    c. Type the **MAC address**.

14. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new LAN or edit an existing one:
   - To create a new LAN named **my_lan**:

     ```
     (config)> add network interface my_lan
     (config network interface my_lan)>
     ```

   - To edit an existing LAN named **my_lan**, change to the **my_lan** node in the configuration schema:

     ```
     (config)> network interface my_lan
     (config network interface my_lan)>
     ```

4. Set the appropriate firewall zone:

   ```
   (config network interface my_lan)> zone zone
   (config network interface my_lan)>
   ```

   See Firewall configuration for further information.
5. Select an Ethernet device or a bridge. See Bridging for more information about bridging.
   a. Enter **device ?** to view available devices and the proper syntax.

      ```
      (config network interface my_lan)> device ?

      Current value:

      (config network interface my_lan)> device
      ```

   b. Set the device for the LAN:

      ```
      (config network interface my_lan)> device device
      (config network interface my_lan)>
      ```

6. Configure IPv4 settings:
   - IPv4 support is enabled by default. To disable:

     ```
     (config network interface my_lan)> ipv4 enable false
     (config network interface my_lan)>
     ```

   - The LAN is configured by default to use a static IP address for its IPv4 configuration. To configure the LAN to be a DHCP client, rather than using a static IP addres:

     ```
     (config network interface my_lan)> ipv4 type dhcp
     (config network interface my_lan)>
     ```

     These instructions assume that the LAN will use a static IP address for its IPv4 configuration.

   a. Set the IPv4 address and subnet of the LAN interface. Use the format *IPv4_address/netmask*, for example, 192.168.2.1/24.

      ```
      (config network interface my_lan)> ipv4 address ip_address/netmask
      (config network interface my_lan)>
      ```

b. Optional IPv4 configuration items:

i. Set the IP metric:

```
(config network interface my_lan)> ipv4 metric num
(config network interface my_lan)>
```

ii. Set the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, the weight is used to load balance traffic to the interfaces.

```
(config network interface my_lan)> ipv4 weight num
(config network interface my_lan)>
```

iii. Set the management priority. This determines which interface will have priority for central management activity. The interface with the highest number will be used.

```
(config network interface my_lan)> ipv4 mgmt num
(config network interface my_lan)>
```

iv. Set the MTU:

```
(config network interface my_lan)> ipv4 mtu num
(config network interface my_lan)>
```

c. Enable the DHCP server:

```
(config network interface my_lan)> ipv4 dhcp_server enable true
```

See DHCP servers for information about configuring the DHCP server.

d. See Configure WAN priority and default route metrics for further information about metrics.

7. (Optional) Configure IPv6 settings:

a. Enable IPv6 support:

```
(config network interface my_lan)> ipv6 enable true
(config network interface my_lan)>
```

b. Set the IPv6 type to DHCP:

```
(config network interface my_lan)> ipv6 type dhcpv6
(config network interface my_lan)>
```

c. Generally, the default settings for IPv6 support are sufficient. You can view the default IPv6 settings by using the question mark (**?**):

```
(config network interface my_lan)> ipv6 ?

IPv6

 Parameters                Current Value
 ------------------------------------------------------------------------
----------
```

```
 enable                    true               Enable
 metric                    0                  Metric
 mgmt                      0                  Management priority
 mtu                       1500               MTU
 prefix_id                 1                  Prefix ID
 prefix_length             48                 Prefix length
 type                      prefix_delegation  Type
 weight                    10                 Weight

 Additional Configuration
 ------------------------------------------------------------------------
----------
 connection_monitor        Active recovery
 dhcpv6_server             DHCPv6 server

(config network interface my_lan)>
```

View default settings for the IPv6 DHCP server:

```
(config network interface my_lan)> ipv6 dhcpv6_server ?

DHCPv6 server: The DHCPv6 server settings for this network interface.

 Parameters                Current Value
 ------------------------------------------------------------------------
----------
 enable                    true           Enable

(config network interface my_lan)>
```

d. Modify any of the remaining default settings as appropriate. For example, to change the minimum length of the prefix:

```
(config network interface my_lan)> ipv6 prefix_length 60
(config network interface my_lan)>
```

If the minimum length is not available, then a longer prefix will be used.

See Configure WAN/WWAN priority and default route metrics for further information about metrics.

e. (Optional) To assign a static address to a network interface:

```
>config
(config)> network interfacemy_lan ipv6 static ?

Static address: IPv6 static address.


Parameters          Current value
------------------------------------------------------------------------
```

```
address                                          Address
enable                        false              Enable

(config)> network interface my_lan ipv6 static address ?

Address: The IPv6 address to use.

Format: IPv6_address/prefix_length

Current value:

(config)>
```

8. (Optional) To configure 802.1x port based network access control:

   **Note** The Connect EZ 16/32 can function as an 802.1x authenticator; it does not function as an 802.1x supplicant.

   a. Enable the 802.1x authenticator on the Connect EZ 16/32 device:

   ```
   (config network interface my_lan)> 802_1x authentication enable true
   (config network interface my_lan)>
   ```

   b. Set the frequency period for reauthorization:

   ```
   (config network interface my_lan)> 802_1x authentication reauth_period
   value
   (config network interface my_lan)>
   ```

   where *value* is an integer between **0** and **86400**. The default is **3600**.

9. (Optional) Configure the MAC address deny list.

   Incoming packets will be dropped from any devices whose MAC addresses is included in the MAC address denylist.

   a. Add a MAC address to the denylist:

   ```
   (config network interface my_lan)> add mac_denylist end mac_address
   (config network interface my_lan)>
   ```

   where *mac_address* is a hyphen-separated MAC address, for example, 32-A6-84-2E-81-58.

   b. Repeat for each additional MAC address.

10. (Optional) Configure the MAC address allowlist.

    If allowlist entries are specified, incoming packets will only be accepted from the listed MAC addresses.

    a. Add a MAC address to the allowlist:

    ```
    (config network interface my_lan)> add mac_allowlist end mac_address
    (config network interface my_lan)>
    ```

    where *mac_address* is a hyphen-separated MAC address, for example, 32-A6-84-2E-81-58.

    b. Repeat for each additional MAC address.

11. Save the configuration and apply the change.

```
(config network interface my_lan)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure the ETH1 port as a LAN or in a bridge

By default, the ETH1 Ethernet port on your Connect EZ 16/32 is configured to function as a WAN port, which means that it:

- Uses the External firewall zone.
- Receives its IPv4 address from an upstream DHCP server.
- Has SureLink enabled to test the quality of its internet connection.

Alternatively, you can configure the ETH1 port to function as a LAN port, or you can create a bridge that includes the ETH1 and ETH2 ports.

### *Configure the ETH1 Ethernet port as a LAN*

This procedure reconfigures the ETH1 port to serve as port for a LAN, which will result in the device having two separate LANs: the default **ETH2** LAN, and the LAN created in this procedure. To utilize both LANs, you will need to have a device connected to the ETH1 port, and a separate device connected to the ETH2 port, and these devices will be on separate LANs.

If instead, you want the ETH1 port to be bridged with the ETH2 port, see Create a bridge that includes the ETH1 port.

To configure the ETH1 Ethernet port as a LAN:

#### Web

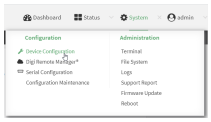
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

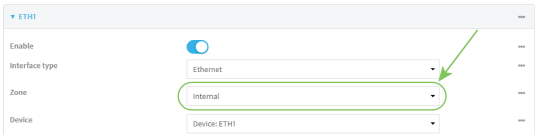
   Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

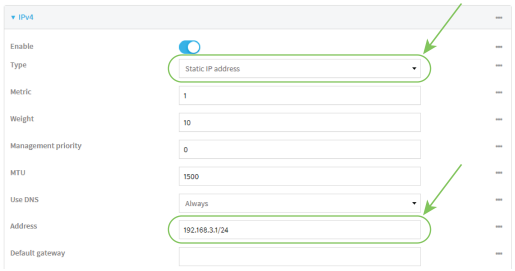


The **Configuration** window is displayed.

3. Click **Network** > **Interfaces** > **ETH1**.
4. For **Zone**, select **Internal**.




5. Configure IPv4 settings:
   a. Click to expand **IPv4**.
   b. For **Type**, select **Static IP address**.
   c. For **Address**, type the IPv4 address and netmask, using the format *IPv4_address/netmask*, for example, 192.168.3.1/24.




   d. Enable the DHCP server:
      i. Click to expand **DHCP server**.
      ii. Click to toggle on **Enable**.
   e. Disable **SureLink**:
      i. Click to expand **SureLink**.
      ii. Click to toggle off **Enable**.
6. (Optional) Configure IPv6 settings:
   a. Click to expand **IPv6**.
   b. For **Type**, select **IPv6 prefix delegation**.
7. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set the **zone** to **internal**:

```
(config)> network interface eth1 zone internal
(config)>
```

4. Configure IPv4 settings:
   a. Set the **type** to **static**:

```
(config)> network interface eth1 ipv4 type static
(config)>
```

   b. Set the address IPv4 address and netmask, using the format *IPv4_address/netmask*, for example:

```
(config)> network interface eth1 ipv4 address 192.168.3.1/24
(config)>
```

   c. Enable the DHCP server:

```
(config)> network interface eth1 ipv4 dhcp_server enable true
(config)>
```

   d. Disable SureLink:

```
(config)> network interface eth1 ipv4 surelink enable false
(config)>
```

5. (Optional) Configure IPv6:
   a. Set the **type** to **prefix_delegation**:

```
(config)> network interface eth1 ipv6 type prefix_delegation
(config)>
```

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### *Create a bridge that includes the ETH1 port*

This procedure will bridge the ETH1 port with the ETH2 port, which will configure the two Ethernet ports to function as a hub.

To bridge the Connect EZ 16/32 device's ETH1 Ethernet port with the ETH2 port:

**Web**

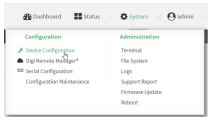
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

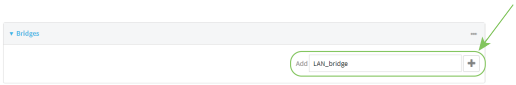
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

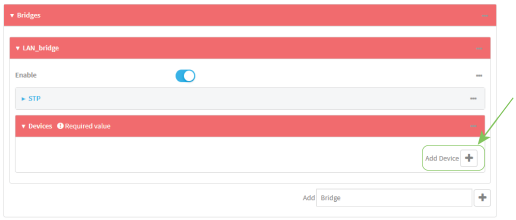
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Create the bridge and add devices:
   a. Click **Network** > **Bridges**.
   b. For **Add Bridge**, type a name for the bridge and click ✚.

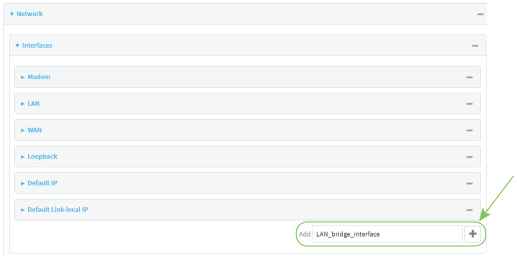
   

   c. Click to expand **Devices**.
   d. Click **Add Device** ✚.

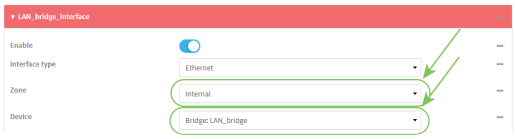
   

   e. For **Device**, select **Device: ETH1**.
   f. Click **Add Device** ✚ again and select the **Device: ETH2**.

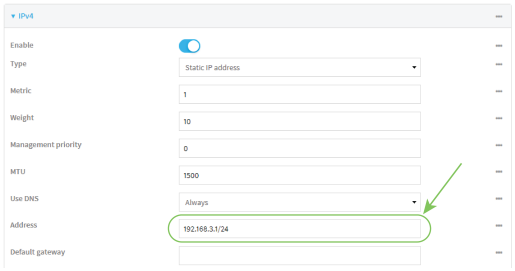
4. Create a LAN interface for the bridge:
   a. Click **Network** > **Interfaces**.
   b. For **Add Interface**, type a name for the interface and click ✚.




   c. For **Zone**, select **Internal**.
   d. For **Device**, select the new bridge.




   e. Click to expand **IPv4**.
   f. For **Address**, type the IPv4 address and netmask, using the format *IPv4_address*/*netmask*, for example, 192.168.3.1/24.




   g. Enable the DHCP server:
      i. Click to expand **DHCP server**.
      ii. Click to toggle on **Enable**.
5. Disable the ETH1 interface:
   a. Click **Network** > **Interfaces** > **ETH1**.
   b. Click to toggle off **Enable**.
6. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create the bridge and add devices:
   a. Create the bridge:

```
(config)> add network bridge bridge_name
(config network bridge bridge_name)>
```

   where *bridge_name* is the name of the new bridge. For example, to create a bridge named LAN_bridge:

```
(config)> add network bridge LAN_bridge
(config network bridge LAN_bridge)>
```

   b. Add the **eth1** device:

```
(config network bridge LAN_bridge)> add device end
/network/device/eth1
(config network bridge LAN_bridge)>
```

   c. Add the **eth2** device:

```
(config network bridge LAN_bridge)> add device end
/network/device/eth2
(config network bridge LAN_bridge)>
```

4. Create a LAN interface for the bridge:
   a. Type **...** to return to the root of the configuration:

```
(config network bridge LAN_bridge)> ...
(config)>
```

   b. Create the bridge:

```
(config)> add network interface interface_name
(config network interface interface_name)>
```

   where *interface_name* is the name of the new interface. For example, to create a interface named LAN_bridge_interface:

```
(config)> add network interface LAN_bridge_interface
(config network interface LAN_bridge_interface)>
```

   c. Set the **zone** to **internal**:

```
(config network interface LAN_bridge_interface)> zone internal
(config network interface LAN_bridge_interface)>
```

d. Set the **device** to the new bridge:

```
(config network interface LAN_bridge_interface)> device
/network/bridge/LAN_bridge
(config network interface LAN_bridge_interface)>
```

e. Set the IPv4 address and netmask for the interface, using the format *IPv4_address/netmask*, for example, 192.168.3.1/24:

```
(config network interface LAN_bridge_interface)> ipv4 address
192.168.3.1/24
(config network interface LAN_bridge_interface)>
```

f. Enable the DHCP server:

```
(config network interface LAN_bridge_interface)> ipv4 dhcp_server
enable true
(config network interface LAN_bridge_interface)>
```

5. Disable the eth1 interface:

```
(config)> network interface eth1 enable false
(config)>
```

6. Save the configuration and apply the change.

```
(config network interface LAN_bridge_interface)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Change the default LAN subnet

You can change the Connect EZ 16/32 default LAN subnet—192.168.2.1/24—to any range of private IPs. The local DHCP server range will also change to the range of the LAN subnet.

To change the LAN subnet:

### Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

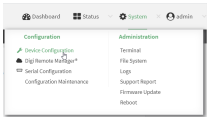
   b. Click the **Device ID**.

   c. Click **Settings**.

d. Click to expand **Config**.

Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network** > **Interfaces** > **LAN** > **IPv4**.
4. For **Address**, change the IP address to an alternate private IP. You must also specify the subnet mask. It must have the syntax of *IPv4_address/netmask*.
5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, set the IP address to an alternate private IP:

```
(config)> network interface lan ipv4 address IPv4_address/netmask
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show LAN status and statistics

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. From the menu, click **Status**.
2. Under **Networking**, click **Interfaces**.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Enter the show network command at the Admin CLI prompt:

```
> show network

 Interface         Proto  Status   Address
 ----------------  -----  -------  ------------------------------
 setupip          IPv4   up       192.168.210.1/24
 setuplinklocalip  IPv4   up         169.254.100.100/16
 eth1              IPv4   up         10.10.10.10/24
 eth1              IPv6   up         fe00:2404::240:f4ff:fe80:120/64
 eth2              IPv4   up         192.168.2.1/24
 eth2              IPv6   up         fd00:2704::1/48
 loopback          IPv4   up         127.0.0.1/8
 modem             IPv4   up         10.200.1.101/30
 modem             IPv6   down

>
```

3. Additional information can be displayed by using the show network verbose command:

```
> show network verbose

 Interface         Proto  Status   Type    Zone      Device    Metric
Weight
 ----------------  -----  -------  ------  --------  --------  ------  --
----
 setupip          IPv4   up       static  setup     eth2      10      10
 setuplinklocalip  IPv4   up         static  setup     eth2      0         10
 eth1              IPv4   up         dhcp    external  eth1      1         10
 eth1              IPv6   up         dhcp    external  eth1      1         10
 eth2              IPv4   up         static  internal  eth2      5         10
 eth2              IPv6   up         static  internal  eth2      5         10
 loopback          IPv4   up         static  loopback  loopback  0         10
 modem             IPv4   up         modem   external  wwan1     3         10
 modem             IPv6   down     modem   external  wwan1     3         10

>
```

4. Enter **show network interface *name*** at the Admin CLI prompt to display additional information about a specific LAN. For example, to display information about ETH2, enter **show network interface *eth2***:

```
> show network interface eth2

 lan1 Interface Status
```

```
---------------------
Device              : eth2
Zone                : internal

IPv4 Status         : up
IPv4 Type           : static
IPv4 Address(es)    : 192.168.2.1/24
IPv4 Gateway        :
IPv4 MTU            : 1500
IPv4 Metric         : 5
IPv4 Weight         : 10
IPv4 DNS Server(s)  :

IPv6 Status         : up
IPv6 Type           : prefix
IPv6 Address(es)    : fd00:2704::1/48
IPv6 Gateway        :
IPv6 MTU            : 1500
IPv6 Metric         : 5
IPv6 Weight         : 10
IPv6 DNS Server(s)  :

>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Delete a LAN

Follow this procedure to delete any LANs that have been added to the system. You cannot delete the preconfigured LAN, **LAN1**.

### Web

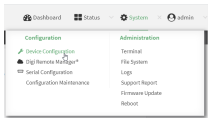
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.




The **Configuration** window is displayed.

3. Click **Network** > **Interfaces**.
4. Click the menu icon (**...**) next to the name of the LAN to be deleted and select **Delete**.

5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **del** command to delete the LAN. For example, to delete a LAN named my_lan:

```
(config)> del network interface my_lan
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## DHCP servers

You can enable DHCP on your Connect EZ 16/32 device to assign IP addresses to clients, using either:

- The DHCP server for the device's local network, which assigns IP addresses to clients on the device's local network. Addresses are assigned from a specified pool of IP addresses. For a local network, the device uses the DHCP server that has the IP address pool in the same IP subnet as the local network.

  When a host receives an IP configuration, the configuration is valid for a particular amount of time, known as the lease time. After this lease time expires, the configuration must be renewed. The host renews the lease time automatically.
- A DHCP relay server, which forwards DHCP requests from clients to a DHCP server that is running on a separate device.

### *Configure a DHCP server*

Note These instructions assume you are configuring the device to use its local DHCP server. For instructions about configuring the device to use a DHCP relay server, see Configure DHCP relay.

#### *Required configuration items*

- Enable the DHCP server.

***Additional configuration items***

- The lease address pool: the range of IP addresses issued by the DHCP server to clients.
- Lease time: The length, in minutes, of the leases issued by the DHCP server.
- The Maximum Transmission Units (MTU).
- The domain name suffix appended to host names.
- The IP gateway address given to clients.
- The IP addresses of the preferred and alternate Domain Name Server (DNS), NTP servers, and WINS severs that are given to clients.
- The TFTP server name.
- The filepath and name of the bootfile on the TFTP server.
- Custom DHCP options. See Configure DHCP options for information about custom DHCP options.
- Static leases. See Map static IP addresses to hosts for information about static leases.

## Web

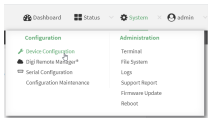
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces**.
4. Click to expand an existing LAN, or create a new LAN. See Configure a Local Area Network (LAN).
5. Click to expand **IPv4** > **DHCP server**.
6. **Enable** the DHCP server.
7. (Optional) For **Lease time**, type the amount of time that a DHCP lease is valid.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

For example, to set **Lease time** to ten minutes, enter **10m** or **600s**.

The default is 12 hours.

- By default, DHCP leases are persistent across reboots. You can disable persistent leases:
  a. Click **Network** > **Advanced**.
  b. Click to toggle off **DHCP persistent leases**.

8. (Optional) For **Lease range start** and **Lease range end**, type the lowest and highest IP address that the DHCP server will assign to a client. This value represents the low order byte of the address (the final triplet in an IPv4 address, for example, 192.168.2.**xxx**). The remainder of the IP address will be based on the LAN's static IP address as defined in the **Address** field.

   Allowed values are between **1** and **254**, and the default is **100** for **Lease range start** and **250** for **Lease range end**.

   - Sequential DHCP address allocation:

     By default, DHCP addresses are assigned psuedo-randomly, using a hash of the client's MAC address to determine the IP address that gets assigned. You can configure the device to use sequential IP addresses instead:

     a. Click **Network** > **Advanced**.
     b. Click to enable **Sequential DHCP address allocation**.

     Because sequential mode does not use a hash based on the client's MAC address, when DHCP lease expires, the client is not likely to get the same IP address assigned to it. Therefore, sentential DHCP address allocation generally should not be used.

9. Optional DHCP server settings:
   a. Click to expand **Advanced settings**.
   b. For **Gateway**, select either:
      - **None**: No gateway is broadcast by the DHCP server. Client destinations must be resolvable without a gateway.
      - **Automatic**: Broadcasts the Connect EZ 16/32 device's gateway.
      - **Custom**: Allows you to identify the IP address of a **Custom gateway** to be broadcast.

      The default is **Automatic**.
   c. For **MTU**,
      - **None**: An MTU of length **0** is broadcast. This is not recommended.
      - **Automatic**: No MTU is broadcast and clients will determine their own MTU.
      - **Custom**: Allows you to identify a **Custom MTU** to be broadcast.

      The default is **Automatic**.
   d. For **Domain name suffix**, type the domain name that should be appended to host names.
   e. For **Primary** and **Secondary DNS**, **Primary** and **Secondary NTP server**, and **Primary** and **Secondary WINS server**, select either:
      - **None**: No server is broadcast.
      - **Automatic**: Broadcasts the Connect EZ 16/32 device's server.
      - **Custom**: Allows you to identify the IP address of the server.

f. Enable **BOOTP dynamic allocation** to automatically assign an IP address to a device on the server.

**CAUTION!** The IP address assigned to the device is leased forever and becomes permanently unavailable for other hosts to use.

g. For **Bootfile name**, type the relative path and file name of the bootfile on the TFTP server.

h. For **TFTP server** name, type the IP address or host name of the TFTP server.

i. Enable

10. See Configure DHCP options for information about **Custom DHCP options**.
11. See Map static IP addresses to hosts for information about **Static leases**.
12. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the DHCP server for an existing LAN. For example, to enable the DHCP server for a LAN named **my_lan**:

```
(config)> network interface my_lan ipv4 dhcp_server enable true
(config)>
```

   See Configure a Local Area Network (LAN) for information about creating a LAN.

4. (Optional) Set the amount of time that a DHCP lease is valid:

```
(config)> network interface my_lan ipv4 dhcp_server lease_time value
(config)>
```

   where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

   For example, to set **network interface my_lan ipv4 dhcp_server lease_time** to ten minutes, enter either **10m** or **600s**:

```
(config)> network interface my_lan ipv4 dhcp_server lease_time 600s
(config)>
```

   - By default, DHCP leases are persistent across reboots. You can disable persistent leases:

```
(config)> network advanced dhcp_persistent_lease false
(config)>
```

5. (Optional) Set the lowest IP address that the DHCP server will assign to a client. This value represents the low order byte of the address (the final triplet in an IPv4 address, for example, 192.168.2.**xxx**). The remainder of the IP address will be based on the LAN's static IP address as defined in the **address** parameter.

```
(config)> network interface my_lan ipv4 dhcp_server lease_start num
(config)>
```

Allowed values are between **1** and **254**, and the default is **100**.

6. (Optional) Set the highest IP address that the DHCP server will assign to a client:

```
(config)> network interface my_lan ipv4 dhcp_server lease_end num
(config)>
```

Allowed values are between **1** and **254**, and the default is **250**.

7. Sequential DHCP address allocation

By default, DHCP addresses are assigned psuedo-randomly, using a hash of the client's MAC address to determine the IP address that gets assigned. You can configure the device to use sequential IP addresses instead:

```
(config)> network advanced sequential_dhcp_allocation true
(config)>
```

Because sequential mode does not use a hash based on the client's MAC address, when DHCP lease expires, the client is not likely to get the same IP address assigned to it. Therefore, sentential DHCP address allocation generally should not be used.

8. Optional DHCP server settings:
   a. Click to expand **Advanced settings**.
   b. Determine how the DHCP server should broadcast the gateway server:

```
(config)> network interface my_lan ipv4 dhcp_server advanced gateway
value
(config)>
```

where **value** is one of:

- **none**: No gateway is broadcast by the DHCP server. Client destinations must be resolvable without a gateway.
- **auto**: Broadcasts the Connect EZ 16/32 device's gateway.
- **custom**: Allows you to identify the IP address of a custom gateway to be broadcast:

```
(config)> network interface my_lan ipv4 dhcp_server advanced
gateway_custom ip_address
(config)>
```

The default is **auto**.

c. Determine how the DHCP server should broadcast the the MTU:

```
(config)> network interface my_lan ipv4 dhcp_server advanced mtu value
(config)>
```

where **value** is one of:

- **none**: An MTU of length **0** is broadcast. This is not recommended.
- **auto**: No MTU is broadcast and clients will determine their own MTU.
- **custom**: Allows you to identify a custom MTU to be broadcast:

```
(config)> network interface my_lan ipv4 dhcp_server advanced
mtu_custom mtu
(config)>
```

The default is **auto**.

d. Set the domain name that should be appended to host names:

```
(config)> network interface my_lan ipv4 dhcp_server advanced domain_
suffix name
(config)>
```

e. Set the IP address or host name of the primary and secondary DNS, the primary and secondary NTP server, and the primary and secondary WINS servers:

```
(config)> network interface my_lan ipv4 dhcp_server advanced primary_
dns value
(config)> network interface my_lan ipv4 dhcp_server advanced
secondary_dns value
(config)> network interface my_lan ipv4 dhcp_server advanced primary_
ntp value
(config)> network interface my_lan ipv4 dhcp_server advanced
secondary_ntp value
(config)> network interface my_lan ipv4 dhcp_server advanced primary_
wins value
(config)> network interface my_lan ipv4 dhcp_server advanced
secondary_wins value
(config)>
```

where **value** is one of:

- **none**: No server is broadcast.
- **auto**: Broadcasts the Connect EZ 16/32 device's server.
- **custom**: Allows you to identify the IP address of the server. For example:

```
(config)> network interface my_lan ipv4 dhcp_server advanced
primary_dns_custom ip_address
(config)>
```

The default is **auto**.

f. Set the IP address or host name of the TFTP server:

```
(config)> network interface my_lan ipv4 dhcp_server advanced nftp_
server ip_address
(config)>
```

g. Set the relative path and file name of the bootfile on the TFTP server:

```
(config)> network interface my_lan ipv4 dhcp_server advanced bootfile
filename
(config)>
```

h. Enable **BOOTP dynamic allocation** to automatically assign an IP address to a device on the server:

**CAUTION!** The IP address assigned to the device is leased forever and becomes permanently unavailable for other hosts to use.

```
(config)> network interface my_lan ipv4 dhcp_server advanced bootp_
dynamic true
(config)>
```

9. See Configure DHCP options for information about custom DHCP options.
10. See Map static IP addresses to hosts for information about static leases.
11. Save the configuration and apply the change.

```
(config network interface my_lan ipv4 dhcp_server advanced static_lease
0)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### Map static IP addresses to hosts

You can configure the DHCP server to assign static IP addresses to specific hosts.

#### Required configuration items

- IP address that will be mapped to the device.
- MAC address of the device.

#### Additional configuration items

- A label for this instance of the static lease.

To map static IP addresses:

Web

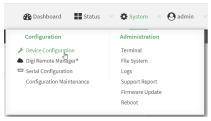
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces**.
4. Click to expand an existing LAN, or create a new LAN. See Configure a Local Area Network (LAN).
5. Click to expand **IPv4** > **DHCP server** > **Advanced settings** > **Static leases**.
6. For **Add Static lease**, click ✚.
7. Type the **MAC address** of the device associated with this static lease.
8. Type the **IP address** for the static lease.

   **Note** The IP address here should be outside of the DHCP server's configured lease range. See Configure a DHCP server for further information about the lease range.
9. (Optional) For **Hostname**, type a label for the static lease. This does not have to be the device's actual hostname.
10. Repeat for each additional DHCP static lease.
11. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a static lease to the DHCP server configuration for an existing LAN. For example, to add static lease to a LAN named **my_lan**:

```
(config)> add network interface my_lan ipv4 dhcp_server advanced static_
lease end
(config network interface my_lan ipv4 dhcp_server advanced static_lease
0)>
```

   See Configure a Local Area Network (LAN) for information about creating a LAN.

4. Set the MAC address of the device associated with this static lease, using the colon-separated format:

```
(config network interface my_lan ipv4 dhcp_server advanced static_lease
0)> mac 00:40:D0:13:35:36
(config network interface my_lan ipv4 dhcp_server advanced static_lease
0)>
```

5. Set the IP address for the static lease:

```
(config network interface my_lan ipv4 dhcp_server advanced static_lease
0)> ip 10.01.01.10
(network interface my_lan ipv4 dhcp_server advanced static_lease 0)>
```

   **Note** The IP address here should be outside of the DHCP server's configured lease range. See Configure a DHCP server for further information about the lease range.

6. (Optional) Set a label for this static lease:

```
(config network interface my_lan ipv4 dhcp_server advanced static_lease
0)> name label
(config network interface my_lan ipv4 dhcp_server advanced static_lease
0)>
```

7. Save the configuration and apply the change.

```
(config network interface my_lan ipv4 dhcp_server advanced static_lease
0)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### *Show current static IP mapping*

To view your current static IP mapping:

**Web**

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the main menu, click **Status**
2. Under **Networking**, click **DHCP Leases**.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Show the static lease configuration. For example, to show the static leases for a lan named **my_lan**:

```
(config)> show network interface my_lan ipv4 dhcp_server advanced static_
lease
0
    ip 192.168.2.10
    mac BF:C3:46:24:0E:D9
    no name
1
    ip 192.168.2.11
    mac E3:C1:1F:65:C3:0E
    no name
(config)>
```

4. Type **cancel** to exit configuration mode:

```
(config)> cancel
>
```

5. Type exit to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## *Delete static IP mapping entries*

To delete a static IP entry:

### Web

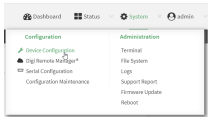
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
b. Click the **Device ID**.
c. Click **Settings**.
d. Click to expand **Config**.

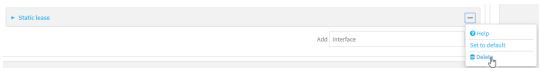
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network** > **Interfaces**.
4. Click to expand an existing LAN.
5. Click to expand **IPv4** > **DHCP server** > **Advanced settings** > **Static leases**.
6. Click the menu icon (**...**) next to the name of the static lease to be deleted and select **Delete**.



7. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Show the static lease configuration. For example, to show the static leases for a lan named **my_lan**:

```
(config)> show network interface my_lan ipv4 dhcp_server advanced static_
lease
0
    ip 192.168.2.10
    mac BF:C3:46:24:0E:D9
    no name
1
    ip 192.168.2.11
    mac E3:C1:1F:65:C3:0E
    no name
(config)>
```

4. Use the **del *index_number*** command to delete a static lease. For example, to delete the static lease for the device listed in the above output with a mac address of BF:C3:46:24:0E:D9 (index number **0**):

```
(config)> del network interface lan1 ipv4 dhcp_server advanced static_
lease 0
(config)>
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## *Configure DHCP options*

You can configure DHCP servers running on your Connect EZ device to send certain specified DHCP options to DHCP clients. You can also set the user class, which enables you to specify which specific DHCP clients will receive the option. You can also force the command to be sent to the clients.

DHCP options can be set on a per-LAN basis, or can be set for all LANs. A total of 32 DHCP options can be configured.

### *Required configuration items*

- DHCP option number.
- Value for the DHCP option.

### *Additional configuration items*

- The data type of the value.
- Force the option to be sent to the DHCP clients.
- A label for the custom option.

### Web

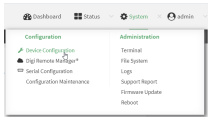
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces**.
4. Click to expand an existing LAN, or create a new LAN. See Configure a Local Area Network (LAN).
5. Click to expand **IPv4** > **DHCP server** > **Advanced settings** > **Custom DHCP option**.
6. For **Add Custom option**, click ✚.

   Custom options are enabled by default. To disable, toggle off **Enable**.
7. For **Option number**, type the DHCP option number.
8. For **Value**, type the value of the DHCP option.
9. (Optional) For **Label**, type a label for the custom option.
10. (Optional) If **Forced send** is enabled, the DHCP option will always be sent to the client, even if the client does not ask for it.
11. (Optional) For **Data type**, select the data type that the option uses. If the incorrect data type is selected, the device will send the value as a string.
12. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a custom DHCP option to the DHCP server configuration for an existing LAN. For example, to add static lease to a LAN named **my_lan**:

```
(config)> add network interface my_lan ipv4 dhcp_server advanced custom_
option end
(config network interface my_lan ipv4 dhcp_server advanced custom_option
0)>
```

See Configure a Local Area Network (LAN) for information about creating a LAN.

4. Custom options are enabled by default. To disable:

```
(config network interface my_lan ipv4 dhcp_server advanced custom_option
0)> enable false
(config network interface my_lan ipv4 dhcp_server advanced custom_option
0)>
```

5. Set the option number for the DHCP option:

```
(config network interface my_lan ipv4 dhcp_server advanced custom_option
0)> option 210
(config network interface my_lan ipv4 dhcp_server advanced custom_option
0)>
```

6. Set the value for the DHCP option:

```
(config network interface my_lan ipv4 dhcp_server advanced custom_option
0)> value_str value
(network interface my_lan ipv4 dhcp_server advanced custom_option 0)>
```

7. (Optional) Set a label for this custom option:

```
(config network interface my_lan ipv4 dhcp_server advanced custom_option
0)> name label
(config network interface my_lan ipv4 dhcp_server advanced custom_option
0)>
```

8. (Optional) To force the DHCP option to always be sent to the client, even if the client does not ask for it:

```
(config network interface my_lan ipv4 dhcp_server advanced custom_option
0)> force true
(config network interface my_lan ipv4 dhcp_server advanced custom_option
0)>
```

9. (Optional) Set the data type that the option uses.

   If the incorrect data type is selected, the device will send the value as a string.

```
(config network interface my_lan ipv4 dhcp_server advanced custom_option
0)> datatype value
(config network interface my_lan ipv4 dhcp_server advanced custom_option
0)>
```

where *value* is one of:

- **1byte**
- **2byte**
- **4byte**
- **hex**
- **ipv4**
- **str**

The default is **str**.

10. Save the configuration and apply the change.

```
(config network interface my_lan ipv4 dhcp_server advanced custom_option
0)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### *Configure DHCP relay*

DHCP relay allows a router to forward DHCP requests from one LAN to a separate DHCP server, typically connected to a different LAN.

For the Connect EZ 16/32 device, DHCP relay is configured by providing the IP address of a DHCP relay server, rather than an IP address range. If both the DHCP relay server and an IP address range are specified, DHCP relay is used, and the specified IP address range is ignored.

Multiple DHCP relay servers can be provided for each LAN. If multiple relay servers are provided, DHCP requests are forwarded to all servers without waiting for a response. Clients will typically use the IP address from the first DHCP response received.

Configuring DHCP relay involves the following items:

#### *Required configuration items*

- Disable the DHCP server, if it is enabled.
- IP address of the primary DHCP relay server, to define the relay server that will respond to DHCP requests.

#### *Additional configuration items*

- IP address of additional DHCP relay servers.

Web

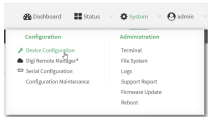
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces**.
4. Click to expand an existing LAN, or create a new LAN. See Configure a Local Area Network (LAN).
5. Disable the DHCP server, if it is enabled:
   a. Click to expand **IPv4** > **DHCP server**.
   b. Click **Enable** to toggle off the DHCP server.
6. Click to expand **DHCP relay**.
7. For **Add DHCP Server:**, click ✚.
8. For **DHCP server address**, type the IP address of the relay server.
9. Repeat for each additional DHCP relay server.
10. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a DHCP relay server to an existing LAN. For example, to add a server to a LAN named **my_lan**:

```
(config)> add network interface my_lan ipv4 dhcp_relay end
(config network interface lan1 my_lan dhcp_relay 0)>
```

See Configure a Local Area Network (LAN) for information about creating a LAN.

4. Set the IP address of the DHCP relay server:

```
(config network interface my_lan ipv4 dhcp_relay 0)> address 10.10.10.10
(config network interface my_lan ipv4 dhcp_relay 0)>
```

5. (Optional) Add additional DHCP relay servers:
   a. Move back one step in the configuration schema by typing two periods (**..**):

```
(config network interface my_lan ipv4 dhcp_relay 0)> ..
(config network interface my_lan ipv4 dhcp_relay)>
```

   b. Add the next server:

```
(config network interface lan1 ipv4 dhcp_relay)> add end
(config network interface lan1 ipv4 dhcp_relay 1)>
```

   c. Set the IP address of the DHCP relay server:

```
(config network interface my_lan ipv4 dhcp_relay 1)> address
10.10.10.11
(config network interface my_lan ipv4 dhcp_relay 1)>
```

   d. Repeat for each additional relay server.

1. Disable the DHCP server, if it is enabled:

```
(config network interface my_lan ipv4 dhcp_relay 1)> .. .. dhcp_server
enable false
(config network interface my_lan ipv4 dhcp_relay 1)>
```

6. Save the configuration and apply the change.

```
(config network interface lan1 ipv4 dhcp_relay 1)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### *Show DHCP server status and settings*

View DHCP status to monitor which devices have been given IP configuration by the Connect EZ device and to diagnose DHCP issues.

**Web**

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the main menu, click **Status**
2. Under **Networking**, click **DHCP Leases**.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Enter the show dhcp-lease command at the Admn CLI prompt:

```
> show dhcp-lease

 IP Address     Hostname         Expires
 -------------  ---------------  -------
 192.168.2.194  MTK-ENG-USER1
 192.168.2.195  MTK-ENG-USER2

>
```

3. Additional information can be returned by using the show dhcp-lease verbose command:

```
> show dhcp-lease verbose

 IP Address     Hostname      Expires                   Type     Active
MAC Address
 -------------  --------      ------------------------  -------  ------
-----------------
 192.168.2.194  MTK-ENG-USER1 May 19 08:25:11 UTC 2021  Dynamic  Yes
ba:ba:2c:13:8c:71
 192.168.2.195  MTK-ENG-USER2 May 20 11:32:12 UTC 2021  Dynamic  Yes
09:eb:10:f0:bc:16

>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Default services listening on LAN ports

The following table lists the default services listening on the specified ports on the Connect EZ 16/32 LAN interfaces:

| Description | TCP/UDP | Port numbers |
|---|---|---|
| DNS server | UDP | 53 |
| DHCP server | UDP | 67 and 68 |

| Description | TCP/UDP | Port numbers |
|---|---|---|
| SSH server | TCP | 22 |
| Web UI | TCP | 443 (also listens on port 80, then redirects to port 443 |

## Configure an interface to operate in passthrough mode

You can configure interfaces on your Connect EZ 16/32 device to operate in passthrough mode, which means that the device passes the IP address assigned to it on a WAN or cellular modem interface, to a client connected to a LAN interface.

### Web

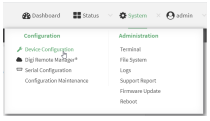
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

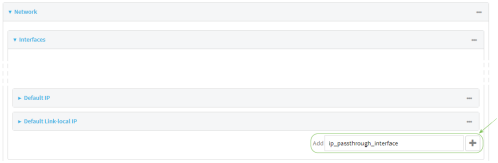
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

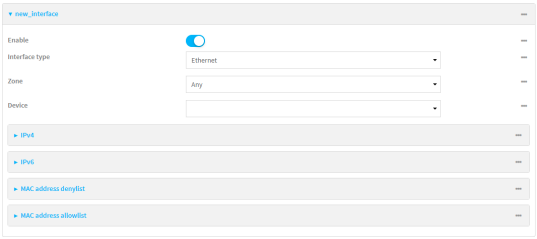
   

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces**.
4. Create the interface or select an existing interface:
   - To create a new interface, for **Add interface**, type a name for the interface and click ✚.

   - To edit an existing interface, click to expand the interface.

   The Interface configuration window is displayed.




New Interfaces are enabled by default. To disable, toggle off **Enable**.

5. For **Interface type**, select **IP Passthrough**.
6. For **Zone**, select **Internal**.
7. For Device, select an Ethernet device or a Wi-Fi access point.
8. Add one or more interface that will be the source of the passed-through IP address:
   a. Click to expand **Source interfaces**.
   b. Click ✚ to add a source interface.
   c. Select the appropriate **Interface**.
   d. Repeat for additional interfaces.
9. (Optional) **Packet filtering** is disabled by default. Toggle on to enable.

   If packet filtering is disabled, traffic is allowed in both directions and it is the responsibility of the external device to provide its own firewall.
10. (Optional) **Allow all addresses** is disabled by default. Toggle on to enable.

    When enabled, this option allows forwarding between the source interface and devices connected to this interface, which allows connected devices to forward and receive packets without network address translation (NAT). This should normally be disabled unless it is required for modem passthrough, because some cellular will disconnect modems that send packets that are not from the carrier-assigned IP address.
11. **Ancillary addressing** is enabled by default, which provides an IPv4 address to the connected device when the source address is not available.
    a. For **Ancillary address/netmask**, type the IPv4 address and netmask to provide to the connected device when the source address is not available.
    b. For **Ancillary gateway**, type the IPv4 address of the network gateway to be used when the connected device when the source address is not available.
    c. **Ancillary DNS redirect** is enabled by default, which means resolves all DNS requests to the connected device and redirects HTTP traffic to the device's web administration page.
12. For **Server type**, select the type of server to use to pass the IP address through to the client.
13. If **PPPoE server** is selected for **Server type**:
    a. Click to expand **PPPoE server**.
    b. For **Service name**, type the name of service to offer to the client.
    c. For **Access concentrator name**, type the name of the access concentrator to report to the client. If no name is provided, the host name is used.
    d. For **Authentication method**, select the authentication method used to connect to the remote peer.

If an authentication method is selected, type the **Username** and **Password** required to authenticate the remote peer.

e. (Optional) Click to expand **Custom PPP configuration**.

f. Custom PPP configuration is disabled by default. Click toggle on **Enable**.

g. Enable **Override** to override the default configuration and use only the custom configuration file.

h. For **Configuration** file, type or paste configuration data using the format of a pppd options file.

14. (Optional) Click to expand **802.1x** to configure 802.1x port based network access control.

The Connect EZ 16/32 can function as an 802.1x authenticator; it does not function as an 802.1x supplicant.

a. Click to expand **Authentication**.

b. Click **Enable server** to enable the 802.1x authenticator on the Connect EZ 16/32 device.

c. Set the **Reauth** period.

15. Configure IPv4 settings:

a. Click to expand **IPv4**.

IPv4 support is enabled by default.

b. Set the **Metric**.

c. For **Weight**, type the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, **Weight** is used to load balance traffic to the interfaces.

d. Set the **Management priority**. This determines which interface will have priority for central management activity. The interface with the highest number will be used.

e. Set the **MTU**.

f. For **Use DNS**, select one of the following:

- **Always**: DNS will always be used for this WAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
- **When primary default route**: Only use the DNS servers provided for this interface when the interface is the primary route.
- **Never**: Never use DNS servers for this interface.

g. See Configure SureLink active recovery to detect WAN/WWAN failures for information about configuring **SureLink** for active recovery.

16. (Optional) Configure IPv6 settings:

a. Click to expand **IPv6**.

b. **Enable** IPv6 support.

c. Set the **Metric**.

d. For **Weight**, type the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, **Weight** is used to load balance traffic to the interfaces.

e. Set the **Management priority**. This determines which interface will have priority for central management activity. The interface with the highest number will be used.

f. Set the **MTU**.

g. For **Use DNS**, select one of the following:

- **Always**: DNS will always be used for this WAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
- **When primary default route**: Only use the DNS servers provided for this interface when the interface is the primary route.
- **Never**: Never use DNS servers for this interface.

h. See Configure SureLink active recovery to detect WAN/WWAN failures for information about configuring **SureLink** for active recovery.

17. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new interface or edit an existing one:

   - To create a new interface named **ip_passthrough_interface**:

```
(config)> add network interface ip_passthrough_interface
(config network interface ip_passthrough_interface)>
```

   - To edit an existing interface named **ip_passthrough_interface**, change to the IP-passthrough-interface node in the configuration schema:

```
(config)> network interface ip_passthrough_interface
(config network interface ip_passthrough_interface)>
```

4. Set the interface type to passthrough:

```
(config network interface ip_passthrough_interface)> type passthrough
(config network interface ip_passthrough_interface)>
```

5. Set the firewall zone to internal:

```
(config network interface ip_passthrough_interface)> zone internal
(config network interface ip_passthrough_interface)>
```

6. Select an Ethernet device or a Wi-Fi access point for this interface:

   a. Enter **device ?** to view available devices and the proper syntax.

```
(config network interface my_wan)> device ?
```

```
Current value:

(config network interface ip_passthrough_interface)> device
```

b. Set the device for the interface:

```
(config network interface ip_passthrough_interface)> device device
(config network interface my_wan)>
```

7. Set passthrough options
8. Configure IPv4 settings:
   - IPv4 support is enabled by default. To disable:

```
(config network interface ip_passthrough_interface)> ipv4 enable
false
(config network interface ip_passthrough_interface)>
```

   a. Set the IP metric:

```
(config network interface ip_passthrough_interface)> ipv4 metric num
(config network interface ip_passthrough_interface)>
```

   b. Set the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, the weight is used to load balance traffic to the interfaces.

```
(config network interface ip_passthrough_interface)> ipv4 weight num
(config network interface ip_passthrough_interface)>
```

   c. Set the management priority. This determines which interface will have priority for central management activity. The interface with the highest number will be used.

```
(config network interface ip_passthrough_interface)> ipv4 mgmt num
(config network interface ip_passthrough_interface)>
```

   d. Set the MTU:

```
(config network interface ip_passthrough_interface)> ipv4 mtu num
(config network interface ip_passthrough_interface)>
```

   e. Configure how to use DNS:

```
(config network interface ip_passthrough_interface)> ipv4 use_dns
value
(config network interface ip_passthrough_interface)>
```

   where *value* is one of:

   - **always**: DNS will always be used for this WAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.

- **primary**: Only use the DNS servers provided for this interface when the interface is the primary route.
- **never**: Never use DNS servers for this interface.

f. See Configure SureLink active recovery to detect WAN/WWAN failures for information about configuring **SureLink** for active recovery.

9. (Optional) Configure IPv6 settings:

a. Enable IPv6 support:

```
(config network interface ip_passthrough_interface)> ipv6 enable true
(config network interface ip_passthrough_interface)>
```

b. Generally, the default settings for IPv6 support are sufficient. You can view the default IPv6 settings by using the question mark (**?**):

```
(config network interface ip_passthrough_interface)> ipv6 ?

IPv6

 Parameters                Current Value
-------------------------------------------------------------------------
---------
 enable                    true              Enable
 metric                    0                 Metric
 mgmt                      0                 Management priority
 mtu                       1500              MTU
 use_dns                   always            Use DNS
 weight                    10                Weight

(config network interface ip_passthrough_interface)>
```

c. Modify any of the remaining default settings as appropriate.

10. (Optional) To configure 802.1x port based network access control:

**Note** The Connect EZ 16/32 can function as an 802.1x authenticator; it does not function as an 802.1x supplicant.

a. Enable the 802.1x authenticator on the Connect EZ 16/32 device:

```
(config network interface ip_passthrough_interface)> 802_1x
authentication enable true
(config network interface ip_passthrough_interface)>
```

b. Set the frequency period for reauthorization:

```
(config network interface ip_passthrough_interface)> 802_1x
authentication reauth_period value
(config network interface ip_passthrough_interface)>
```

where *value* is an integer between **0** and **86400**. The default is **3600**.

11. Save the configuration and apply the change.

```
(config network interface ip_passthrough_interface)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Virtual LANs (VLANs)

Virtual LANs (VLANs) allow splitting a single physical LAN into separate Virtual LANs. Each device on a VLAN can only access other devices on the same VLAN and each device is unaware of any other VLAN, which isolates networks from one another, even though they run over the same physical network.

Your Connect EZ 16/32 device supports two VLANs modes:

- Trunking: Supports multiple VLANs per Ethernet port, which enables you to extend your VLAN across multiple switches through your entire network.
- Switchport: Each Ethernet port can have one or more VLAN IDs associated to it. Any un-tagged VLAN packets that come into a network interface are automatically tagged with the primary VLAN ID for that switchport. This allows devices on the network that aren't configured with a VLAN to act as if they are directly connected to the VLAN.

This section contains the following topics:

Create a trunked VLAN route ..... 204
Create a VLAN using switchport mode ..... 206

## Create a trunked VLAN route

**Required configuration items**

- Device to be assigned to the VLAN.
- The VLAN ID. The TCP header uses the VLAN ID to identify the destination VLAN for the packet.

To create a VLAN:

### Web

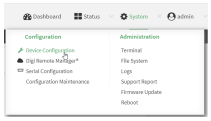
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Virtual LAN**.
4. Type a name for the VLAN and click ✚.
5. Select the **Device**.
6. Type or select a unique numeric **ID** for the VLAN ID.
7. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the VLAN:

```
(config)> add network vlan name
(config)>
```

4. Set the device to be used by the VLAN:
   a. View a list of available devices:

```
(config network vlan vlan1)> device ?

Device: The Ethernet device to use for this virtual LAN
Format:
  /network/device/eth1
  /network/device/eth2
  /network/device/loopback
  /network/vlan/vlan1
  /network/bridge/lan
Current value:

(config network vlan vlan1)>
```

   b. Add the device:

```
(config network vlan vlan1)> device /network/device/
(config network vlan vlan1)>
```

5. Set the VLAN ID:

```
(config network vlan vlan1)> id value
```

   where *value* is an integer between **1** and **4095**.

6. Save the configuration and apply the change.

```
(config network vlan vlan1)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Create a VLAN using switchport mode

**Required configuration items**

- Device to be assigned to the VLAN.
- The VLAN ID. The TCP header uses the VLAN ID to identify the destination VLAN for the packet.

To create a VLAN using switchport mode:

### Web

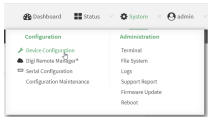
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Bridges**.
4. For **Add Bridge**, type a name for the bridge and click ✚.
5. Bridges are enabled by default. To disable, toggle off **Enable**.
6. For **Bridge type**, select **Switchport**.
7. (Optional) Enable Spanning Tree Protocol (STP).

   STP is used when using multiple LANs on the same device, to prevent bridge loops and other routing conflicts.

   a. Click **STP**.
   b. Click **Enable**.
   c. For **Forwarding delay**, enter the number of seconds that the device will spend in each of the listening and learning states before the bridge begins forwarding data. The default is **2** seconds.
8. For **Port**, type a name for the VLAN port and click ✚. Generally, numbers are used for VLAN ports.

9. Select the **Device** that the port uses.
10. Configure Vlan IDs:
    a. Click to expand **Vlan IDs**.
    b. Click ✚ for **Add Vlan ID**.
    c. Type or select a unique numeric **Vlan ID**.
    d. Click ✚ for **Add Vlan ID** again to add additional VLAN IDs.
11. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the VLAN:

```
(config)> add network vlan name
(config)>
```

4. Set the device to be used by the VLAN:
   a. View a list of available devices:

```
(config network vlan vlan1)> device ?

Device: The Ethernet device to use for this virtual LAN
Format:
  /network/device/eth1
  /network/device/eth2
  /network/device/loopback
  /network/vlan/vlan1
  /network/bridge/lan
Current value:

(config network vlan vlan1)>
```

   b. Add the device:

```
(config network vlan vlan1)> device /network/device/
(config network vlan vlan1)>
```

5. Set the VLAN ID:

```
(config network vlan vlan1)> id value
```

   where *value* is an integer between **1** and **4095**.

6. Save the configuration and apply the change.

```
(config network vlan vlan1)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Bridging

Bridging is a mechanism to create a single network consisting of multiple devices, such as Ethernet devices and wireless access points. You can also use bridging to create a Vitural LAN switchport bridge. See Create a VLAN using switchport mode for more information about switchport bridging for VLANs.

This section contains the following topics:

Configure a bridge ..... 210

## Configure a bridge

**Required configuration items**

- A name for the bridge.

  Bridges are enabled by default.
- Devices to be included in the bridge.

**Additional configuration items**

- Enable Spanning Tree Protocol (STP).

To create a bridge:

### Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

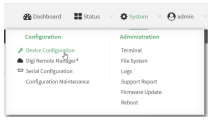
   b. Click the **Device ID**.

   c. Click **Settings**.

   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Bridges**.
4. For **Add Bridge**, type a name for the bridge and click ✚.
5. Bridges are enabled by default. To disable, toggle off **Enable**.
6. For **Bridge type**, select **Standard**.

   See Create a VLAN using switchport mode for information about switchport bridging.
7. (Optional) Enable Spanning Tree Protocol (STP).

   STP is used when using multiple LANs on the same device, to prevent bridge loops and other routing conflicts.

   a. Click **STP**.

   b. Click **Enable**.

c. For **Forwarding delay**, enter the number of seconds that the device will spend in each of the listening and learning states before the bridge begins forwarding data. The default is **2** seconds.

8. (Optional) Enable Rapid Spanning Tree Protocol (RSTP) for faster response to topology changes on the network.
   a. Click **RSTP** to enable.
   b. For **Hello Time**, enter the number of seconds between bridge protocol units (BPDUs) sent on a port. The default is **2** seconds.
   c. For **Max Age**, enter the maximum number of seconds before a bridge port saves its BDPU configuration. The default is **20** seconds.
   d. For **Priority**, enter the system priority. The default priority number is **8**.
   e. (Optional) For **Custom mstpd options**, enter the extra configuration options to pass to mspd daemon.
9. Add devices to the bridge:
   a. Click to expand **Devices**.
   b. For **Add device**, click ✚.
   c. Select the **Device**.
   d. Repeat to add additional devices.

**Note** The MAC address of the bridge is taken from the first available device in the list.

10. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create the bridge:

```
(config)> add network bridge my_bridge
(config network bridge my_bridge)>
```

4. Bridges are enabled by default.
   - To disable:

```
(config network bridge my_bridge)> enable false
(config network bridge my_bridge)>
```

- To enable if it has been disabled:

```
(config network bridge my_bridge)> enable true
(config network bridge my_bridge)>
```

5. Set the bridge **mode** to **standard**:

```
(config network bridge my_bridge)> mode standard
(config network bridge my_bridge)>
```

6. Add devices to the bridge:
   a. Determine available devices:

```
(config network bridge my_bridge)> .. .. interface lan device ?


Default value: /network/lan
Current value: /network/lan

(config network bridge my_bridge)>
```

   b. Add the appropriate device.

**Note** The MAC address of the bridge is taken from the first available device in the list.

7. (Optional) Enable Spanning Tree Protocol (STP).

   STP is used when using multiple LANs on the same device, to prevent bridge loops and other routing conflicts.
   a. Enable STP:

```
(config network bridge my_bridge)> stp enable true
```

   b. Set the number of seconds that the device will spend in each of the listening and learning states before the bridge begins forwarding data:

```
(config network bridge my_bridge)> stp forward_delay num
(config)>
```

   The default is **2** seconds.

8. (Optional) Enable Rapid Spanning Tree Protocol (RSTP) for faster response to topology changes on the network.

```
(config network bridge my_bridge)> rstp enable true
```

9. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Show SureLink status and statistics

You can show SureLink status for all interfaces, or for an individual interface. You can also show Surelink status for ipsec tunnels and OpenVPN clients.

SureLink status is only available from the Admin CLI.

### Command line

## Show SureLink State

To show the current state of SureLink for the Connect EZ 16/32 device, use the show surelink state command:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type:

```
> show surelink state

Test on network.interface.eth1.ipv6 with condition: one
dns_configured (n);

network.interface.eth1.ipv6;  -> update_routing_table
  ACTION              ATTEMPTS     STATUS
  restart_interface    00/01      [FAILED]
  update_routing_table 00/01

Test on network.interface.modem.ipv4 with condition: all
dns_configured (n);

network.interface.modem.ipv4;  -> restart_interface
  ACTION              ATTEMPTS     STATUS
  update_routing_table 00/03      [ BUSY ]
  restart_interface    00/03
  reset_modem          00/03
  switch_sim           00/03
  modem_power_cycle    00/03
  restart_interface    00/03

>
```

## Show SureLink status for all interfaces

To show the SureLink status all interfaces, use the show surelink interface all command:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type :

```
> show surelink interface all

 Interface  Test                          Proto  Last Response  Status
 ---------  ----------------------------  -----  -------------  -------
 eth1       Interface is up               IPv4   32 seconds     Passing
 eth1       Interface's DNS servers (DNS) IPv4   28 seconds     Passing
 eth2       Interface is up               IPv4   21 seconds     Passing
 eth2       Interface's DNS servers (DNS) IPv4   20 seconds     Passing
 modem      Interface is up               IPv4   115 seconds    Passing
 modem      Interface's DNS servers (DNS) IPv4   114 seconds    Passing

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show SureLink status for a specific interface

To show the SureLink status a specific interface, use the show surelink interface name *name* command:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the show surelink interface name *name* command to show the Surelink status of a specific interface, for example:

```
> show surelink interface name eth1

 wan1 Surelink Status
 --------------------
 IPv4 Status : Passing
 IPv6 Status : Failed

 Test                          Proto  Last Response  Status
 ----------------------------  -----  -------------  ------
 Interface's DNS servers (DNS) IPv6   15 seconds     Failed

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show SureLink status for all IPsec tunnels

To show the SureLink status all IPsec tunnels, use the show surelink ipsec all command:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type :

```
> show surelink ipsec all

 IPsec   Test                 Last Response  Status
 ------  -------------------  -------------  ------------------
 test    194.43.79.74 (Ping)  29 seconds     Passed
 test    194.43.79.75 (Ping)  5 seconds      Passed
 test1   194.43.79.74 (Ping)  21 seconds     Failed
 test2   194.43.79.75 (Ping)  21 seconds     Waiting for result

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show SureLink status for a specific IPsec tunnel

To show the SureLink status a specific IPsec tunnel, use the show surelink ipsec tunnel *name* command:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the show surelink ipsec tunnel *name* command to show the Surelink status of a specific tunnel, for example:

```
> show surelink ipsec tunnel test

 IPsec   Test                 Last Response  Status
 ------  -------------------  -------------  ------------------
 test    194.43.79.74 (Ping)  29 seconds     Passed
 test    194.43.79.75 (Ping)  5 seconds      Passed

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show SureLink status for all OpenVPN clients

To show the SureLink status all OpenVPN clients, use the show surelink openvpn client all command:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type :

```
> show surelink openvpn all

 OpenVPN Client   Test                 Last Response  Status
 --------------  -------------------  -------------  ------------------
 test_client1    194.43.79.74 (Ping)   29 seconds     Passed
 test_client1    194.43.79.75 (Ping)   5 seconds      Passed
 test_client2    194.43.79.74 (Ping)   21 seconds     Failed
 test_client2    194.43.79.75 (Ping)   21 seconds     Waiting for result

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show SureLink status for a specific OpenVPN client

To show the SureLink status a specific OpenVPN client, use the show surelink openvpn client *name* command:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the show surelink openvpn client *name* command to show the Surelink status of a specific OpenVPN client, for example:

```
> show surelink openvpn client test_client1

 OpenVPN Client   Test                 Last Response  Status
 --------------  -------------------  -------------  ------------------
 test_client1    194.43.79.74 (Ping)   29 seconds     Passed
 test_client1    194.43.79.75 (Ping)   5 seconds      Passed

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Configure a TCP connection timeout

You can configure the number of times an unacknowledged TCP data packet will be retransmitted before the connection is considered lost.

This feature is useful as it allows a backup system to control the serial port if the primary system goes offline, or for the primary system to be able to recover regardless of whether there has been a network disruption.

A low number of retries will end a "stale" connection more quickly that a larger number. The default is 15 retries.

## Web

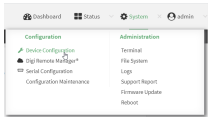
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Set the TCP retry attempts value:
   a. Click **Network** > **Advanced**.
   b. For **TCP retries2**, enter the number of times an unacknowledged TCP data packet will be transmitted before the connection is considered lost.

      **Minimum**: 0

      **Maximum**: 255

      **Default**: 15
4. Click **Apply** to save the configuration and apply the change.

# Configure an SFP+ port

The Connect EZ 16/32 includes two SPF+ ports, to which you can connect an SFP+ transceiver module for fiber connection, such as the Finisar Network FTLX8574D3BCL SFP+.

Before you use the SFP+ ports, you must enable them and to any optional configuration.

**Note** Connect EZ 16/32 can support both a copper port and an SFP+ port at the same time. If an SFP+ port is enabled, the SFP+ port LED will illuminate if an SPF+ transceiver is installed, regardless of whether the optical/fiber cable is connected end-to-end.

## Additional configuration items

- Active recovery configuration. See Configure SureLink active recovery to detect WAN/WWAN failures for further information.
- Additional IPv4 configuration:
  - The type being the way to control how the modem in the Digi device obtains an IP address from the cellular network.
  - The metric for IPv4 routes associated with the WAN.
  - The relative weight for IPv4 routes associated with the WAN.
  - The IPv4 management priority of the WAN. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
  - The IPv4 Maximum Transmission Unit (MTU) of the WAN.
  - Whether to assign a static IPv4 address to the WAN.
  - When to use DNS: always, never, or only when this interface is the primary default route.
  - When to use DNS servers for this interface.
  - Whether to include the Connect EZ 16/32 device's hostname in DHCP requests.
  - IPv4 DHCP server configuration. See DHCP servers for more information.
- IPv6 configuration:
  - The type being the way to control how the modem in the Digi device obtains an IP address from the cellular network.
  - The metric for IPv6 routes associated with the WAN.
  - The relative weight for IPv6 routes associated with the WAN.
  - The IPv6 management priority of the WAN. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
  - The IPv6 Maximum Transmission Unit (MTU) of the WAN.
  - Whether to assign a static IPv6 address to the WAN.
  - When to use DNS: always, never, or only when this interface is the primary default route.
  - When to use DNS servers for this interface.
  - Whether to include the Connect EZ 16/32 device's hostname in DHCP requests.
  - The IPv6 prefix length and ID.
  - IPv6 DHCP server configuration. See DHCP servers for more information.
- MAC address denylist and allowlist.

To configure an SFP+ port:

### Web

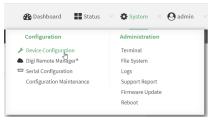
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces** , then **SFP1** or **SFP2**.
4. The SFP+ ports are disabled by default. To enable toggle on **Enable**.
5. For **Interface Type**, select **Ethernet**. This is the default.
6. For **Zone**, select **Edge**. This is the default.
7. For **Device**, select a port: **Device: SFP1** or **Device: SFP2**. The selection must match the SFP+ port you are configuring.
8. (Optional) Click to expand **802.1x** to configure 802.1x port based network access control.

   The Connect EZ 16/32 can function as an 802.1x authenticator; it does not function as an 802.1x supplicant.

   a. Click to expand **Authentication**.
   b. Click **Enable server** to enable the 802.1x authenticator on the Connect EZ 16/32 device.
   c. Set the **Reauth** period.
9. Configure IPv4 settings:

   a. Click to expand **IPv4**.

      IPv4 support is enabled by default.
   b. For **Type**, select **Static IP address**DHCP address.
   c. For **Address**, type the IP address and subnet of the LAN interface. Use the format *IPv4_address/netmask*, for example, 192.168.2.1/24.
   d. Optional IPv4 configuration items:
      i. Set the **Metric**.

         See Configure WAN/WWAN priority and default route metrics for further information about metrics.

ii. For **Weight**, type the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, **Weight** is used to load balance traffic to the interfaces.

iii. Set the **Management priority**. This determines which interface will have priority for central management activity. The interface with the highest number will be used.

iv. Set the **MTU**.

v. For **Use DNS**, select one of the following:

- **Always**: DNS will always be used for this WAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
- **When primary default route**: Only use the DNS servers provided for this interface when the interface is the primary route.
- **Never**: Never use DNS servers for this interface.

vi. Enable **DHCP Hostname** to instruct the Connect EZ 16/32 device to include the device's system name with DHCP requests as the Client FQDN option. The DHCP server can then be configured to register the device's hostname and IP address with an associated DNS server.

- See RFC4702 for further information about DHCP server support for the Client FQDN option.
- See Configure system information for information about setting the Connect EZ 16/32 device's system name.

e. Enable the DHCP server:

i. Click to expand **DHCP server**.

ii. Click **Enable**.

See DHCP servers for information about configuring the DHCP server.

f. Enable **Force link** to keep the network interface active even when the device link is down.

10. See Configure DHCP relay for information about configuring **DHCP relay**.
11. (Optional) Configure IPv6 settings:

a. Click to expand **IPv6**.

b. **Enable** IPv6 support.

c. For **Type**, select **IPv6 prefix delegationDHCPv6 address**.

d. For **Prefix length**, type the minimum length of the prefix to assign to this LAN. If the minimum length is not available, then a longer prefix will be used.

e. For **Prefix ID**, type the identifier used to extend the prefix to the assigned length. Leave blank to use a random identifier.

f. Set the **Metric**.

See Configure WAN/WWAN priority and default route metrics for further information about metrics.

g. For **Weight**, type the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, **Weight** is used to load balance traffic to the interfaces.

h. Set the **Management priority**. This determines which interface will have priority for central management activity. The interface with the highest number will be used.

i. Set the **MTU**.

j. For **Use DNS**:

- **Always**: DNS will always be used for this WAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
- **When primary default route**: Only use the DNS servers provided for this interface when the interface is the primary route.
- **Never**: Never use DNS servers for this interface.

k. Enable **DHCP Hostname** to instruct the Connect EZ 16/32 device to include the device's system name with DHCP requests as the Client FQDN option. The DHCP server can then be configured to register the device's hostname and IP address with an associated DNS server.

- See RFC4702 for further information about DHCP server support for the Client FQDN option.
- See Configure system information for information about setting the Connect EZ 16/32 device's system name.

12. (Optional) Click to expand **MAC address denylist**.

    Incoming packets will be dropped from any devices whose MAC addresses is included in the **MAC address denylist**.

    a. Click to expand **MAC address denylist**.

    b. For **Add MAC address**, click ✚.

    c. Type the **MAC address**.

13. (Optional) Click to expand **MAC address allowlist**.

    If allowlist entries are specified, incoming packets will only be accepted from the listed MAC addresses.

    a. Click to expand **MAC address allowlist**.

    b. For **Add MAC address**, click ✚.

    c. Type the **MAC address**.

1. See Configure SureLink active recovery to detect WAN/WWAN failures for information about configuring **SureLink**.

14. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Navigate to the SFP+ port you want to configure.

```
(config)> network interface sfp1
(config network interface sfp1)>
```

4. Enable the SFP1 port.

```
(config network interface sfp1)>enable true
(config network interface sfp1)>
```

5. Set the interface type.

```
(config network interface sfp1)>type ethernet
(config network interface sfp1)>
```

6. Set the appropriate firewall zone:

```
(config network interface sfp1)>zone edge
(config network interface sfp1)>
```

7. Set the device.

```
(config network interface sfp1)>/network/device/sfp1
(config network interface sfp1)>
```

8. Configure IPv4 settings:
   - IPv4 support is enabled by default. To disable:

     ```
     (config network interface my_wan)> ipv4 enable false
     (config network interface my_wan)>
     ```

   - Configure the WAN to be a DHCP clientThe WAN is configured by default to use a static IP address for its IPv4 configuration. To configure the WAN to be a DHCP client, rather than using a static IP addres:

     ```
     (config network interface my_wan)> ipv4 type dhcp
     (config network interface my_wan)>
     ```

     These instructions assume that the LAN will use a static IP address for its IPv4 configuration.

   a. Set the IPv4 address and subnet of the LAN interface. Use the format *IPv4_address/netmask*, for example, 192.168.2.1/24.

   ```
   (config network interface my_lan)> ipv4 address ip_address/netmask
   (config network interface my_lan)>
   ```

   b. Optional IPv4 configuration items:
      i. Set the IP metric:

      ```
      (config network interface my_wan)> ipv4 metric num
      (config network interface my_wan)>
      ```

See Configure WAN/WWAN priority and default route metrics for further information about metrics.

ii. Set the relative weight for default routes associated with this interface. For multiple active interfaces with the same metric, the weight is used to load balance traffic to the interfaces.

```
(config network interface my_wan)> ipv4 weight num
(config network interface my_wan)>
```

iii. Set the management priority. This determines which interface will have priority for central management activity. The interface with the highest number will be used.

```
(config network interface my_wan)> ipv4 mgmt num
(config network interface my_wan)>
```

iv. Set the MTU:

```
(config network interface my_wan)> ipv4 mtu num
(config network interface my_wan)>
```

v. Configure how to use DNS:

```
(config network interface my_wan)> ipv4 use_dns value
(config network interface my_wan)>
```

where *value* is one of:

- **always**: DNS will always be used for this WAN; when multiple interfaces have the same DNS server, the interface with the lowest metric will be used for DNS requests.
- **primary**: Only use the DNS servers provided for this interface when the interface is the primary route.
- **never**: Never use DNS servers for this interface.

vi. Enable DHCP Hostname to instruct the Connect EZ 16/32 device to include the device's system name with DHCP requests as the Client FQDN option. The DHCP server can then be configured to register the device's hostname and IP address with an associated DNS server.

```
(config network interface my_wan)> ipv4 dhcp_hostname true
(config network interface my_wan)>
```

- See RFC4702 for further information about DHCP server support for the Client FQDN option.
- See Configure system information for information about setting the Connect EZ 16/32 device's system name.

c. Enable the DHCP server:

```
(config network interface my_wan)> ipv4 dhcp_server enable true
```

See DHCP servers for information about configuring the DHCP server.

9. (Optional) Configure IPv6 settings:

a. Enable IPv6 support:

```
(config network interface my_wan)> ipv6 enable true
(config network interface my_wan)>
```

b. Set the IPv6 type to DHCP:

```
(config network interface my_wan)> ipv6 type dhcpv6
(config network interface my_wan)>
```

c. Generally, the default settings for IPv6 support are sufficient. You can view the default IPv6 settings by using the question mark (**?**):

```
(config network interface my_wan)> ipv6 ?

IPv6

 Parameters                Current Value
 ------------------------------------------------------------------------
----------
 dhcp_hostname             false              DHCP Hostname
 enable                    true               Enable
 metric                    0                  Metric
 mgmt                      0                  Management priority
 mtu                       1500               MTU
 type                      dhcpv6             Type
 use_dns                   always             Use DNS
 prefix_id                 1                  Prefix ID
 prefix_length             48                 Prefix length
 type                      prefix_delegation  Type
 weight                    10                 Weight

 Additional Configuration
 ------------------------------------------------------------------------
----------
 connection_monitor        Active recovery
 dhcpv6_server             DHCPv6 server

(config network interface my_wan)>
```

View default settings for the IPv6 DHCP server:

```
(config network interface my_wan)> ipv6 dhcpv6_server ?

DHCPv6 server: The DHCPv6 server settings for this network interface.

 Parameters                Current Value
 ------------------------------------------------------------------------
----------
 enable                    true           Enable
```

```
(config network interface my_wan)>
```

d. Modify any of the remaining default settings as appropriate. For example, to change the metricminimum length of the prefix:

```
(config network interface my_wan)> ipv6 metric 1prefix_length 60
(config network interface my_wan)>
```

If the minimum length is not available, then a longer prefix will be used.

See Configure WAN/WWAN priority and default route metrics for further information about metrics.

10. (Optional) To configure 802.1x port based network access control:

**Note** The Connect EZ 16/32 can function as an 802.1x authenticator; it does not function as an 802.1x supplicant.

a. Enable the 802.1x authenticator on the Connect EZ 16/32 device:

```
(config network interface my_wan)> 802_1x authentication enable true
(config network interface my_wan)>
```

b. Set the frequency period for reauthorization:

```
(config network interface my_wan)> 802_1x authentication reauth_period
value
(config network interface my_wan)>
```

where *value* is an integer between **0** and **86400**. The default is **3600**.

11. (Optional) Configure the MAC address deny list.

Incoming packets will be dropped from any devices whose MAC addresses is included in the MAC address denylist.

a. Add a MAC address to the denylist:

```
(config network interface my_wan)> add mac_denylist end mac_address
(config network interface my_wan)>
```

where *mac_address* is a hyphen-separated MAC address, for example, 32-A6-84-2E-81-58.

b. Repeat for each additional MAC address.

12. (Optional) Configure the MAC address allowlist.

If allowlist entries are specified, incoming packets will only be accepted from the listed MAC addresses.

a. Add a MAC address to the allowlist:

```
(config network interface my_wan)> add mac_allowlist end mac_address
(config network interface my_wan)>
```

where *mac_address* is a hyphen-separated MAC address, for example, 32-A6-84-2E-81-58.

b. Repeat for each additional MAC address.

13. See Configure SureLink active recovery to detect WAN/WWAN failures for information about configuring SureLink for active recovery.
14. Save the configuration and apply the change.

```
(config network interface my_wan)> save
Configuration saved.
>
```

15. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Serial port

Connect EZ 16/32 devices have access to different features, depending on the serial port mode selection.

## Default serial port configuration

You can review the default serial port configuration for your device.

## Serial mode options

You can choose a serial mode option for each serial port, depending on the feature that you want to use.

- Login: Allows the port to be used to log into the CLI.
- Remote Access: Provides socket level access to ports.
- Application: Provides access to the serial device from Python applications.
- PPP dial-in: Allows the device to answer Point-to-Point Protocol (PPP) connections over serial ports.
- RealPort: Used in conjunction with the Digi RealPort driver.
- UDP serial: Provides access to the serial port using UDP.
- Modem emulator: Allows the device to act as a dial-up modem emulator for handling incoming AT dial-ins.
- Modbus: Allows the device to function as a Modbus protocol gateway.

## View serial port information

- Show serial port status and statistics
- Review the serial port message log

# Default serial port configuration

The Connect EZ 16/32 default serial port configuration is:

- **Enabled**: enabled
- **Serial mode**: Remote access
- **Label**: None
- **Baud rate**: 9600

- **Data bits**: **8**
- **Parity**: None
- **Stop bits**: 1
- **Flow control**: None
- **Escape sequence**: None
- **History size**: 0
- **Exclusive access**: disabled
- **Idle timeout**: 0 m

### Baud rate options

The baud rate options are: 50, 75, 110, 134, 150, 200, 300, 600, 1200, 1800, 2400, 4800, 5787, 9600, 14400, 19200, 28800, 38400, 57600, 115200, 230400

- **Default baud rate**: 9600
- **Minimum baud rate**: 50
- **Maximum baud rate**: 230400

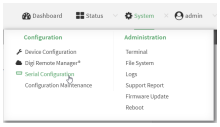
## Configure Login mode for a serial port

**Login** mode allows the user to log into the device through the serial port.

To change the configuration to match the serial configuration of the device to which you want to connect:

### Web

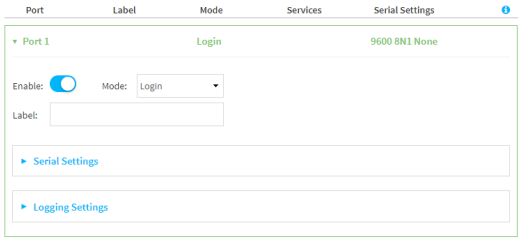
1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.




The **Serial Configuration** page is displayed.

**Note** You can also configure the serial port by using **Device Configuration** > **Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

3. Click the name of the port that you want to configure.




The serial port is enabled by default. To disable, toggle off **Enable**.

4. For **Mode**, select **Login**.
5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default. If you enable **Altpin** in EIA-232 mode, the DCD and DSR signals are swapped. This allows use of DCD with 8-wire cables. **Altpin** has no impact on 422 or 485 mode. For more information, see Serial connector pinout.
6. (Optional) For **Label**, enter a label that will be used when referring to this port.
7. For **Signalling**, select the electrical signaling interface type used on this serial port:
   - **RS-232**
     - Enable **RTS Toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control.
     - For **RTS Pre-delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**.
     - For **RTS Post-delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**.
   - **RS-422**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
   - **RS-485**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
     - Enable **Full Duplex** if you want to enable full duplex communication on this serial port.

   The default is **RS-232**.
8. Expand **Serial Settings**.

   The entries in the following fields must match the information for the power controller. Refer to your power controller manual for the correct entries.

   a. **Baud rate**: For **Baud rate**, select the baud rate used by the device to which you want to connect. The default is **9600**.
      - Max baud rate: **230400**
      - Minimum: **50**

      For a complete list, see Baud rate options.

   b. **Data bits**: For **Data bits**, select the number of data bits used by the device to which you want to connect. The default is **8**.

   c. **Parity**: For **Parity**, select the type of parity used by the device to which you want to connect. The default is **None**.

   d. **Stop bits**: For **Stop bits**, select the number of stop bits used by the device to which you want to connect. The default is **1**.

   e. **Flow control**: For **Flow control**, select the type of flow control used by the device to which you want to connect. The default is **None**.
9. Expand **Logging Settings** to configure logging for this serial port.

   a. To enable logging, click to toggle on **Enable**.

   b. In the **Log file name** field, enter a descriptive name for the log file.

   c. For **Log file size**, type the size of the log file. When the log file reaches the size limit, the current file is saved and a new file is created. The default is 65536 bytes.

d. From the **Type of data to log** list box, specify the type of data that should be saved.
   - **Received**
   - **Transmitted**
   - **Both**
   - **Both with arrows**. This is the default.

e. If you want to log the time at which date was received or transmitted, click the **Timestamps** toggle to **Enable**.

f. If you want to log the data as hexadecimal values, click the **Hexadecimal** toggle to **Enable**.

> **Note** You can review the message log in the **Serial Port Log** page. See Review the serial port message log.

10. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The serial port is enabled by default. To disable:

```
(config)> serial port1 enable false
(config)>
```

4. Set the mode:

```
(config)> serial port1 mode login
(config)>
```

5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default. If you enable **Altpin** in EIA-232 mode, the DCD and DSR signals are swapped. This allows use of DCD with 8-wire cables. **Altpin** has no impact on 422 or 485 mode. For more information, see Serial connector pinout.

```
(config)> serial port1 altpin true
(config)>
```

6. Set the signaling interface type used on this serial port:
   - **rs-232**
     - Enable **rts_toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control:

```
(config)> serial port1 rts_toggle true
(config)>
```

- For **rts_pre_delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 "rts_pre_delay value
(config)>
```

- For **rts_post_delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 rts_post_delay value
(config)>
```

- **rs-422**
  - Enable **Termination** if you want to enable electrical termination on this serial port.
- **rs-485**
  - Enable **termination** if you want to enable electrical termination on this serial port:

```
(config)> serial port1 termination true
(config)>
```

  - Enable **full_duplex** if you want to enable full duplex communication on this serial port:

```
(config)> serial port1 full_duplex true
(config)>
```

The default is **rs-232**.

7. (Optional) Set a label that will be used when referring to this port.

```
(config)>path-paramlabel label
(config)>
```

8. Set the baud rate used by the device to which you want to connect:

```
(config)> serial port1 baudrate rate
(config)>
```

where **rate** is the desired baud rate:

- Default baud rate: **9600**
- Max baud rate: **230400**
- Minimum baud rate: **50**

  For a complete list, see Baud rate options.

9. Set the number of data bits used by the device to which you want to connect:

```
(config)> serial port1 databits bits
(config)>
```

10. Set the type of parity used by the device to which you want to connect:

```
(config)> serial port1 parity parity
(config)>
```

Allowed values are:

- **even**
- **odd**
- **none**

The default is **none**.

11. Set the stop bits used by the device to which you want to connect:

```
(config)> serial port1 stopbits bits
(config)>
```

12. Set the type of flow control used by the device to which you want to connect:

```
(config)> serial port1 flow value
(config)>
```

where value is one of:

- **none**
- **rts/cts**
- **xon/xoff**

13. Configure serial port logging:
    a. Enable serial port logging:

```
(config)>serial port1 logging enable true
(config)>
```

    b. Set the file name:

```
(config)>serial port1 logging filename string
(config)>
```

    c. Set the maximum allowed log size for the serial port log when starting the log:

```
(config)>serial port1 logging size value
(config)>
```

    where *value* is the size of the log file in bytes. The default is **65536**.
    d. Specify the data type:

```
(config)>serial port1 logging type value
(config)>
```

    where *value* is one of:
    - received
    - transmitted

- both
- arrows. This is the default.

e. Log the time at which date was received or transmitted:

```
(config)>serial port1 logging hex true
(config)>
```

f. Log data as hexadecimal values:

```
(config)>serial port1 logging timestamp true
(config)>
```

14. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

15. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

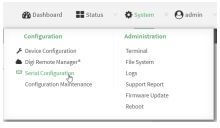
# Configure Remote Access mode for a serial port

**Remote Access** mode allows for remote access to another device that is connected to the serial port.

To change the configuration to match the serial configuration of the device to which you want to connect:

## Web

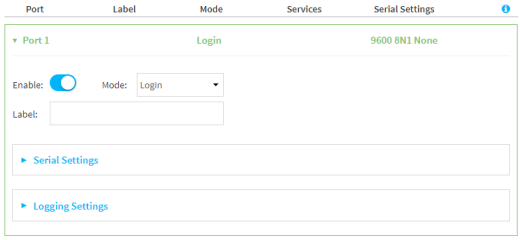
1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.




The **Serial Configuration** page is displayed.

**Note** You can also configure the serial port by using **Device Configuration** > **Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

3. Click the name of the port that you want to configure.




   The serial port is enabled by default. To disable, toggle off **Enable**.
4. For **Serial mode**, select **Remote access (TCP)**.
5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default. If you enable **Altpin** in EIA-232 mode, the DCD and DSR signals are swapped. This allows use of DCD with 8-wire cables. **Altpin** has no impact on 422 or 485 mode. For more information, see Serial connector pinout.
6. (Optional) For **Label**, enter a label that will be used when referring to this port.
7. For **Signalling**, select the electrical signaling interface type used on this serial port:
   - **RS-232**
     - Enable **RTS Toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control.
     - For **RTS Pre-delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**.
     - For **RTS Post-delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**.
   - **RS-422**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
   - **RS-485**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
     - Enable **Full Duplex** if you want to enable full duplex communication on this serial port.

   The default is **RS-232**.
8. Expand **Serial Settings**.

   The entries in the following fields must match the information for the power controller. Refer to your power controller manual for the correct entries.

   a. **Baud rate**: For **Baud rate**, select the baud rate used by the device to which you want to connect. The default is **9600**.
      - Max baud rate: **230400**
      - Minimum: **50**

        For a complete list, see Baud rate options.

   b. **Data bits**: For **Data bits**, select the number of data bits used by the device to which you want to connect. The default is **8**.

c. **Parity**: For **Parity**, select the type of parity used by the device to which you want to connect. The default is **None**.

d. **Stop bits**: For **Stop bits**, select the number of stop bits used by the device to which you want to connect. The default is **1**.

e. **Flow control**: For **Flow control**, select the type of flow control used by the device to which you want to connect. The default is **None**.

9. Click to expand **Data Framing**.

   a. Click **Enable** to enable the data framing feature.

   b. For **Maximum Frame Count**, enter the maximum size of the packet. The default is **1024**.

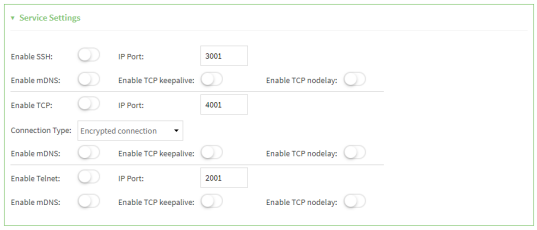
   c. For **Idle Time**, enter the length of time the device should wait before sending the packet.

   d. For **End Pattern**, enter the end pattern. The packet is sent when this pattern is received from the serial port.

   e. Click **Strip End Pattern** if you want to remove the end pattern from the packet before it is sent.

10. Expand **Service Settings**.

    All service settings are disabled by default. Click available options to toggle them to enabled, and set the IP ports as appropriate.

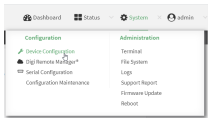



**Note** If the Telnet service is enabled for the serial port, note that the **Telnet Login** option, when enabled, prompts the user to enter Telnet login credentials when accessing the serial port via Telnet. The **Telnet Login** option is enabled by default. To disable this option, navigate to **System** > **Device Configuration** > **Authentication** > **Serial** and disable **Telnet Login**.

For each type of service, you can also configure the access control.

To do this, you need to go to **Device Configuration**:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.




The **Configuration** window is displayed.

b. Access the configuration for the appropriate type of service:

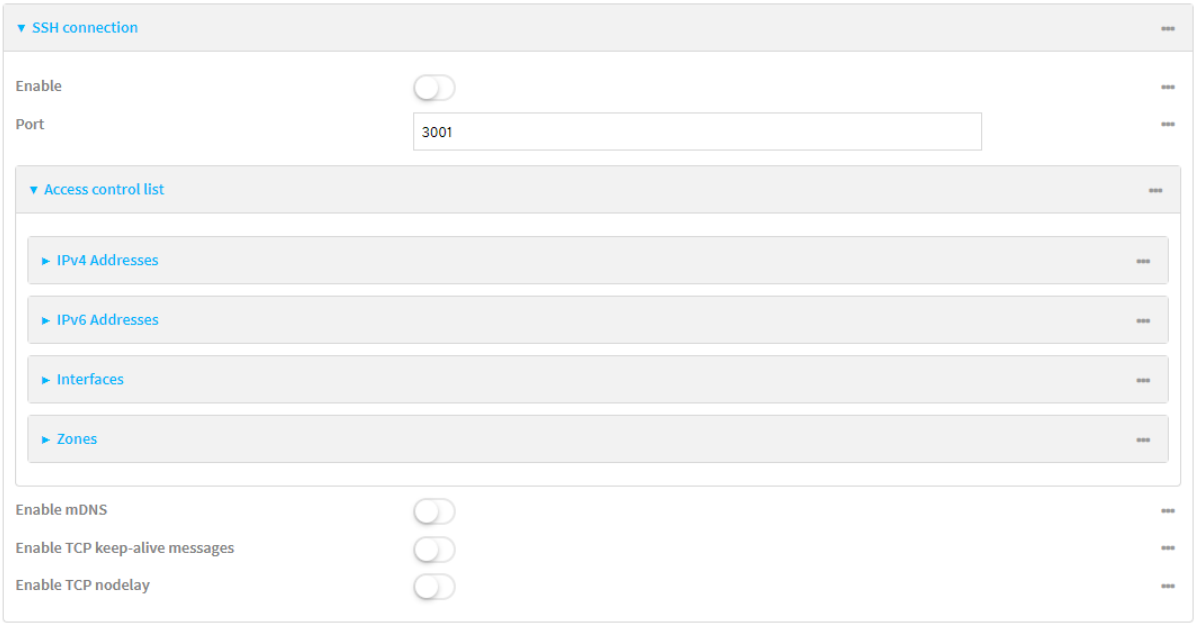
   i. Click to expand **Serial**.

   ii. Click to expand the appropriate serial port.

   iii. Click to expand the appropriate type of service.

   iv. Click to expand **Access Control List**.

For example, to set the Access Control List for the SSH connection for serial port 1, click to expand **Serial** > **Port 1** > **SSH connection** > **Access Control List**:



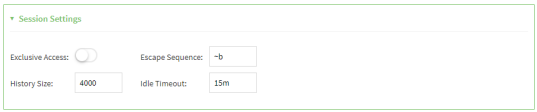

- To limit access to specified IPv4 addresses and networks:
  i. Click **IPv4 Addresses**.
  ii. For **Add Address**, click ✚.
  iii. For **Address**, enter the IPv4 address or network that can access the device's service-type. Allowed values are:
    - A single IP address or host name.
    - A network designation in CIDR notation, for example, 192.168.1.0/24.
    - **any**: No limit to IPv4 addresses that can access the service-type.
  iv. Click ✚ again to list additional IP addresses or networks.
- To limit access to specified IPv6 addresses and networks:
  i. Click **IPv6 Addresses**.
  ii. For **Add Address**, click ✚.
  iii. For **Address**, enter the IPv6 address or network that can access the device's service-type. Allowed values are:
    - A single IP address or host name.
    - A network designation in CIDR notation, for example, 2001:db8::/48.
    - **any**: No limit to IPv6 addresses that can access the service-type.
  iv. Click ✚ again to list additional IP addresses or networks.
- To limit access to hosts connected through a specified interface on the device:
  i. Click **Interfaces**.
  ii. For **Add Interface**, click ✚.

iii. For **Interface**, select the appropriate interface from the dropdown.

iv. Click ✚ again to allow access through additional interfaces.

- To limit access based on firewall zones:
  i. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
  ii. For **Add Zone**, click ✚.
  iii. For **Zone**, select the appropriate firewall zone from the dropdown.
  See Firewall configuration for information about firewall zones.
  iv. Click ✚ again to allow access through additional firewall zones.

11. Expand **Autoconnect Settings**. The autoconnect feature is used to initiate a connection to a remote server to directly access the serial port.
    a. Click **Enable** to enable the autoconnect feature.
    b. For **Connection Trigger**, select the option that describes the type of event that should trigger the connection.
    If you select the **Data received matches a string** option, additional fields display.
       a. In the **Data Match String** field, enter the received data string that should trigger the connection. The syntax is: *backslash escaped string*
       b. The **Flush String** option determines whether the match string data sent from the remote server is discarded.
          - **Enable**: Discard the match string data. This is the default.
          - **Disable**: Do not discard the match string data.
    c. For **Outbound Connection Type**, select the option that describes the method used to initiate the connection.
    d. For **Destination**, enter the host name or IP address of the remote server. When using SSH, this should be prefixed with the user name and followed by @, for example, **admin@192.168.1.1**.
    e. For **IP port**, enter the TCP port of the remote server (1-65535).
    f. Click **Enable TCP keep-alive** to enable TCP keepalive on the connection.
    g. Click **Enable TCP nodelay** to enable TCP nodelay on the connection.
    h. For **Socket ID string**, type text to be transmitted to the remote server when the socket connects.
12. Expand **Session Settings**.




    a. Enable **Exclusive access** to limit access to the serial port to a single active session. This option is disabled by default. When it is disabled, multiple users can connect using Telnet, TCP, and SSH.
    b. For **Escape sequence**, type the characters used to start an escape sequence. If no characters are defined, the escape sequence is disabled. The default is **~b**.

c. For **History size**, type or select the number of bytes of output from the serial port that are written to buffer. These bytes are redisplayed when a user connects to the serial port. The default is **4000** bytes.

d. For **Idle timeout**, type the amount of time to wait before disconnecting due to user inactivity.

13. Expand **Monitor Settings**.
    a. Enable **CTS** to monitor CTS (Clear to Send) changes on this port.
    b. Enable **DCD** to monitor DCD (Data Carrier Detect) changes on this port.
14. Expand **Logging Settings** to configure logging for this serial port.
    a. To enable logging, click to toggle on **Enable**.
    b. In the **Log file name** field, enter a descriptive name for the log file.
    c. For **Log file size**, type the size of the log file. When the log file reaches the size limit, the current file is saved and a new file is created. The default is 65536 bytes.
    d. From the **Type of data to log** list box, specify the type of data that should be saved.
        - **Received**
        - **Transmitted**
        - **Both**
        - **Both with arrows**. This is the default.
    e. If you want to log the time at which date was received or transmitted, click the **Timestamps** toggle to **Enable**.
    f. If you want to log the data as hexadecimal values, click the **Hexadecimal** toggle to **Enable**.

    Note You can review the message log in the **Serial Port Log** page. See Review the serial port message log.

15. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Serial ports is enabled by default. To disable:

```
(config)> serial port_number enable false
(config)>
```

Command line examples in this section will use port1 for the serial port. However, any port number can be used.

4. Set the mode:

```
(config)> serial port1 mode remoteaccess
(config)>
```

5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default. If you enable **Altpin** in EIA-232 mode, the DCD and DSR signals are swapped. This allows use of DCD with 8-wire cables. **Altpin** has no impact on 422 or 485 mode. For more information, see Serial connector pinout.

```
(config)> serial port1 altpin true
(config)>
```

6. Set the signaling interface type used on this serial port:
   - **rs-232**
     - Enable **rts_toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control:

```
(config)> serial port1 rts_toggle true
(config)>
```

     - For **rts_pre_delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 "rts_pre_delay value
(config)>
```

     - For **rts_post_delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 rts_post_delay value
(config)>
```

   - **rs-422**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
   - **rs-485**
     - Enable **termination** if you want to enable electrical termination on this serial port:

```
(config)> serial port1 termination true
(config)>
```

     - Enable **full_duplex** if you want to enable full duplex communication on this serial port:

```
(config)> serial port1 full_duplex true
(config)>
```

   The default is **rs-232**.

7. (Optional) Set a label that will be used when referring to this port.

```
(config)>serial port1 label label
(config)>
```

8. Set the baud rate used by the device to which you want to connect:

```
(config)> serial port1 baudrate rate
(config)>
```

where **rate** is the desired baud rate:

- Default baud rate: **9600**
- Max baud rate: **230400**
- Minimum baud rate: **50**

  For a complete list, see Baud rate options.

9. Set the number of data bits used by the device to which you want to connect:

```
(config)> serial port1 databits bits
(config)>
```

10. Set the type of parity used by the device to which you want to connect:

```
(config)> serial port1 parity parity
(config)>
```

Allowed values are:

- **even**
- **odd**
- **none**

The default is **none**.

11. Set the stop bits used by the device to which you want to connect:

```
(config)> serial port1 stopbits bits
(config)>
```

12. Set the type of flow control used by the device to which you want to connect:

```
(config)> serial port1 flow value
(config)>
```

where value is one of:

- **none**
- **rts/cts**
- **xon/xoff**

13. Configure the session settings.

a. Set the characters used to start an escape sequence:

```
(config)>serial port1 escape string
(config)
```

If no characters are defined, the escape sequence is disabled. The default is **~b**.

b. Limit access to the serial port to a single active session:

```
(config)>serial port1 exclusive true
(config)
```

c. Set the number of bytes of output from the serial port that are written to buffer. These bytes are redisplayed when a user connects to the serial port.

```
(config)>serial port1 history bytes
(config)
```

The default is **4000** bytes.

d. Set the amount of time to wait before disconnecting due to user inactivity:

```
(config)>serial port1 idle_timeout value
(config)
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **idle_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)>serial port1 idle_timeout 600s
(config)
```

The default is **15m**.

14. Configure monitor settings.

a. (Optional) Enable monitoring of CTS (Clear to Send) changes on this port:

```
(config)>serial port1 monitor cts true
(config)
```

b. (Optional) Enable monitoring of DCD (Data Carrier Detect) changes on this port:

```
(config)>serial port1 monitor dcd true
(config)
```

15. (Optional) Configure autoconnect:

a. Enable autoconnect:

```
(config)>serial port1 autoconnect enable true
(config)>
```

b. Set the option that will trigger the connection:

```
(config)>serial port1 autoconnect trigger value
(config)>
```

where *value* is one of:

- **always**
- **data**
- **dcd**
- **destination**
- **dsr**
- **match**

  If **match** is selected:

  i. Set the string that, when received, will trigger the connection:

  ```
  (config)>serial port1 autoconnect match_string string
  (config)>
  ```

  ii. **flush_string** is enabled by default, which will discard the matched string from data sent to the server. To disable:

  ```
  (config)>serial port1 autoconnect flush_string false
  (config)>
  ```

The default is **always**.

c. Set the option that initiates the connection:

```
(config)>serial port1 autoconnect conn_type value
(config)>
```

where *value* is one of:

- **ssh**
- **tcp**
- **telnet**
- **tls**
- **tls_auth**

The default is **tls**.

d. Set the host name or IP address of the destination server:

```
(config)>serial port1 autoconnect destination hostname/IP_address
(config)>
```

When using SSH, this should be prefixed with the user name and followed by @, for example:

```
(config)>serial port1 autoconnect destination admin@192.168.1.1
(config)>
```

e. Set the TCP port of the destination server:

```
(config)>serial port1 autoconnect port int
(config)>
```

where *int* is any integer between **1** and **65535**.

f. To enable TCP keepalive:

```
(config)>serial port1 autoconnect keepalive true
(config)>
```

g. To enable TCP nodelay:

```
(config)>serial port1 autoconnect nodely true
(config)>
```

h. Set the text to be transmitted to the remote server when the socket connects:

```
(config)>serial port1 socketid string
(config)>
```

16. (Optional) Configure data framing:

a. Enable data framing:

```
(config)>serial port1 framing enable true
(config)
```

b. Set the maximum size of the packet:

```
(config)>serial port1 framing max_count int
(config)
```

The default is **1024**.

c. Set the length of time the device should wait before sending the packet:

```
(config)>serial port1 framing idle_time value
(config)
```

where *value* is in milliseconds (ms) or seconds (s). The maximum value is **60s**.

d. Set the end pattern. The packet is sent when this pattern is received from the serial port:

```
(config)>serial port1 framing end_pattern backslash-escaped-string
(config)
```

e. Set the strip end pattern if you want to remove the end pattern from the packet before it is sent:

```
(config)>serial port1 framing strip_pattern true
(config)
```

17. (Optional) Configure service settings:

a. Configure SSH settings:

i. Enable SSH:

```
(config)>serial port1 service ssh enable true
(config)>
```

ii. Set the port to be used for ssh communications:

```
(config)>serial port1 service ssh port int
(config)>
```

where *int* is any integer between **1** and **65535**. The default is **3001**.

iii. Enable TCP keep-alive messages:

```
(config)>serial port1 service ssh keepalive true
(config)>
```

iv. Enable TCP nodelay messages:

```
(config)>serial port1 service ssh nodelay true
(config)>
```

v. (Optional) Configure access control:

- To limit access to specified IPv4 addresses and networks:

```
(config)> add serial port1 service ssh acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add serial port1 service ssh acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config)> add serial port1 service ssh acl interface end
value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add serial port1 service ssh acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that
can be referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------
------------------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to include additional firewall zones.

vi. (Optional) Enable Multicast DNS (mDNS):

```
(config)>serial port1 service ssh mdns enable true
(config)>
```

b. Configure TCP settings:

i. Enable TCP:

```
(config)>serial port1 service tcp enable true
(config)>
```

ii. Set the port to be used for ssh communications:

```
(config)>serial port1 service tcp port int
(config)>
```

where *int* is any integer between **1** and **65535**. The default is **4001**.

iii. Enable TCP keep-alive messages:

```
(config)>serial port1 service tcp keepalive true
(config)>
```

iv. Set the option that initiates the connection:

```
(config)>serial port1 service tcp conn_type value
(config)>
```

where *value* is one of:

- **tcp**
- **tls**
- **tls_auth**

The default is **tls**.

v. Enable TCP nodelay messages:

```
(config)>serial port1 service tcp nodelay true
(config)>
```

vi. (Optional) Configure access control:

- To limit access to specified IPv4 addresses and networks:

```
(config)> add serial port1 service tcp acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add serial port1 service tcp acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config)> add serial port1 service tcp acl interface end
value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add serial port1 service tcp acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that
can be referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------
------------------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to include additional firewall zones.

vii. (Optional) Enable Multicast DNS (mDNS):

```
(config)>serial port1 service tcp mdns enable true
(config)>
```

c. Configure telnet settings:

i. Enable Telnet:

```
(config)>serial port1 service telnet enable true
(config)>
```

ii. Set the port to be used for Telnet communications:

```
(config)>serial port1 service telnet port int
(config)>
```

where *int* is any integer between **1** and **65535**. The default is **3001**.

iii. Enable TCP keep-alive messages:

```
(config)>serial port1 service telnet keepalive true
(config)>
```

iv. Enable TCP nodelay messages:

```
(config)>serial port1 service telnet nodelay true
(config)>
```

v. (Optional) Configure access control:

- To limit access to specified IPv4 addresses and networks:

```
(config)> add serial port1 service telnet acl address end
value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add serial port1 service telnet acl address6 end
value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config)> add serial port1 service telnet acl interface end
value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add serial port1 service telnet acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that
can be referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------
------------------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to include additional firewall zones.

vi. (Optional) Enable Multicast DNS (mDNS):

```
(config)>serial port1 service telnet mdns enable true
(config)>
```

18. Configure serial port logging:
    a. Enable serial port logging:

```
(config)>serial port1 logging enable true
(config)>
```

    b. Set the file name:

```
(config)>serial port1 logging filename string
(config)>
```

    c. Set the maximum allowed log size for the serial port log when starting the log:

```
(config)>serial port1 logging size value
(config)>
```

where *value* is the size of the log file in bytes. The default is **65536**.

d. Specify the data type:

```
(config)>serial port1 logging type value
(config)>
```

where *value* is one of:

- received
- transmitted
- both
- arrows. This is the default.

e. Log the time at which date was received or transmitted:

```
(config)>serial port1 logging hex true
(config)>
```

f. Log data as hexadecimal values:

```
(config)>serial port1 logging timestamp true
(config)>
```

19. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

20. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

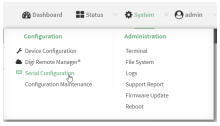
# Configure Application mode for a serial port

**Application** mode provides access to the serial device from Python applications.

To change the configuration to match the serial configuration of the device to which you want to connect:

## Web

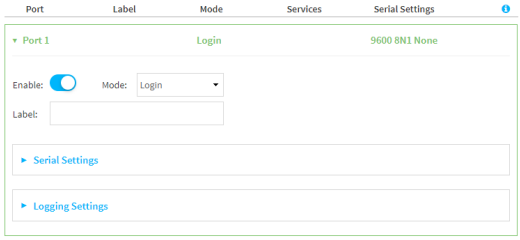
1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.



The **Serial Configuration** page is displayed.

**Note** You can also configure the serial port by using **Device Configuration** > **Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

3. Click the name of the port that you want to configure.




   The serial port is enabled by default. To disable, toggle off **Enable**.
4. For **Mode**, select **Application**. The default is **Remote Access**.
5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default. If you enable **Altpin** in EIA-232 mode, the DCD and DSR signals are swapped. This allows use of DCD with 8-wire cables. **Altpin** has no impact on 422 or 485 mode. For more information, see Serial connector pinout.
6. (Optional) For **Label**, enter a label that will be used when referring to this port.
7. For **Signalling**, select the electrical signaling interface type used on this serial port:
   - **RS-232**
     - Enable **RTS Toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control.
     - For **RTS Pre-delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**.
     - For **RTS Post-delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**.
   - **RS-422**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
   - **RS-485**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
     - Enable **Full Duplex** if you want to enable full duplex communication on this serial port.

   The default is **RS-232**.
8. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The serial port is enabled by default. To disable:

```
(config)> serial port1 enable false
(config)>
```

4. Set the mode:

```
(config)> serial port1 mode application
(config)>
```

5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default. If you enable **Altpin** in EIA-232 mode, the DCD and DSR signals are swapped. This allows use of DCD with 8-wire cables. **Altpin** has no impact on 422 or 485 mode. For more information, see Serial connector pinout.

```
(config)> serial port1 altpin true
(config)>
```

6. Set the signaling interface type used on this serial port:
   - **rs-232**
     - Enable **rts_toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control:

```
(config)> serial port1 rts_toggle true
(config)>
```

     - For **rts_pre_delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 "rts_pre_delay value
(config)>
```

     - For **rts_post_delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 rts_post_delay value
(config)>
```

   - **rs-422**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
   - **rs-485**
     - Enable **termination** if you want to enable electrical termination on this serial port:

```
(config)> serial port1 termination true
(config)>
```

     - Enable **full_duplex** if you want to enable full duplex communication on this serial port:

```
(config)> serial port1 full_duplex true
(config)>
```

The default is **rs-232**.

7. (Optional) Set a label that will be used when referring to this port.

```
(config)>path-paramlabel label
(config)>
```

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Configure PPP dial-in mode for a serial port

**PPP dial-in** allows the device to answer Point-to-Point Protocol (PPP) connections over serial ports.

To change the configuration to match the serial configuration of the device to which you want to connect:

## Web

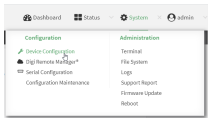
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

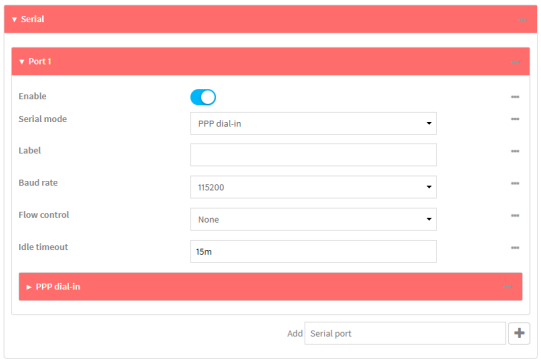
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click to expand the name of the port that you want to configure, for example, **Port 1**.

   The serial port is enabled by default. To disable, toggle off **Enable**.

4. For **Mode**, select **PPP-Dial-in**. The default is **Remote Access**.




5. (Optional) For **Label**, enter a label that will be used when referring to this port.
6. For **Baud rate**, select the baud rate used by the device to which you want to connect. The default is **9600**.
   - Max baud rate: **230400**
   - Minimum: **50**

     For a complete list, see Baud rate options.
7. For **Flow control**, select the type of flow control used by the device to which you want to connect. The default is **None**.
8. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default. If you enable **Altpin** in EIA-232 mode, the DCD and DSR signals are swapped. This allows use of DCD with 8-wire cables. **Altpin** has no impact on 422 or 485 mode. For more information, see Serial connector pinout.
9. For **Idle timeout**, type the amount of time that the active session can be idle before the session is disconnected.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

   For example, to set **Idle timeout** to ten minutes, enter **10m** or **600s**.
10. Click to expand **PPP dial-in**.
11. For **Local IP address**, type the IP address assigned to this interface.
12. For **Remote IP address**, type the IP address assigned to the remote peer.
13. For **Metric**, set the priority of routes associated with this interface. If there are multiple active routes that match a destination, then the route with the lowest metric will be used.
14. For **Default route**, toggle to control whether a default route gets added for the PPP interface. This feature is disabled by default.
15. For **Zone**, select the firewall zone for this interface. This can be used by packet filtering rules and access control lists to restrict network traffic on this interface.
16. For **Authentication method**, select the method used to authenticate the remote peer. Allowed values are:
    - **None**: No authentication is required.
    - **Automatic**: Attempt to authenticate using CHAP first, and then PAP.

- **CHAP**: Use Challenge Handshake Authentication Protocol (CHAP) to authenticate.
- **PAP**: Use Password Authentication Protocol (PAP) to authenticate.

If Automatic, CHAP, or PAP are selected, type the **Username** and **Password** used to authenticate the remote peer.

17. (Optional) Configure the serial port to use a custom PPP configuration file:
    a. Click to expand **Custom PPP configuration**.
    b. Click **Enable** to enable the use of a custom PPP configuration file.
    c. Click **Override** to override the default PPP configuration and only use the custom configuration file.

    If **Override** is not enabled, the custom PPP configuration file is used in addition to the default configuration.
    d. For **Configuration file**, paste or type the configuration data in the format of a pppd options file. Because the options are passed directly to the pppd command line, they should all be entered on a single line. For example:

```
debug lcp-echo-interval 10 lcp-echo-failure 2
```

18. (Optional) Configure a script that will be run to prepare the link before PPP negotiations are started:
    a. Click to expand **Connect script**.
    b. Click **Enable** to enable the use of a connection script.
    c. For **Connect script filename**, type the name of the script. Scripts are located in the /etc/config/serial directory. An example script, windows_dun.sh is provided.

    Example windows_dun.sh file:

```
#!/bin/sh

# Example connect script for connecting from a PC using a Windows
dial-up
# networking connection with built-in standard 33600 bps modem driver
and phone
# number 123.

# The shell's 'read' builtin breaks on newline, so translate incoming
carriage-
# return to newline, and outgoing newline to carriage-return-newline.
stty icrnl onlcr opost

# Read input from the serial port, one line at a time.
while read -r line; do
    case "$line" in
        ATDT123)
            echo "CONNECT" # instruct the peer to start PPP
            exit 0 # start up the local PPP session
            ;;
        AT*)
            echo "OK" # passively accept any other AT command
```

```
            ;;
    esac
done
```

19. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The serial port is enabled by default. To disable:

```
(config)> serial port1 enable false
(config)>
```

4. Set the mode:

```
(config)> serial port1 mode ppp_dialin
(config)>
```

5. (Optional) Set a label that will be used when referring to this port.

```
(config)> serial port1  label label
(config)>
```

6. Set the baud rate used by the device to which you want to connect:

```
(config)> serial port1 baudrate rate
(config)>
```

   where **rate** is the desired baud rate:

   - Default baud rate: **9600**
   - Max baud rate: **230400**
   - Minimum baud rate: **50**

     For a complete list, see Baud rate options.
7. Set the type of flow control used by the device to which you want to connect:

```
(config)> serial port1 flow value
(config)>
```

   where value is one of:

   - **none**
   - **rts/cts**
   - **xon/xoff**

8. Set the amount of time that the active session can be idle before the session is disconnected:

```
(config)> serial port1 idle_timeout value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **idle_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)> serial port1 idle_timeout 600s
(config)>
```

9. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default. If you enable **Altpin** in EIA-232 mode, the DCD and DSR signals are swapped. This allows use of DCD with 8-wire cables. **Altpin** has no impact on 422 or 485 mode. For more information, see Serial connector pinout.

```
(config)> serial port1 altpin true
(config)>
```

10. Set the local IP address assigned to this interface:

```
(config)> serial port1 ppp_dialin local_address IPv4_address
(config)>
```

11. Set the IP address assigned to the remote peer:

```
(config)> serial port1 ppp_dialin remote_address IPv4_address
(config)>
```

12. The default route is added for the PPP interface is disabled by default. To enable:

```
(config)> serial port1 ppp_dialin default_route true
config)>
```

13. Set the authentication method used to authenticate the remote peer:

```
(config)> serial port1 ppp_dialin auth value
(config)>
```

where *value* is one of:

- **none**: No authentication is required.
- **auto**: Attempt to authenticate using CHAP first, and then PAP.
- **chap**: Use Challenge Handshake Authentication Protocol (CHAP) to authenticate.
- **pap**: Use Password Authentication Protocol (PAP) to authenticate.

The default is **none**.

If auto, chap, or pap are set, set the username and password used to authenticate the remote peer:

```
(config)> serial port1 ppp_dialin username username
(config)> serial port1 ppp_dialin password password
(config)>
```

14. Set the priority of routes associated with this interface. If there are multiple active routes that match a destination, then the route with the lowest metric will be used.

```
(config)> serial port1 ppp_dialin metric int
(config)>
```

The default is **10**.

15. Set the firewall zone for this interface. This can be used by packet filtering rules and access control lists to restrict network traffic on this interface.
    a. Use the **?** to determine available zones:

```
(config)> serial port1 ppp_dialin zone ?

Zone: The firewall zone assigned to this interface. This can be used
by packet
filtering rules and access control lists to restrict network traffic
on this
interface.
Format:
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
Default value: internal
Current value: internal

(config)>
```

    b. Set the zone:

```
(config)> serial port1 ppp_dialin zone zone
(config)>
```

16. (Optional) Configure the serial port to use a custom PPP configuration file:
    a. Enable the use of a custom PPP configuration file:

```
(config)> serial port1 ppp_dialin custom enable true
(config)>
```

    b. Enable **override** to override the default PPP configuration and only use the custom configuration file:

```
(config)> serial port1 ppp_dialin custom override true
(config)>
```

If **override** is not enabled, the custom PPP configuration file is used in addition to the default configuration.

c. Paste or type the configuration data in the format of a pppd options file:

```
(config)> serial port1 ppp_dialin custom config_file data
(config)>
```

where *data* are one or more pppd command line options. Because the options are passed directly to the pppd command line, they should all be entered on a single line. For example:

```
(config)> serial port1 ppp_dialin custom config_file "debug lcp-echo-
interval 10 lcp-echo-failure 2"
(config)>
```

17. (Optional) Configure a script that will be run to prepare the link before PPP negotiations are started:

a. Enable the use of a connection script.

```
(config)> serial port1 ppp_dialin connect enable true
(config)>
```

b. Set the name of the script:

```
(config)> serial port1 ppp_dialin connect script filename
(config)>
```

Scripts are located in the /etc/config/serial directory. An example script, windows_dun.sh is provided.

Example windows_dun.sh file:

```
#!/bin/sh

# Example connect script for connecting from a PC using a Windows
dial-up
# networking connection with built-in standard 33600 bps modem driver
and phone
# number 123.

# The shell's 'read' builtin breaks on newline, so translate incoming
carriage-
# return to newline, and outgoing newline to carriage-return-newline.
stty icrnl onlcr opost

# Read input from the serial port, one line at a time.
while read -r line; do
    case "$line" in
```

```
        ATDT123)
            echo "CONNECT" # instruct the peer to start PPP
            exit 0 # start up the local PPP session
            ;;
        AT*)
            echo "OK" # passively accept any other AT command
            ;;
    esac
done
```

18. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

19. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

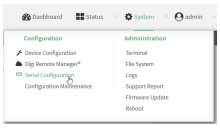
# Configure UDP serial mode for a serial port

The **UDP** serial mode option in the serial port configuration provides access to the serial port using UDP.

To change the configuration to match the serial configuration of the device to which you want to connect:

## Web

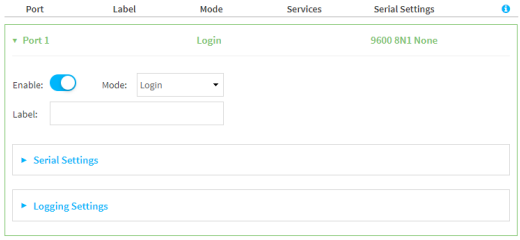
1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.



The **Serial Configuration** page is displayed.

**Note** You can also configure the serial port by using **Device Configuration** > **Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

3. Click to expand the port that you want to configure for UDP serial mode.




   The serial port is enabled by default. To disable, toggle off **Enable**.

4. For **Mode**, select **UDP serial**.

   The default is **Remote Access**.

5. (Optional) For **Label**, enter a label that will be used when referring to this port.

6. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default. If you enable **Altpin** in EIA-232 mode, the DCD and DSR signals are swapped. This allows use of DCD with 8-wire cables. **Altpin** has no impact on 422 or 485 mode. For more information, see Serial connector pinout.

7. For **Signalling**, select the electrical signaling interface type used on this serial port:

   - **RS-232**
     - Enable **RTS Toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control.
     - For **RTS Pre-delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**.
     - For **RTS Post-delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**.
   - **RS-422**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
   - **RS-485**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
     - Enable **Full Duplex** if you want to enable full duplex communication on this serial port.

   The default is **RS-232**.

8. Expand **Serial Settings**.

   a. For **Baud rate**, select the baud rate used by the device to which you want to connect.
      - Default baud rate: **9600**
      - Max baud rate: **230400**
      - Minimum: **50**

        For a complete list, see Baud rate options.

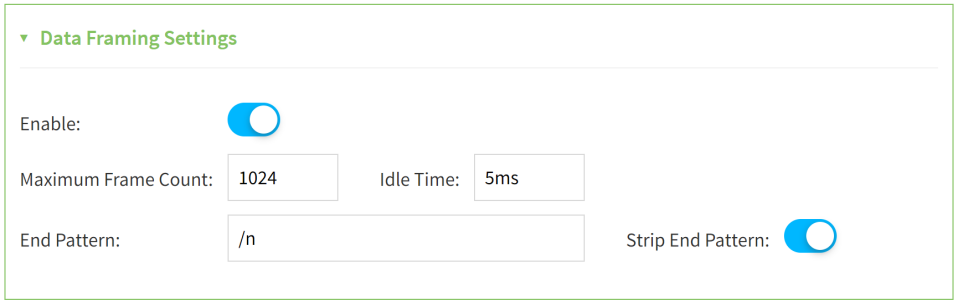
b. For **Data bits**, select the number of data bits used by the device to which you want to connect.

c. For **Parity**, select the type of parity used by the device to which you want to connect.

d. For **Stop bits**, select the number of stop bits used by the device to which you want to connect.

e. For **Flow control**, select the type of flow control used by the device to which you want to connect.

9. Expand **Data Framing Settings**.




a. Click to expand **Data Framing**.

i. Click **Enable** to enable the data framing feature.

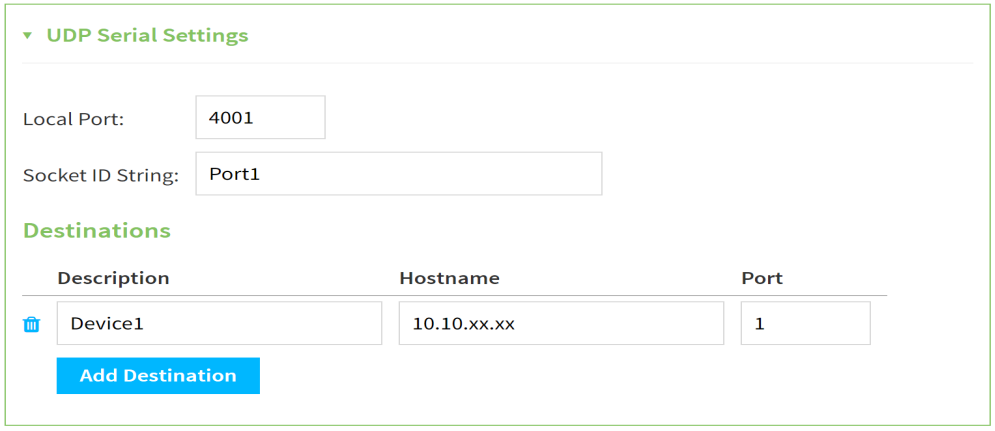
ii. For **Maximum Frame Count**, enter the maximum size of the packet. The default is **1024**.

iii. For **Idle Time**, enter the length of time the device should wait before sending the packet.

iv. For **End Pattern**, enter the end pattern. The packet is sent when this pattern is received from the serial port.

v. Click **Strip End Pattern** if you want to remove the end pattern from the packet before it is sent.

10. Expand **UDP Serial Settings**.




a. For **Local port**, enter the UDP port. The default is 4001 or serial port 1, 4002 for serial port 2, etc.

b. (Optional) For **Socket String ID**, enter a string that should be added at the beginning of each packet.

c. For **Destinations**, you can configure the remote sites to which you want to send data. If you do not specify any destinations, the Connect EZ 16/32 sends new data from the last IP address and port from which data was received. To add a destination:

   i. Click **Add Destination**. A destination row is added.

   ii. (Optional) For **Description**, enter a description of the destination.

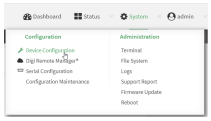
   iii. For **Hostname**, enter the host name or IP address of the remote site to which data should be sent.

   iv. For **Port**, enter the port number of the remote site to which data should be sent.

You can also configure access control for the serial port.

To do this, you need to go to **Device Configuration**:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.




The **Configuration** window is displayed.

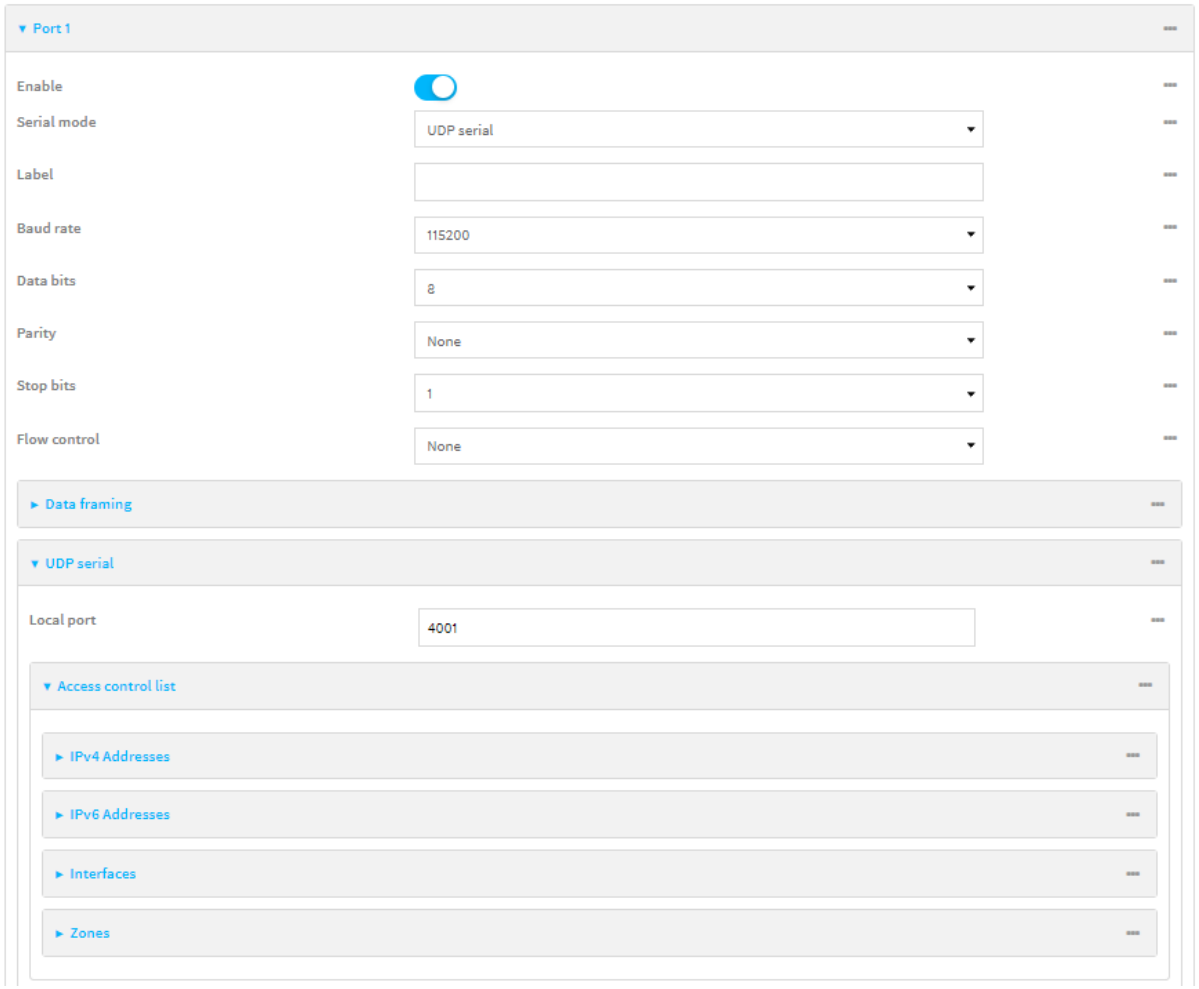
b. Access the configuration for the appropriate type of service:

   i. Click to expand **Serial**.

   ii. Click to expand the appropriate serial port.

   iii. Click to expand **UDP serial**.

   iv. Click to expand **Access Control List**.




- To limit access to specified IPv4 addresses and networks:
  i. Click **IPv4 Addresses**.
  ii. For **Add Address**, click ✚.
  iii. For **Address**, enter the IPv4 address or network that can access the device's service-type. Allowed values are:
    - A single IP address or host name.
    - A network designation in CIDR notation, for example, 192.168.1.0/24.
    - **any**: No limit to IPv4 addresses that can access the service-type.
  iv. Click ✚ again to list additional IP addresses or networks.
- To limit access to specified IPv6 addresses and networks:
  i. Click **IPv6 Addresses**.
  ii. For **Add Address**, click ✚.
  iii. For **Address**, enter the IPv6 address or network that can access the device's service-type. Allowed values are:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

iv. Click ✚ again to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the device:
  i. Click **Interfaces**.
  ii. For **Add Interface**, click ✚.
  iii. For **Interface**, select the appropriate interface from the dropdown.
  iv. Click ✚ again to allow access through additional interfaces.
- To limit access based on firewall zones:
  i. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
  ii. For **Add Zone**, click ✚.
  iii. For **Zone**, select the appropriate firewall zone from the dropdown.
  See Firewall configuration for information about firewall zones.
  iv. Click ✚ again to allow access through additional firewall zones.

11. Expand **Logging Settings** to configure logging for this serial port.
    a. To enable logging, click to toggle on **Enable**.
    b. In the **Log file name** field, enter a descriptive name for the log file.
    c. For **Log file size**, type the size of the log file. When the log file reaches the size limit, the current file is saved and a new file is created. The default is 65536 bytes.
    d. From the **Type of data to log** list box, specify the type of data that should be saved.
       - **Received**
       - **Transmitted**
       - **Both**
       - **Both with arrows**. This is the default.
    e. If you want to log the time at which date was received or transmitted, click the **Timestamps** toggle to **Enable**.
    f. If you want to log the data as hexadecimal values, click the **Hexadecimal** toggle to **Enable**.

    Note You can review the message log in the **Serial Port Log** page. See Review the serial port message log.

12. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The serial port is enabled by default. To disable:

```
(config)> serial port1 enable false
(config)>
```

4. Set the mode:

```
(config)> serial port1 mode udp
(config)>
```

5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default. If you enable **Altpin** in EIA-232 mode, the DCD and DSR signals are swapped. This allows use of DCD with 8-wire cables. **Altpin** has no impact on 422 or 485 mode. For more information, see Serial connector pinout.

```
(config)> serial port1 altpin true
(config)>
```

6. Set the signaling interface type used on this serial port:
   - **rs-232**
     - Enable **rts_toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control:

```
(config)> serial port1 rts_toggle true
(config)>
```

     - For **rts_pre_delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 "rts_pre_delay value
(config)>
```

     - For **rts_post_delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 rts_post_delay value
(config)>
```

   - **rs-422**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
   - **rs-485**
     - Enable **termination** if you want to enable electrical termination on this serial port:

```
(config)> serial port1 termination true
(config)>
```

- Enable **full_duplex** if you want to enable full duplex communication on this serial port:

```
(config)> serial port1 full_duplex true
(config)>
```

The default is **rs-232**.

7. (Optional) Set a label that will be used when referring to this port.

```
(config)>serial port1 label label
(config)>
```

8. Set the baud rate used by the device to which you want to connect:

```
(config)>serial port1 label baudrate rate
(config)>
```

where **rate** is the desired baud rate:

- Default baud rate: **9600**
- Max baud rate: **230400**
- Minimum baud rate: **50**

  For a complete list, see Baud rate options.

9. Set the number of data bits used by the device to which you want to connect:

```
(config)>serial port1 label databits bits
(config)>
```

10. Set the type of parity used by the device to which you want to connect:

```
(config)>serial port1 label parity parity
(config)>
```

Allowed values are:

- **even**
- **odd**
- **none**

The default is **none**.

11. Set the stop bits used by the device to which you want to connect:

```
(config)>serial port1 label stopbits bits
(config)>
```

12. Set the type of flow control used by the device to which you want to connect:

```
(config)>serial port1 label flow type
(config)
```

Allowed values are:

- **none**
- **rts/cts**
- **xon/xoff**

The default is **none**.

13. (Optional) Configure data framing:
    a. Enable data framing:

```
(config)>serial port1 framing enable true
(config)
```

    b. Set the maximum size of the packet:

```
(config)>serial port1 framing max_count int
(config)
```

    The default is **1024**.

    c. Set the length of time the device should wait before sending the packet:

```
(config)>serial port1 framing idle_time value
(config)
```

    where *value* is in milliseconds (ms) or seconds (s). The maximum value is **60s**.

    d. Set the end pattern. The packet is sent when this pattern is received from the serial port:

```
(config)>serial port1 framing end_pattern backslash-escaped-string
(config)
```

    e. Set the strip end pattern if you want to remove the end pattern from the packet before it is sent:

```
(config)>serial port1 framing strip_pattern true
(config)
```

14. Set the UDP port:

```
(config)> serial port1 udp port port
(config)>
```

    The default is **4001**.

15. (Optional) Enter a string that should be added at the beginning of each packet:

```
(config)> serial port1 udp socketid backslash-escaped-string
(config)>
```

16. Configure the remote sites to which you want to send data. If you do not specify any destinations, the Connect EZ 16/32 send new data to the last hostname and port from which data was received. To add a destination:

i. Add a destination:

```
(config)> add serial port1 upd destination end
(config serial port1 udp destination 0)>
```

ii. (Optional) Enter a description of the destination:

```
(config serial port1 udp destination 0)> description string
(config serial port1 udp destination 0)>
```

iii. Set the host name or IP address of the remote site to which data should be sent:

```
(config serial port1 udp destination 0)>hostname hostanme-or-IP-
address
(config serial port1 udp destination 0)>
```

iv. Set the port number of the remote site to which data should be sent:

```
(config serial port1 udp destination 0)> port port
(config serial port1 udp destination 0)>
```

17. (Optional) Configure access control:

a. Return to the root configuration prompt by typing **...**:

```
(config serial port1 udp destination 0)> ...
(config)>
```

b. Set the Access Control List:

- To limit access to specified IPv4 addresses and networks:

```
(config)> add serial port1 udp acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add serial port1 udp acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config)> add serial port1 udp acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add serial port1 udp acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that
can be referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ----------------------------------------------------
---------------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to include additional firewall zones.

- To limit access to specified IPv4 addresses and networks:

```
(config)> add serial port1 udp acl address end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add serial port1 udp acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config)> add serial port1 udp acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add serial port1 udp acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------------------
------------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

18. Configure serial port logging:
    a. Enable serial port logging:

```
(config)>serial port1 logging enable true
(config)>
```

    b. Set the file name:

```
(config)>serial port1 logging filename string
(config)>
```

    c. Set the maximum allowed log size for the serial port log when starting the log:

```
(config)>serial port1 logging size value
(config)>
```

    where *value* is the size of the log file in bytes. The default is **65536**.

    d. Specify the data type:

```
(config)>serial port1 logging type value
(config)>
```

    where *value* is one of:
    - received
    - transmitted
    - both
    - arrows. This is the default.

    e. Log the time at which date was received or transmitted:

```
(config)>serial port1 logging hex true
(config)>
```

    f. Log data as hexadecimal values:

```
(config)>serial port1 logging timestamp true
(config)>
```

19. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

20. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Configure Modem emulator mode for a serial port

**Modem emulator** mode allows the device to act as a dial-up modem emulator for handling incoming AT dial-ins.

To change the configuration to match the serial configuration of the device to which you want to connect:

## Web

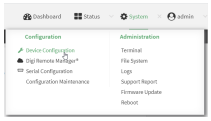
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click to expand the name of the port that you want to configure, for example, **Port 1**.

   The serial port is enabled by default. To disable, toggle off **Enable**.
4. For **Mode**, select **Modem emulator**. The default is **Remote Access**.
5. (Optional) For **Label**, enter a label that will be used when referring to this port.
6. For **Baud rate**, select the baud rate used by the device to which you want to connect. The default is **9600**.
   - Max baud rate: **230400**
   - Minimum baud rate: **50**

     For a complete list, see Baud rate options.
7. For **Data bits**, select the number of data bits used by the device to which you want to connect. The default is **8**.
8. For **Parity**, select the type of parity used by the device to which you want to connect. The default is **None**.
9. For **Stop bits**, select the number of stop bits used by the device to which you want to connect. The default is **1**
10. For **Flow control**, select the type of flow control used by the device to which you want to connect. The default is **None**.

11. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default. If you enable **Altpin** in EIA-232 mode, the DCD and DSR signals are swapped. This allows use of DCD with 8-wire cables. **Altpin** has no impact on 422 or 485 mode. For more information, see Serial connector pinout.
12. For **Idle timeout**, type the amount of time that the active session can be idle before the session is disconnected.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Idle timeout** to ten minutes, enter **10m** or **600s**.
13. For **Escape character**, type the character to use in the escape sequence. Enter this character three times, followed by the escape delay and then an AT command to switch from data mode to command mode. The default is the plus sign (**+**).
14. For **Escape delay**, type the delay between the escape sequence and an AT command to switch from data mode to command mode. The default is **1s**.
15. For **Auto-answer rings**, type the number of rings to wait before auto-answering. Enter **0** (zero) to disable auto-answering.
16. **Command echo** is enabled by default. Commands sent to the port are echoed back to the user. Select to disable this feature.
17. For **Result codes**, select the type of result code that are displayed as responses to commands. Options are:
    - **None**: No result codes are displayed.
    - **Numeric**: Numeric result codes are displayed.
    - **Verbose**: Result codes are displayed in English, for example: OK, ERROR, CONNECT. This is the default.
18. (Optional) Click to expand **Phonebook** and create dial strings that can be used to connect to remote servers.
    a. Click ✚ to add a phone book entry.
    b. For **Label**, type a descriptive name for the phone book entry.
    c. (Required) For **Dialstring**, type the string to dial to connect to the remote server.
    d. (Required) For **Connection destination**, type the hostname or IP address of the remote server.
    e. (Required) For **Connection port**, type the TCP port of the remote server. Minimum is 1 and maximum is 65535.
19. Expand **TCP connection** to configure TCP connection for this serial port.
    a. To enable a TCP connection, click to toggle on **Enable**.
    b. For **Port**, type the TCP port for this service. The default is **4001**.
    c. Expand **Access control list** to create a list of IP addresses, interfaces, and firewall zones from which this service may be accessed.
        - To limit access to specified IPv4 addresses and networks:
            i. Click **IPv4 Addresses**.
            ii. For **Add Address**, click ✚.
            iii. For **Address**, enter the IPv4 address or network that can access the device's service-type. Allowed values are:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

iv. Click ✚ again to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:
  i. Click **IPv6 Addresses**.
  ii. For **Add Address**, click ✚.
  iii. For **Address**, enter the IPv6 address or network that can access the device's service-type. Allowed values are:
    - A single IP address or host name.
    - A network designation in CIDR notation, for example, 2001:db8::/48.
    - **any**: No limit to IPv6 addresses that can access the service-type.

  iv. Click ✚ again to list additional IP addresses or networks.
- To limit access to hosts connected through a specified interface on the device:
  i. Click **Interfaces**.
  ii. For **Add Interface**, click ✚.
  iii. For **Interface**, select the appropriate interface from the dropdown.
  iv. Click ✚ again to allow access through additional interfaces.
- To limit access based on firewall zones:
  i. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
  ii. For **Add Zone**, click ✚.
  iii. For **Zone**, select the appropriate firewall zone from the dropdown.

  See Firewall configuration for information about firewall zones.

  iv. Click ✚ again to allow access through additional firewall zones.

d. Toggle on **Enable mDNS** to enable Multicast DNS (mDNS) reporting for this service. This feature is disabled by default.

20. Expand **Logging Settings** to configure logging for this serial port.
    a. To enable logging, click to toggle on **Enable**.
    b. In the **Log file name** field, enter a descriptive name for the log file.
    c. For **Log file size**, type the size of the log file. When the log file reaches the size limit, the current file is saved and a new file is created. The default is 65536 bytes.
    d. From the **Type of data to log** list box, specify the type of data that should be saved.
       - **Received**
       - **Transmitted**
       - **Both**
       - **Both with arrows**. This is the default.

    e. If you want to log the time at which date was received or transmitted, click the **Timestamps** toggle to **Enable**.

f. If you want to log the data as hexadecimal values, click the **Hexadecimal** toggle to **Enable**.

> **Note** You can review the message log in the **Serial Port Log** page. See Review the serial port message log.

21. Click **Apply** to save the configuration and apply the change.

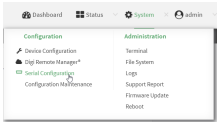
# Configure Modbus mode for a serial port

**Modbus** mode allows you to use the serial port for Modbus. See Modbus gateway.

To change the configuration to match the serial configuration of the device to which you want to connect:

## Web

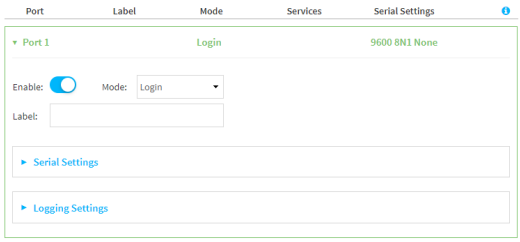
1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.




The **Serial Configuration** page is displayed.

> **Note** You can also configure the serial port by using **Device Configuration** > **Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

3. Click the name of the port that you want to configure.




The serial port is enabled by default. To disable, toggle off **Enable**.

4. For **Mode**, select **Modbus**.
5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default. If you enable **Altpin** in EIA-232 mode, the DCD and DSR signals are swapped. This allows use of DCD with 8-wire cables. **Altpin** has no impact on 422 or 485 mode. For more information, see Serial connector pinout.
6. (Optional) For **Label**, enter a label that will be used when referring to this port.
7. For **Signalling**, select the electrical signaling interface type used on this serial port:
   - **RS-232**
     - Enable **RTS Toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control.

- For **RTS Pre-delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**.
- For **RTS Post-delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**.

■ **RS-422**

- Enable **Termination** if you want to enable electrical termination on this serial port.

■ **RS-485**

- Enable **Termination** if you want to enable electrical termination on this serial port.
- Enable **Full Duplex** if you want to enable full duplex communication on this serial port.

The default is **RS-232**.

8. Expand **Serial Settings**.

   The entries in the following fields must match the information for the power controller. Refer to your power controller manual for the correct entries.

   a. **Baud rate**: For **Baud rate**, select the baud rate used by the device to which you want to connect. The default is **9600**.
      ■ Max baud rate: **230400**
      ■ Minimum: **50**

      For a complete list, see Baud rate options.

   b. **Data bits**: For **Data bits**, select the number of data bits used by the device to which you want to connect. The default is **8**.

   c. **Parity**: For **Parity**, select the type of parity used by the device to which you want to connect. The default is **None**.

   d. **Stop bits**: For **Stop bits**, select the number of stop bits used by the device to which you want to connect. The default is **1**.

   e. **Flow control**: For **Flow control**, select the type of flow control used by the device to which you want to connect. The default is **None**.

9. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The serial port is enabled by default. To disable:

```
(config)> serial port1 enable false
(config)>
```

4. Set the mode:

```
(config)> serial port1 mode modbus
(config)>
```

5. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default. If you enable **Altpin** in EIA-232 mode, the DCD and DSR signals are swapped. This allows use of DCD with 8-wire cables. **Altpin** has no impact on 422 or 485 mode. For more information, see Serial connector pinout.

```
(config)> serial port1 altpin true
(config)>
```

6. Set the signaling interface type used on this serial port:
   - **rs-232**
     - Enable **rts_toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control:

```
(config)> serial port1 rts_toggle true
(config)>
```

     - For **rts_pre_delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 "rts_pre_delay value
(config)>
```

     - For **rts_post_delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 rts_post_delay value
(config)>
```

   - **rs-422**
     - Enable **Termination** if you want to enable electrical termination on this serial port.
   - **rs-485**
     - Enable **termination** if you want to enable electrical termination on this serial port:

```
(config)> serial port1 termination true
(config)>
```

     - Enable **full_duplex** if you want to enable full duplex communication on this serial port:

```
(config)> serial port1 full_duplex true
(config)>
```

   The default is **rs-232**.

7. (Optional) Set a label that will be used when referring to this port.

```
(config)>path-paramlabel label
(config)>
```

8. Set the baud rate used by the device to which you want to connect:

```
(config)> serial port1 baudrate rate
(config)>
```

where **rate** is the desired baud rate:

- Default baud rate: **9600**
- Max baud rate: **230400**
- Minimum baud rate: **50**

  For a complete list, see Baud rate options.

9. Set the number of data bits used by the device to which you want to connect:

```
(config)> serial port1 databits bits
(config)>
```

10. Set the type of parity used by the device to which you want to connect:

```
(config)> serial port1 parity parity
(config)>
```

Allowed values are:

- **even**
- **odd**
- **none**

The default is **none**.

11. Set the stop bits used by the device to which you want to connect:

```
(config)> serial port1 stopbits bits
(config)>
```

12. Set the type of flow control used by the device to which you want to connect:

```
(config)> serial port1 flow value
(config)>
```

where value is one of:

- **none**
- **rts/cts**
- **xon/xoff**

13. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

14. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Configure RealPort mode using the Digi Navigator

You can use RealPort mode to enable communication between a device and your computer. From the **Digi Navigator**, you can easily configure your device for RealPort, and then install and configure RealPort on your computer.

Each time the **Digi Navigator** is launched on your computer, any Digi devices that are on the network and support device discovery are discovered by the **Navigator**.

For each of the devices that have been discovered, you can set serial ports on the device to RealPort mode as needed, and then also enable the RealPort service. The COM ports on your laptop are also configured. These processes ensure that RealPort is configured on the device and on your computer.

---

**Note** You must configure the device for RealPort before you install and configure RealPort on your computer. The RealPort configuration on the device includes enabling RealPort service on the device. When you configure RealPort on your computer, it must connect to the RealPort service on the device.

---

### *Digi Navigator installation*

The **Digi Navigator** can only be installed on a computer with a Windows OS. If you are using Linux, you can manually install and configure RealPort without **Digi Navigator**. For the Linux installation process, refer to the Get started: Install RealPort for LINUX in the **RealPort Installation User's Guide**.

## Installation and configuration process

These steps explain how to install and configure the **Digi Navigator**.

**Step 1**: Install the Digi Navigator

**Step 2**: Configure RealPort on a Digi device from the Digi Navigator

**Step 3**: Install and configure RealPort on your computer

---

**Note** If you have Digi Navigator 1.0 already installed, Digi recommends that you uninstall it, as both versions of the Digi Navigator are not needed. See Uninstall Digi Navigator 1.0.

---

## Digi Navigator features

- Digi Navigator application features
- Filter devices for display in the Digi Navigator
  - Filter the device list by service option
  - Filter the device list for auto-discovered devices
  - Filter the device list by RealPort configuration status
- Specify the IP address to discover a Digi device
- Set an IP address for a device
- Access a device's web UI from the Digi Navigator
- Manage the list of devices configured for RealPort

- Refresh the RealPort device list
- Review the COM ports configured for RealPort
- Uninstall the RealPort device configuration from your computer

- Reconfigure RealPort on a device
- Generate a device setup script
- Review Digi Navigator version information
- Uninstall Digi Navigator 1.0

## Install the Digi Navigator

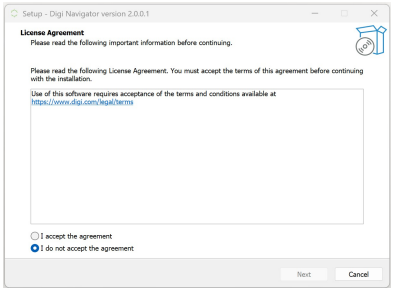
This section explains how to download and install the **Digi Navigator** application.

**Note** Microsoft Visual C++ is required for RealPort and is installed by default during the Digi Navigator install process.

1. Navigate to the Digi Navigator support page.

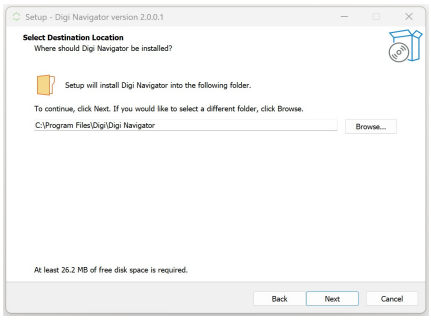
   **Note** The **Digi Navigator** application can also be downloaded from your device's product support page.

2. Scroll down to the **Product Resources** tab, and in the **Drivers & Patches** section, click **Digi Navigator**.
3. From the list box, select the appropriate Microsoft Windows option from the list of driver options.
4. Click the **download** link to download the **Digi Navigator** application.
5. When the download is complete, click on the downloaded .exe file. The **Digi Navigator Setup** wizard displays.
6. In the **License Agreement** page, review the agreement and select the **I accept the agreement** option.

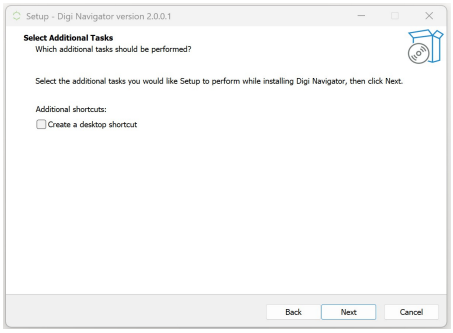



7. Click **Next**. The **Select Destination Location** page displays.

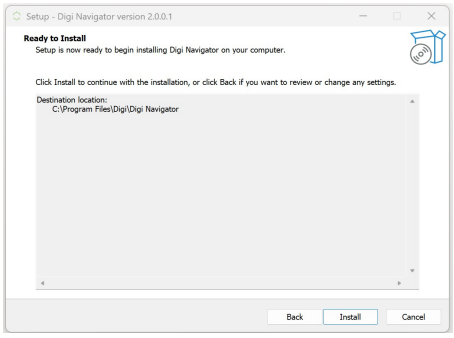
- You can leave the installation location as the default, or click **Browse** to select a different location.




8. Click **Next**. The **Select Additional Tasks** page displays.
   - If you want to create a shortcut for the Digi Navigator, select the **Create a desktop shortcut** option.

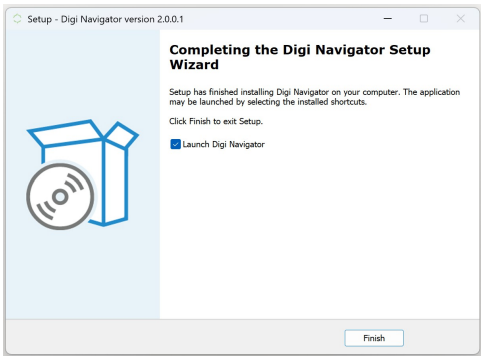



9. Click **Next**. The **Ready to Install** page displays.




10. Click **Install** to start the installation. When complete, the **Completing the Digi Navigator Setup Wizard** page displays.

    The **Launch Digi Navigator** option is selected by default. De-select this option if you don't want the **Digi Navigator** to automatically launch each time you boot your computer.




11. Click **Finish** to complete the installation process. If the **Launch Digi Navigator** option was selected, the Digi Navigator launches.

**NEXT STEP**: Configure RealPort on a device. See Configure RealPort on a Digi device from the Digi Navigator.

## Configure RealPort on a Digi device from the Digi Navigator

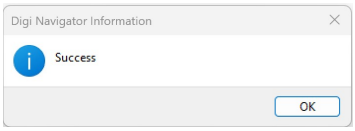
You can configure the Connect EZ 16/32 to communicate with your computer using RealPort. In this step, you can select which serial ports on the device should be set to RealPort mode, and the RealPort service is enabled for the device.

Configuring RealPort on your device is the first step in a two-step process. To ensure communication between the device and your laptop, you must also configure your computer for RealPort after the first step is completed.

**Note** You can also manually configure the device for RealPort by logging into the device's web UI. See Advanced RealPort configuration without using the Digi Navigator.

1. Make sure the Connect EZ 16/32 is powered and connected your local network or computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. A list of the devices discovered by the **Digi Navigator** displays. For information about how devices are discovered and how to add a device to the list, see Digi Navigator device discovery process.
4. Find the device that you want to configure and expand it to display the IP addresses for the device.
5. Use one of the following methods to begin configuring RealPort on the device:
   - **Configuration pane**: Click on the IP address to display options in the Configuration pane. Click **Configure Device for RealPort**. The **Enter Device Credentials** page displays.
   - **Shortcut menu**: Right-click on an IP address to display the shortcut menu, and click **Configure Device For RealPort**. The **Enter Device Credentials** page displays.
6. In the **Enter Device Credentials** page, enter the device's default user name and password in the **Username** and **Password** fields. The default user name is **admin** and the default password is the unique password printed on the label packaged with your device. If the defaults do not work, they may have been changed. Verify with your system administrator.

7. Click **OK**.
8. When RealPort configuration is complete, the **Success** message displays.




9. Click **OK** to close the message.
10. (Optional) If desired, you can verify the RealPort configuration. See Configure the serial port for RealPort mode and Configure the RealPort service.

**NEXT STEP**: Install and configure RealPort on your computer. See Install and configure RealPort on your computer.

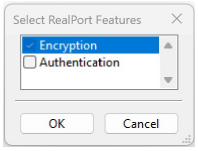
## Install and configure RealPort on your computer

You can configure your computer to communicate with the Connect EZ 16/32 using RealPort. In this step, RealPort is installed on your computer and communication with the device is configured.

Configuring RealPort on your device is the second step in a two-step process. To ensure communication between the device and your laptop, you must also have configured your device for RealPort. See Configure RealPort on a Digi device from the Digi Navigator.

**Note** You can also manually install and configure RealPort on your computer. See Advanced RealPort configuration without using the Digi Navigator.

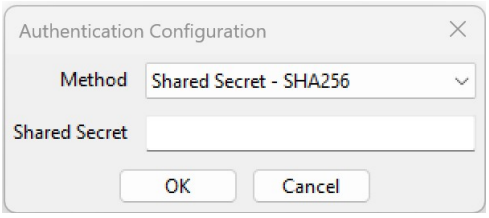
1. Make sure the Connect EZ 16/32 is powered and connected your local network or computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. A list of the devices discovered by the **Digi Navigator** displays. For information about how devices are discovered and how to add a device to the list, see Digi Navigator device discovery process.
4. Find the device that you want to access and expand it to display the IP addresses for the device.
5. Use one of the following methods to begin configuring RealPort on your computer:
   - **Configuration pane**: Click on the IP address to display options in the Configuration pane. Click **Configure this PC for RealPort**. The **Select RealPort Features** dialog displays.
   - **Shortcut menu**: Right-click on an IP address to display the shortcut menu, and click **Configure this PC for RealPort**. The **Select RealPort Features** dialog displays.
6. Configure features in the **Select RealPort Features** dialog.



a. Enable **Encryption** to enable encryption of data. This is enabled by default.

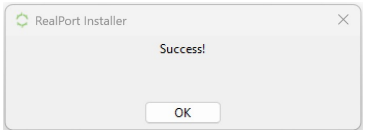
b. Enable **Authentication** to configure the authentication method the RealPort server uses to authenticate clients. The **Authentication Configuration** dialog displays.

- From the **Method** list box, select the **Shared Secret - SHA256** option.
- For **Shared Secret**, enter the authentication password to ensure secure communication. Leave this field blank to disable authentication.




c. Click **OK**.

7. The **Select Ports** dialog displays. By default, all of the ports on the device are selected to be configured for RealPort. De-select the ports that you don't want to configure for RealPort.
8. Click **OK**. The **COM Selection** dialog displays.
9. From the **Select starting COM** list box, select the first COM port that should be configured for RealPort. The first available COM port is selected by default. The number of COM ports configured matches the number of serial ports on the device.
10. Click **OK**. A series of progress messages displays.
11. When the configuration is complete, a message displays.




12. Click **OK** to close the message.
13. (Optional) After RealPort configuration on your laptop is complete, you can open the Windows **Properties** dialog for your computer.

a. Launch the **Digi Navigator** if it is not currently open. A list of devices that have RealPort enabled and configured displays in the **Installed RealPort Devices** section at the bottom of the screen.

b. Double-click on a device name. The Windows **Properties** dialog for your computer displays. and display the COM ports on your computer that are configured for RealPort. For more information, see Review the COM ports configured for RealPort.

## Digi Navigator device discovery process

When the **Digi Navigator** is installed or launched, it discovers Digi devices that are on your local network and that also support device discovery. A list of the discovered Digi devices are displayed by default in the **Digi Navigator**.

If a Digi device is not on the same network as your computer or the device is undiscoverable, the device is not displayed in the **Digi Navigator**. You can add the device using that device's IP address, and after it has been added, it also displays in the **Digi Navigator**.

The sections below describe different scenarios for discovering devices.

**Device supports Digi Navigator discovery**

When the **Digi Navigator** is launched, all discoverable devices are displayed in the application screen. These include devices that are on the same network as your computer and the network has a DHCP server, or devices that have a static IP address.

The **Digi Navigator** uses the HTTPS service by default to discover devices to your network. Other services can be used. See Services used to discover a device when connected to a network.

**Device cannot be discovered by Digi Navigator**

If a device is not on the same network as your computer or the device is undiscoverable, you can manually add the device using that device's IP address. See Specify the IP address to discover a Digi device.

**Device supports Digi Navigator discovery, but a DHCP server is not on the network**

If the device is directly connected to a computer or connected to a network with no DHCP server, there are two options available to connect to the device:

- **192.168.210.1**: A set up address that is available in the OS. See Assign a generic IP address to the device.
- **169.254.100.100**: An auto-IP address available in the OS. See Use the autodiscovery protocol to discover a device.

Note If you use either of these IP addresses to connect to the device for initial config, you should then set a unique IP address for the device that is appropriate for the network on which it will be deployed.

## Services used to discover a device when connected to a network

To discover the IP address for a Digi device connected to your network, the **Digi Navigator** uses the HTTPS service by default. Other services can be used, if needed.

You can limit the service options that display in the configuration pane in the **Digi Navigator**.

1. Make sure **Digi Navigator** is installed and the Connect EZ 16/32 is powered and connected to your local network or computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. Click **Filters** > **Services** from the toolbar to display the service options: **HTTPS**, **HTTP**, and **SSH**. To ensure that you can communicate with your device, at least one option should be selected.
4. Click on service option to select it or deselect it. A check mark displays next to a selected option.

   The selected options are included in the configuration pane. You can click on a service option in the configuration pane to use that service to log in to the device.

### *Use the autodiscovery protocol to discover a device*

If a Digi device is directly connected to a computer or connected to a network with no DHCP server, you can assign an IP address to the Digi device so that the device is automatically discovered.

1. Make sure **Digi Navigator** is installed and the Connect EZ 16/32 is powered and connected to your local network or computer with an Ethernet cable.
2. Launch the **Digi Navigator**.

3. From the toolbar, click **Filters** > **IP Addresses** > **169.254.100.100** option.
4. Log into the device and set a unique IP address for the device that is appropriate for the network on which it will be deployed. See Define a static IP address.

### *Assign a generic IP address to the device*

If the Connect EZ device is directly connected to a computer or connected to a network with no DHCP server, you can assign a generic IP address to the device. Using this IP address requires you to set this IP address on your computer as well as on the device.

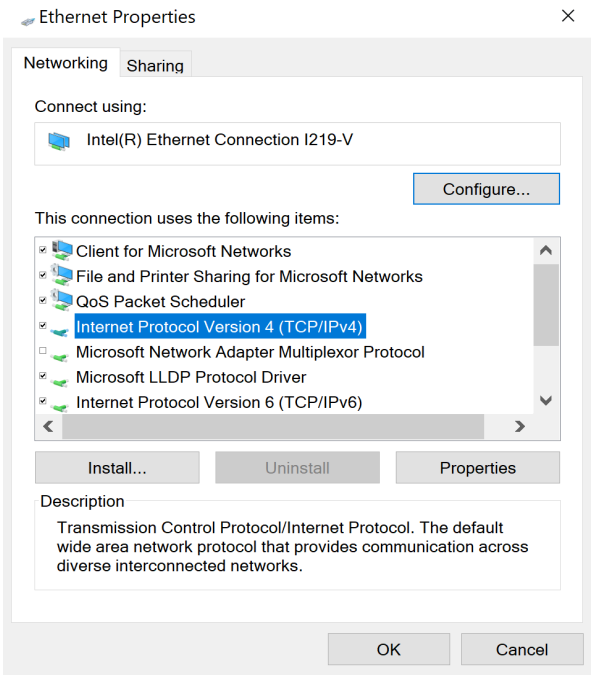
#### *Step 1: Assign a generic IP address to the device*

1. Make sure **Digi Navigator** is installed and the Connect EZ 16/32 is powered and connected to your local network or computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. From the toolbar, click **Filters** > **IP Addresses** > **192.168.210.1**.

#### *Step 2: Assign the IP address to your computer*

You must also manually assign this IP address to your computer to ensure a connection. Both your computer and device must be connected to a private network that does not have a DHCP server.

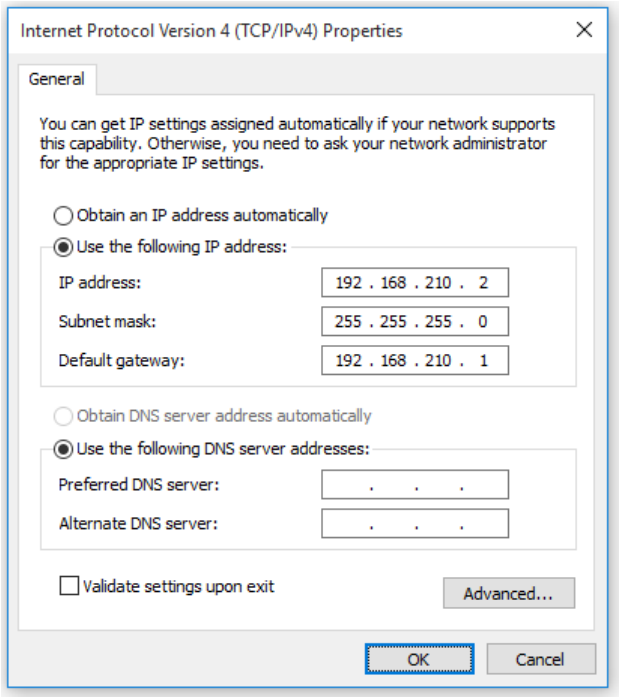
1. Use an Ethernet cable to connect the device and your computer. Both your computer and device must be connected to your private network.
2. On your PC, navigate to the Ethernet network settings dialog.
3. Click the **Internet Protocol Version 4 (TCP/IPv4)** parameter.




4. Click **Properties**. The **Internet Protocol Version 4 (TCP/IPv4) Properties** dialog appears.
5. Select **Use the following IP address**.

**Note** **IMPORTANT**: Make note of the current IP address entries for **IP address**, **Subnet mask**, and **Default gateway**. You will need this information to complete the final step of the process.

6. Configure with the following details:
   - **IP address** for PC: 192.168.210.2
   - **Subnet**: 255.255.255.0
   - **Gateway**: 192.168.210.1




7. Click **OK**.
8. Open a browser window.
9. Enter the default gateway IP address to access the device: **192.168.210.1**. The device's login screen displays.
10. Log into the device using the default user name and password. The default user name is **admin** and the default password is printed on the bottom label of the device and on the loose label included in the package. If the defaults to not work, they may have been changed. Confirm this information with your system administrator.
11. Update the IP address for the device.
12. On your PC, revert the IP address information to the original entries.
    a. Return to the **Internet Protocol Version 4 (TCP/IPv4) Properties** dialog.
    b. Enter the original IP address entries for **IP address**, **Subnet mask**, and **Default gateway**.
    c. Click **OK**.

### *Specify the IP address to discover a Digi device*

You can manually add a device to the known device list, using the device's IP address. This feature is useful if a device is not on the same network as your computer or the device is undiscoverable.

***Before you begin***

To add a device, you will need:

- The device's IP address.
- The user name and password for the device.

To add a device to the known device list:

1. Make sure **Digi Navigator** is installed and the Connect EZ 16/32 is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. Click **Configure** > **Known Devices**.
4. Click **Add**. The **New Device** dialog displays.
   a. In the **Name** field, enter a descriptive name for the device.
   b. Click **Add**.
   c. In the **IP Addresses** field, enter the IP address of the device.

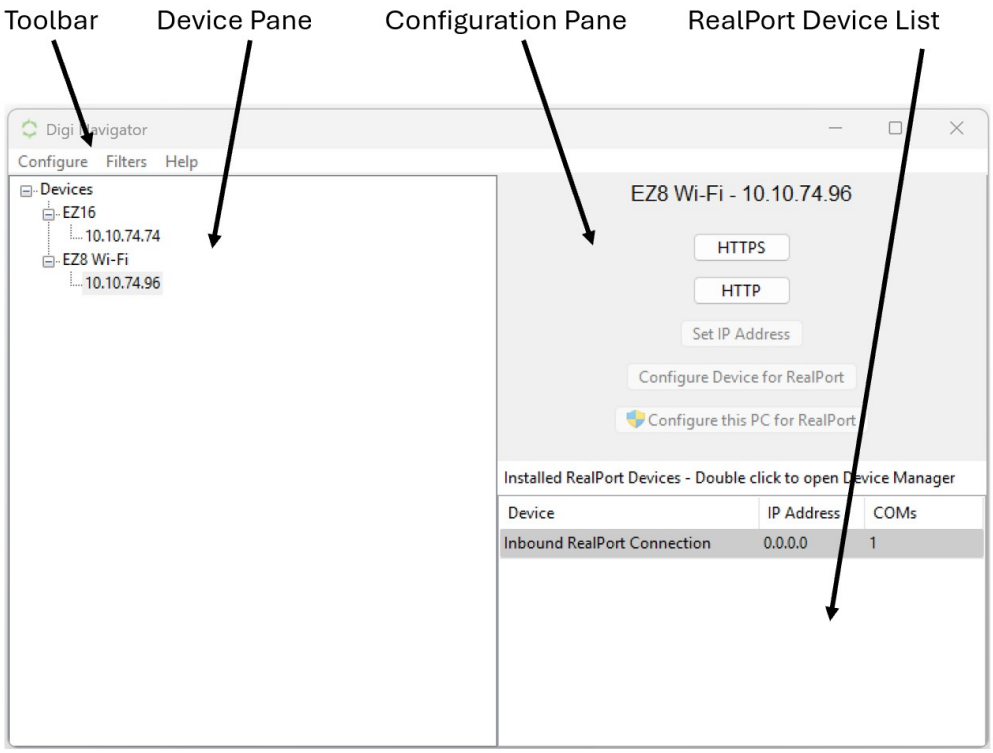
      If you want to enter more than one IP address for this device, click **Add** and enter another IP address.
   d. Click the buttons for the services that you want to use to communicate with the device. The default port number for each service can be changed. After a service has been selected, you can click the button for the service to de-select it.

      To ensure that you can communicate with your device, at least one option should be selected.

      - **HTTPS**: The **HTTPS** service is selected by default. The default port number is **443**.
      - **HTTP**: The default port number is **80**.
      - **SSH**: The default port number is **22**.
      - **RealPort**: Click **RealPort** to enable the RealPort service for the device. The default port number is **1027**.
5. Click **OK**. You are returned to the **Known Devices** dialog.
6. Click the **X** in the upper right corner to close the dialog.
7. The device you just added displays in the device list.

## Digi Navigator application features

All features of the **Digi Navigator** are available from the main application screen.




### *Toolbar*

The toolbar menus are used to configure Digi Navigator.

| Menu item | Sub-menu item | Description |
|---|---|---|
| **Configure** | **Known Devices** | If a Digi device is not on the same network as your computer or the device is undiscoverable, you can manually add the device using that device's IP address.<br>▪ Specify the IP address to discover a Digi device |
| | **Refresh Installed RealPort Device List** | Use the **Refresh Installed RealPort Device List** feature to update the list of the Digi devices that have RealPort enabled and configured. The list displays in the RealPort Device List pane in the Digi Navigator.<br>▪ Refresh the RealPort device list |
| | **Generate Device Setup Script** | Use the **Generate Device Setup Script** feature to generate a script of the RealPort configuration of the local PC. The script can be saved and used as a backup.The script is generated as a .cmd file.<br>▪ Generate a device setup script |
| **Filters** | **Services** | You can limit the service options that display in the Configuration pane in the **Digi Navigator**. You can click on a service option in the |

| Menu item | Sub-menu item | Description |
|---|---|---|
| | | Configuration pane to use that service to log in to the device.<br>■ Filter the device list by service option |
| | **IP Addresses** | These specific IP addresses can be used to discover a Digi device that is directly connected to a computer or connected to a network with no DHCP server.<br>■ **192.168.210.1**: A set up IP address that is available in the OS. See Assign a generic IP address to the device.<br>■ **169.254.100.100**: An auto-IP address available in the OS. See Use the autodiscovery protocol to discover a device. |
| | **Devices > Supported Services > RealPort** | You can use the **RealPort** option to filter which devices are included in the device list, depending on the RealPort configuration status.<br>■ Filter the device list by RealPort configuration status |
| | **Devices > Discovered Devices** | You can use the **Discovered Devices** option to filter which devices are included in the device list, depending on whether the device was auto-discovered.<br>■ Filter the device list for auto-discovered devices |
| **Help** | **About** | Review the Digi Navigator version information.<br>■ Review Digi Navigator version information |

### *Device pane*

A list of the discovered devices and those added to the known device list display in the Device pane. Expand each device to display the IP addresses associated with each device.

#### Filter the device list

You can apply filters to limit which devices display in the pane.

- Filter the device list by service option
- Filter the device list for auto-discovered devices
- Filter the device list by RealPort configuration status

#### Display configuration options for a device in the Configuration page

Expand a device and click on an IP address for the device to display related configurations options in the Configuration pane.

#### Shortcut menu

You can right-click on the IP address for a device to display the shortcut menu options. The options are an easy way to use the features from the toolbar.

| Item | Description |
|---|---|
| **Add to Known Devices** | If a Digi device is not on the same network as your computer or the device is undiscoverable, you can manually add the device using that device's IP address.<br>■ Specify the IP address to discover a Digi device |
| **HTTPS** | You can use the **HTTPS** menu option to access the device's web UI using the HTTPS service.<br>■ Access a device's web UI from the Digi Navigator |
| **HTTP** | You can choose the **HTTP** menu option to access the device's web UI using the HTTP service.<br>■ Access a device's web UI from the Digi Navigator |
| **SSH** | You can use the **SSH** menu option to access the device's web UI using the SSH service.<br>■ Access a device's web UI from the Digi Navigator |
| **Set IP Address** | You can reconfigure the IP address of a device to a DHCP address or a specified static address.<br>■ Set an IP address for a device |
| **Configure Device for RealPort** | You can use the **Configure Device for RealPort** menu option to configure RealPort on the device.<br>■ Configure RealPort on a Digi device from the Digi Navigator<br>■ Reconfigure RealPort on a device |
| **Configure this PC for RealPort** | Use the **Configure this PC for RealPort** menu option to configure RealPort on your computer so that it can communicate with the device.<br>■ Install and configure RealPort on your computer |

### *Configuration pane*

You can use the buttons in the Configuration pane to connect to a device's web UI, and configure RealPort on your device and on your computer.

| Item | Description |
|---|---|
| **HTTPS** | You can click **HTTPS** to access the device's web UI using the HTTPS service.<br>■ Access a device's web UI from the Digi Navigator |
| **HTTP** | You can click **HTTP** to access the device's web UI using the HTTP service.<br>■ Access a device's web UI from the Digi Navigator |
| **SSH** | You can click **SSH** to access the device's web UI using the SSH service.<br>■ Access a device's web UI from the Digi Navigator |

| Item | Description |
|---|---|
| **Set IP Address** | You can reconfigure the IP address of a device to a DHCP address or a specified static address.<br>■ Set an IP address for a device |
| **Configure Device for RealPort** | Click **Configure Device for RealPort** to configure RealPort on the device.<br>■ Configure RealPort on a Digi device from the Digi Navigator<br>■ Reconfigure RealPort on a device |
| **Configure this PC for RealPort** | Click **Configure this PC for RealPort** to configure RealPort on your computer so that it can communicate with the device.<br>■ Install and configure RealPort on your computer |

### *RealPort device list pane*

The RealPort device list displays all of the devices in Digi Navigator that are configured for RealPort.

| Item | Description |
|---|---|
| **Open Device Manager** | Click a name in the RealPort device list to open the Windows **Properties** dialog on your computer to access the configured COM ports. The number of COM ports configured for RealPort matches the number of serial ports on the device.<br>■ Review the COM ports configured for RealPort |
| **Uninstall Device** | You can uninstall RealPort from the device and uninstall the RealPort configuration for this device from your computer if needed, using the **Uninstall Device** shortcut menu option.<br>■ Uninstall the RealPort device configuration from your computer |

### *Filter the device list displayed in the Digi Navigator*

You can apply filters to limit which devices display in the device list.

**Filter the device list by service option**

You can filter the device list that displays in the Device page by service. This also determines which service buttons display in the Configuration pane.

The Digi Navigator uses the HTTPS service by default to discover the IP addresses for the Digi devices connected to your network. Other services can be used, if needed.

1. Make sure **Digi Navigator** is installed and the Connect EZ 16/32 is powered and connected to your local network or computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. Click **Filters** > **Services** from the toolbar to display the service options: **HTTPS**, **HTTP**, and **SSH**. To ensure that you can communicate with your device, at least one option should be selected.
4. Click on service option to select it or deselect it. A check mark displays next to a selected option.

   The selected options are included in the configuration pane. You can click on a service option in the configuration pane to use that service to log in to the device.

**Filter the device list for auto-discovered devices**

You can use the **Discovered Devices** option to filter which devices are included in the device list, depending on whether the device was auto-discovered or is a device that was manually added to the known device list.

1. Make sure **Digi Navigator** is installed and the Connect EZ 16/32 is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. From the toolbar, click **Filters** > **Devices**. Use the **Discovered Devices** menu option to filter the devices.
   - **Selected**: Both known and discovered devices are listed.
   - **Not selected**: Only known devices are listed.

**Filter the device list by RealPort configuration status**

You can use the **RealPort** option to filter which devices are included in the device list, depending on the RealPort configuration status.

1. Make sure **Digi Navigator** is installed and the Connect EZ 16/32 is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. From the toolbar, click **Filters** > **Devices** > **Supported Services**. Use the **RealPort** menu option to filter the devices.
   - **Selected**: Only discovered devices that are configured for the RealPort service display. Known devices are included if the device is configured for RealPort.
   - **Not selected**: All discovered devices on your network and all known devices display, regardless of RealPort service configuration status.

## *Specify the IP address to discover a Digi device*

You can manually add a device to the known device list, using the device's IP address. This feature is useful if a device is not on the same network as your computer or the device is undiscoverable.

***Before you begin***

To add a device, you will need:

- The device's IP address.
- The user name and password for the device.

To add a device to the known device list:

1. Make sure **Digi Navigator** is installed and the Connect EZ 16/32 is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. Click **Configure** > **Known Devices**.
4. Click **Add**. The **New Device** dialog displays.
   a. In the **Name** field, enter a descriptive name for the device.
   b. Click **Add**.
   c. In the **IP Addresses** field, enter the IP address of the device.

      If you want to enter more than one IP address for this device, click **Add** and enter another IP address.
   d. Click the buttons for the services that you want to use to communicate with the device. The default port number for each service can be changed. After a service has been selected, you can click the button for the service to de-select it.

      To ensure that you can communicate with your device, at least one option should be selected.

      - **HTTPS**: The **HTTPS** service is selected by default. The default port number is **443**.
      - **HTTP**: The default port number is **80**.
      - **SSH**: The default port number is **22**.
      - **RealPort**: Click **RealPort** to enable the RealPort service for the device. The default port number is **1027**.
5. Click **OK**. You are returned to the **Known Devices** dialog.
6. Click the **X** in the upper right corner to close the dialog.
7. The device you just added displays in the device list.

## *Set an IP address for a device*

You can reconfigure the IP address of a device to a DHCP address or a specified static address.

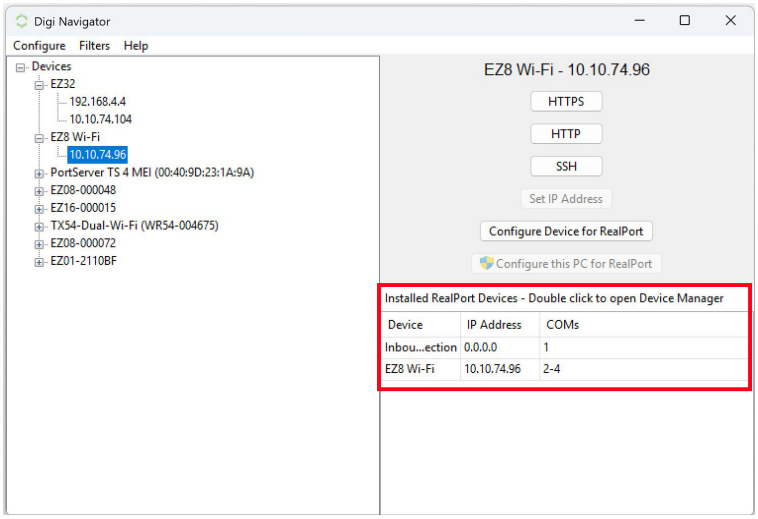
**Note** This feature can be used with only discovered devices. It is not enabled for known devices.

1. Make sure the Connect EZ 16/32 is powered and connected your local network or computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. A list of the devices discovered by the **Digi Navigator** displays. For information about how devices are discovered and how to add a device to the list, see Digi Navigator device discovery process.
4. Find the device that you want to configure and expand it to display the IP addresses for the device.

5. Use one of the following methods to begin reconfiguring the IP address:
   - **Configuration pane**: Click on the IP address to display options in the Configuration pane. Click **Set IP Address**. The **IP Address Configuration** dialog displays.
   - **Shortcut menu**: Right-click on an IP address to display the shortcut menu, and click **Set IP Address**. The **IP Address Configuration** dialog displays.
6. In the **IP Address Configuration** dialog, enter the required information:
   - **Type**: From the **Type** list box, select an option: **DHCP** or **Static IP address**.
   - **Address**: Enter the IP address.
   - **Default gateway**: Enter the default gateway that should be used.
7. Click **OK**.

## *Manage the list of devices configured for RealPort*

After you have enabled and configured RealPort on at least one Digi device, a list of configured devices displays at the bottom of the **Digi Navigator**. You can refresh the list and easily access the COM port configuration on your computer.



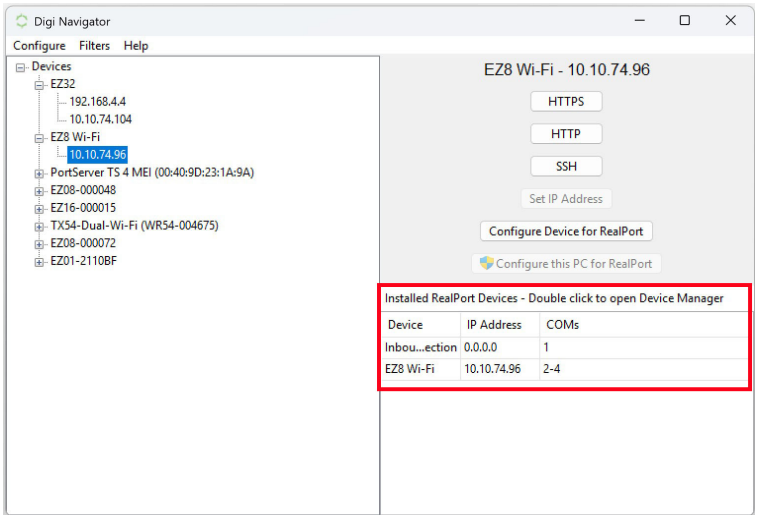

- **Refresh**: From the toolbar, choose **Configure** > **Refresh Installed RealPort Device List** to update the list of Connect EZ 16/32 devices that have RealPort enabled and configured.
- **Device Manager**: Double-click on a device name in the list to open the Windows **Properties** dialog on your computer to access the configured COM ports. The number of COM ports configured for RealPort matches the number of serial ports on the device.
- **Uninstall the RealPort configuration on your computer**: You can use the **Uninstall Device** option to remove the RealPort device configuration on your computer for a selected device. This ensures that your computer is not able to connect to the selected device.

### Refresh the RealPort device list

You can refresh the list of the Digi devices that have RealPort enabled and configured. The list displays in the **Installed RealPort Devices** pane in the Digi Navigator.

1. Make sure **Digi Navigator** is installed and the Connect EZ 16/32 is powered and connected to your local network or to your computer with an Ethernet cable.

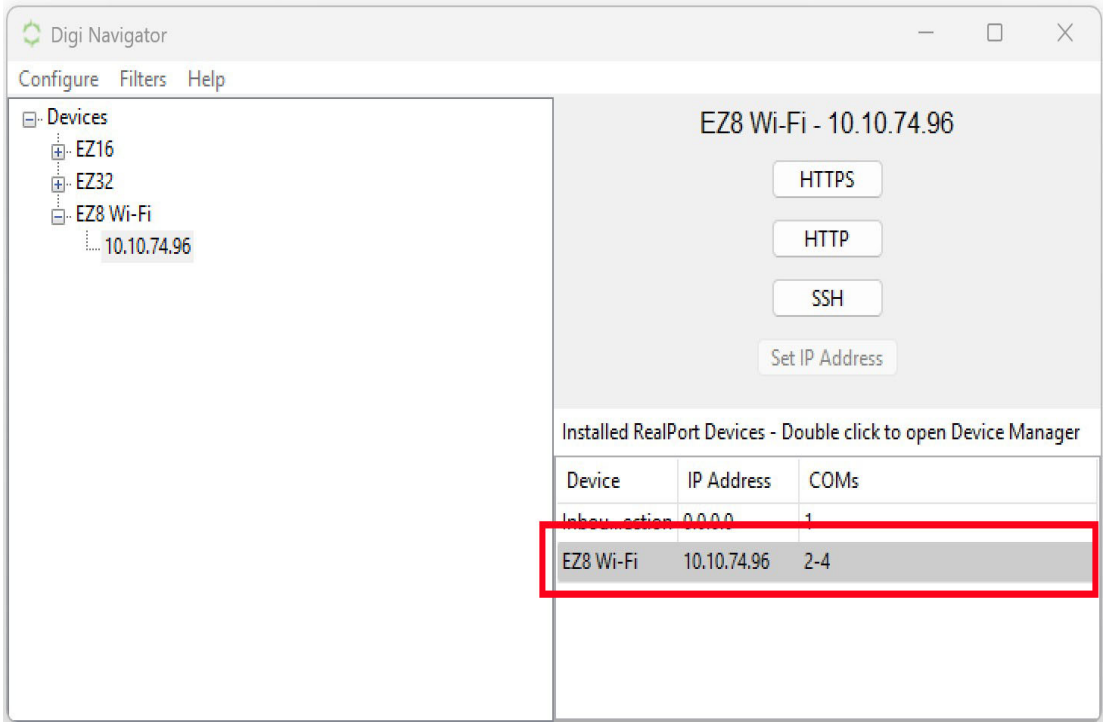
2. Launch the **Digi Navigator**.
3. Click **Configure** > **Refresh Installed RealPort Device List** to refresh the list.




### Review the COM ports configured for RealPort

You can open the Windows **Properties** dialog on your computer to access the configured COM ports. The number of COM ports configured for RealPort matches the number of serial ports on the device.

1. Make sure **Digi Navigator** is installed and the Connect EZ 16/32 is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. In the RealPort list section of the Digi Navigator, double-click on a name in the **Device** column.

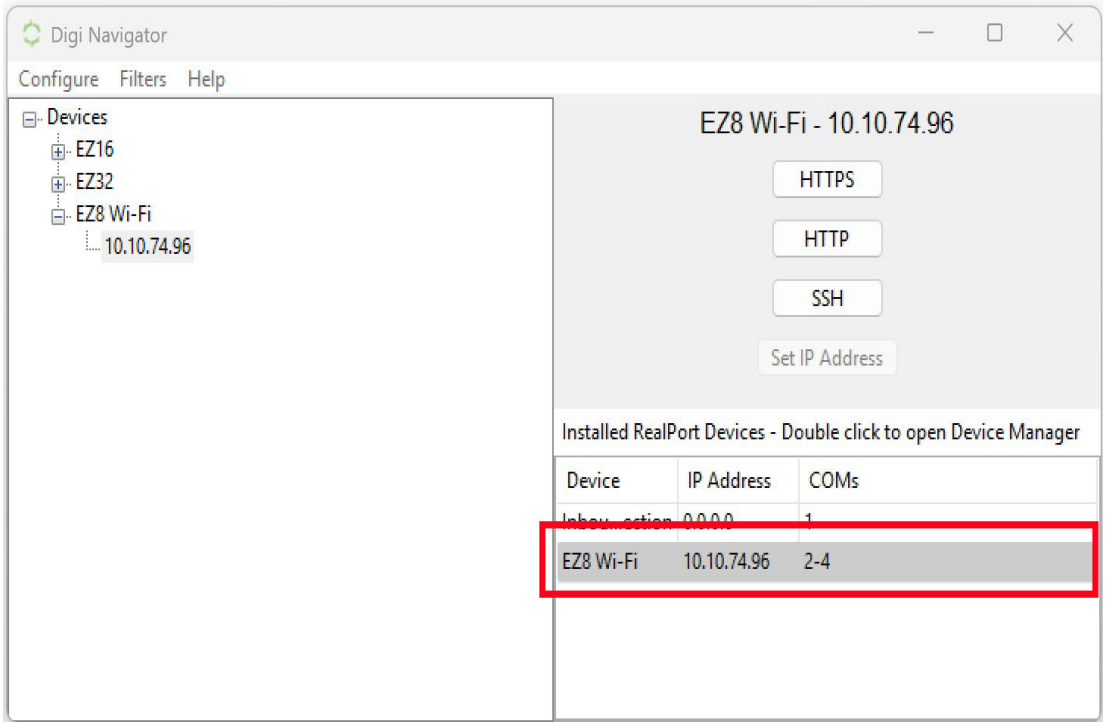



4. The standard Windows **Device Properties** dialog opens.
   a. Click the **General** tab.
   b. Click **Change settings**.
   c. Click the **Advanced** tab.
   d. Click **Properties**. The COM ports display.
   e. Click **OK** or **Cancel** to close the dialog.

**Uninstall the RealPort device configuration from your computer**

You can use the **Uninstall Device** option to remove the RealPort device configuration on your computer for a selected device. This ensures that your computer is not able to connect to the selected device.

1. Make sure **Digi Navigator** is installed and the Connect EZ 16/32 is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. In the RealPort list section of the **Digi Navigator**, find the device that you want to uninstall.




4. Right-click on an IP address in the list to display the shortcut menu.
5. Click **Uninstall Device** to remove the RealPort configuration for this device from your computer.
6. When the process is complete, a **Success** message displays in a confirmation dialog.
7. Click **OK** to close the dialog.

### *Reconfigure RealPort on a device*

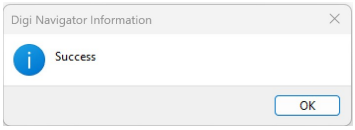
After you have initially configured RealPort on a device and established a connection with your computer, you can reconfigure RealPort on the device as needed.

**Note** If you reconfigure RealPort on a device, you do not need to reconfigure your computer.

1. Make sure the Connect EZ 16/32 is powered and connected your local network or computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. A list of the devices discovered by the **Digi Navigator** displays. For information about how devices are discovered and how to add a device to the list, see Digi Navigator device discovery process.
4. Find the device that you want to configure and expand it to display the IP addresses for the device.
5. Use one of the following methods to begin configuring RealPort on the device:
   - **Configuration pane**: Click on the IP address to display options in the Configuration pane. Click **Configure Device for RealPort**. The **Enter Device Credentials** page displays.

- **Shortcut menu**: Right-click on an IP address to display the shortcut menu, and click **Configure Device For RealPort**. The **Enter Device Credentials** page displays.

6. In the **Enter Device Credentials** page, enter the device's default user name and password in the **Username** and **Password** fields. The default user name is **admin** and the default password is the unique password printed on the label packaged with your device. If the defaults do not work, they may have been changed. Verify with your system administrator.
7. Click **OK**.
8. When RealPort configuration is complete, the **Success** message displays.




9. Click **OK** to close the message.
10. (Optional) If desired, you can verify the RealPort configuration. See Configure the serial port for RealPort mode and Configure the RealPort service.

### *Access a device's web UI from the Digi Navigator*

You can access the device's web UI and log in from the Configuration pane in the **Digi Navigator**, or from the shortcut menu for the device's IP address.

The service options are available in the Configuration pane or the shortcut menu if these conditions are met:

- The service button must be included in the **Services** filter. See Filter the device list by service option.
- At least one device must be configured for the service. For known devices, see Specify the IP address to discover a Digi device.

To access a device's web UI:

1. Make sure **Digi Navigator** is installed and the Connect EZ 16/32 is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. A list of the devices discovered by the **Digi Navigator** displays. For information about how devices are discovered and how to add a device to the list, see Digi Navigator device discovery process.
4. Find the device that you want to access and expand it to display the IP addresses for the device.
5. Launch the web UI for the device using one of the following methods:
   - **Configuration pane**: Click on an IP address for the device to display the configured service button(s) in the Configuration pane. Click on any of the active buttons (**HTTP**, **HTTPS**, **SSH**) to access the web UI and log in.
   - **Shortcut menu**: Right-click on the IP address for a device to display the shortcut menu. Click on any of the service options (**HTTP**, **HTTPS**, **SSH**) to access the web UI and log in.

### Generate a device setup script

You can generate a script of the RealPort configuration of the local PC. The script can be saved and used as a backup.The script is generated as a .cmd file.

1. Make sure **Digi Navigator** is installed and the Connect EZ 16/32 is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. Click **Configure** > **Generate Device Setup Script**. The standard Windows dialog to name a file displays.
   a. Select a location and enter a descriptive name.
   b. Click **Save**.
4. The script is generated, a confirmation dialog displays when complete.
5. Click **OK** to close the dialog.

### Review Digi Navigator version information

You can review the Digi Navigator version information.

1. Make sure **Digi Navigator** is installed and the Connect EZ 16/32 is powered and connected to your local network or to your computer with an Ethernet cable.
2. Launch the **Digi Navigator**.
3. From the toolbar, click **Help** > **About**. The **About Digi Navigator** dialog displays.
4. Review the information.
5. Click **OK** to close the dialog.

### Uninstall Digi Navigator 1.0

If you have Digi Navigator 1.0 installed, Digi recommends that you uninstall it, as both versions of the Digi Navigator are not needed.

1. If Digi Navigator 1.0 is open, close it before you begin.
2. Launch the Windows **Control Panel**.
3. Click the **Programs** option.
4. Click **Uninstall a Program**.
5. Scroll through the list of programs to find Digi Navigator 1.x.
6. Right-click on the program name to display the menu.
7. Click **Uninstall**. The **Digi Navigator Uninstall** wizard displays.
8. Click **Next**. The uninstall process begins.

   Note If Digi Navigator 1.0 is open, a confirmation dialog with the message "Digi Navigator is running. Click OK to close it." displays. Click **OK** to continue with the uninstall process.

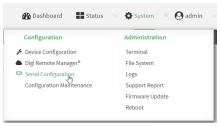
9. When complete, the **Completing Digi Navigator Uninstall** page displays.
10. Click **Finish** to complete the uninstall process.

# Copy a serial port configuration

You can copy the configuration defined for one serial port to other serial ports on the same device. This feature is useful if you have several ports that have the same or a similar configuration.

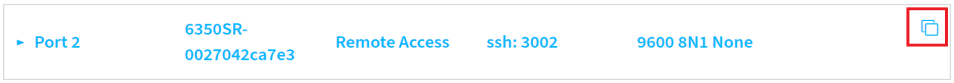
## Web

1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.

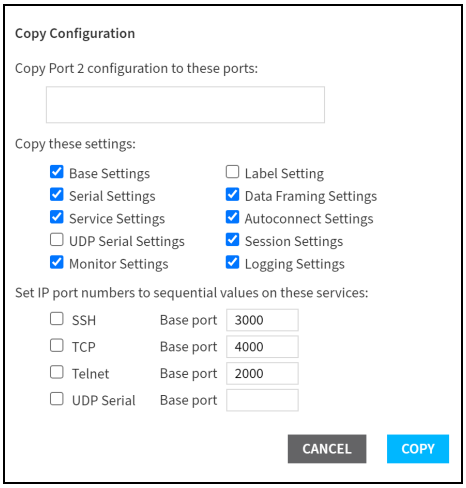


The **Serial Configuration** page is displayed.

3. Find the serial port that has the configuration that you want to copy.
4. You can drag-and-drop the selected configuration to copy it, or click the **copy configuration** icon.
   - **Drag-and-drop**: Click the **copy configuration** icon and drag it over a different serial port, then drop it.
   - **Click**: Click the **copy configuration** icon.




5. The **Copy Configuration** dialog displays.




6. Select the items you want to copy and specify the serial ports to which the configuration should be applied.

| Field | Description |
|---|---|
| **Copy Port X** | Enter the serial port numbers to which the configuration should be |

| Field | Description |
|---|---|
| **configuration to these ports** | applied. You can enter a single number or a group, such as: 2-5, 10, 13-15.<br>If you used the drag-and-drop method, the serial port number on which you dropped the configuration is entered in this field by default. You can change the entry if needed. |
| **Copy these settings** | The setting sections available for the selected serial port mode are selected by default. You can click the box next to an item name to select or deselect it.<br>If you select a setting section that is not available for the serial mode types, the settings are copied, but have no effect on the current serial port mode. |
| **Set IP Port numbers to sequential values on these services** | Note This feature is optional.<br><br>Select a service, and then set the IP port number to a starting number in the **Base port** field. When the configuration is applied to each selected port, a sequential IP port number is applied to the defined serial ports.<br>For example, serial port 1 has the TCP port set to a base port number, and you choose to apply sequential TCP port numbers to serial ports 2, 3, and 4.<br>The TCP port numbers would be assigned as follows:<br>■ Serial port 1: base port number +1<br>■ Serial port 2: base port number +2<br>■ Serial port 3: base port number +3<br>■ Serial port 4: base port number +4 |

7. Click **Copy**. The configuration is copied to the specified serial ports.
8. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **a** to access the Admin CLI.
2. At the command line, type **system serial copy** plus the parameters for the features you want to include. More than parameter can be specified so you can copy more settings.

```
system serial copy SOURCE DESTINATION [all] [autoconnect]
[autodetect] [base] [data_match] [framing] [hangup] [label]
[logging] [modem] [monitor] [ppp_dialin] [serial] [service]
[session] [udp]
```

   where:

- **SOURCE**: The serial port that you want to copy from. (Required)
- **DESTINATION**: A list of the serial ports to which you want to copy the configuration. Example: 1-4,8-10, or type **all**. (Required)

Syntax:

- **all**: Copy all serial port settings.
- **autoconnect**: Copy the autoconnect settings.
- **autodetect**: Copy the autodetect settings.
- **base**: Copy enable, mode, sharing, and signal settings.
- **data_match**: Copy the data matching settings.
- **framing**: Copy the data framing settings.
- **hangup**: Copy the hangup or signal loss settings.
- **label**: Copy the label settings.
- **logging**: Copy the logging settings.
- **modem**: Copy the modem emulator settings.
- **monitor**: Copy the signal change monitoring settings.
- **ppp_dialin**: Copy the PPP dial-in settings.
- **serial**: Copy the baud rate, data bits, parity, stop bits, and flow control settings.
- **service**: Copy SSH, TCP, and Telnet service settings.
- **session**: Copy escape, history, exclusive, and idle timeout settings.
- **udp**: Copy UDP serial settings.

3. (Optional) Set sequential IP port numbers for a service on a list of ports.

```
system serial ipport DESTINATION SERVICE BASE
```

Where:

- **DESTINATION**: Enter a list of serial ports to set IP port numbers. Example: 1-4,8-10, or type **all**. (Required)
- **SERVICE**: The service type to set IP port numbers. (Required)

  Where *SERVICE* is one of: **ssh**, **tcp**, **telnet**, or **udp**
- **BASE**: Set service IP port numbers to base port + serial port number. (Required).

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **q** to disconnect from the device.

# Advanced RealPort configuration without using the Digi Navigator

You can configure the Connect EZ 16/32 to communicate with your computer using RealPort.

## Windows Operating System

This method can be used if your computer has a Windows OS installed and you choose not to use the Digi Navigator to discover devices and configure RealPort.

To complete the RealPort configuration process for Windows:

**Step 1**: Download the RealPort driver

**Step 2**: Configure RealPort on your computer

**Step 3**: Configure the serial port for RealPort mode

**Step 4**: Configure the RealPort service

## Linux Operating System

To complete the RealPort configuration process for Linux OS:

**Step 1**: Download the RealPort driver

**Step 2**: To complete the RealPort configuration process, refer to the Get started: Install RealPort for LINUX section in the **RealPort Installation User's Guide**.

## Download the RealPort driver

The first step is to download the RealPort application and save it to a location that you can easily access.

1. Navigate to https://hub.digi.com/support/products/realport/.
2. Scroll down to the **Product Resources** tab, and in the **Drivers & Patches** section, click **RealPort Driver**.
3. From the list box, select the appropriate Microsoft Windows option from the list of driver options. The associated RealPort for Windows option displays.
4. Click the **download** link.
5. When the download is complete, navigate to your download folder. The application is in a .zip file.
6. You can leave the .zip file in the download folder, or copy the .zip file and paste it to a location that you can easily access.

## Configure RealPort on your computer

RealPort must be installed on yourcomputer, and then RealPort configured for the IP address of each device that should be allowed a RealPort connection.

You will run the RealPort Wizard for each device that you want to configure. RealPort is installed on your laptop the first time that you run the wizard. The installation process is ignored each subsequent time that you run the wizard.

**Before you begin**

- Download RealPort onto your laptop, and make note of the download location. See Download the RealPort driver.
- Have the IP address of the device that you want to configure.

**Step 1: Implement RealPort**

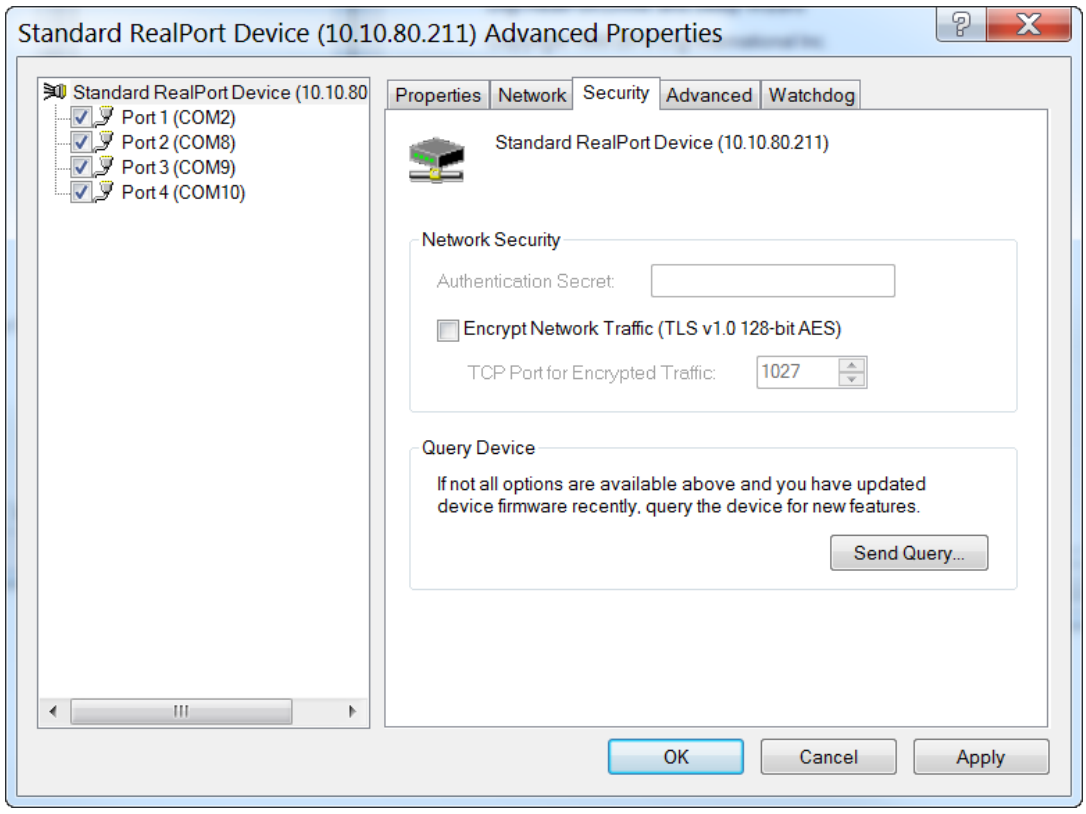
1. Navigate to the downloaded Realport .zip file.
2. Open the .zip file.
3. Click on **setup.exe** to launch the RealPort wizard. The **Welcome to the Digi RealPort Setup Wizard** screen displays.
4. If this is not the first time you have run the wizard, select the **Add a New Device** option. If this is the first time running the wizard, no options are available on the screen.

5. Click **Next**. The **Select Device** screen displays.
   a. From the list of device options, select the **Device not listed** option.
6. Click **Next**. The **Describe the Device** screen displays.
   a. In the **Device Model Name** field, enter a descriptive name for the device.
   b. In the **Network Settings** section, select the **IP** option and enter the IP address in the associated field.
   c. In the **COM Port Settings** section, from the **No. Ports** list box, select the number of physical serial ports that you want to configure. You can specify from 1 to the maximum number of ports available on the device.
   d. In the **Device Features** section, select both the **Encryption** and **Authentication** options.
7. Click **Finish** to complete the process and close the wizard.

**Note** If this is the first time that you have run the RealPort wizard, Realport is installed on your laptop. If it is not the first time or if RealPort is already installed, it is not installed again.

**Step 2: Configure a RealPort connection on your laptop for your device**

1. Follow the standard Windows process to access the **Device Manager** from your computer's operating system.
2. Select **Multi-port Serial Adapters**.
3. Right-click on your device. Click the **Properties** menu option. The **Properties** dialog appears.
4. Click the **Advanced** tab.
5. Click **Properties**. The **Advanced Properties** dialog appears
6. Click the **Security** tab.




7. Select the **Encrypt Network Traffic** check box to enable encrypted network traffic. When you select this option, the **TCP Port for Encrypted Traffic** field becomes available.
8. The **TCP Port for Encrypted Traffic** field has a default value of **1027**. The entry must match the device's TCP port setting.
9. (Optional) If you want to use authentication, configure the feature.
   a. From the the **Authentication Method** list box, select the **Shared Secret - SHA256** option.
   b. Enter the authentication password in the **Shared Secret** field.
10. Click **Apply**.
11. Click **OK** to close the **Advanced Properties** dialog.
12. Click **OK** to close the **Properties** window.

## Configure the serial port for RealPort mode

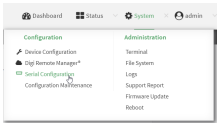
RealPort mode allows you to use Realport.

To change the configuration to match the serial configuration of the device to which you want to connect:

Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

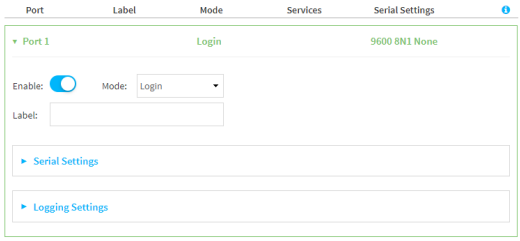
1. On the menu, click **System**. Under **Configuration**, click **Serial Configuration**.




The **Serial Configuration** page is displayed.

**Note** You can also configure the serial port by using **Device Configuration** > **Serial**. Changes made by using either **Device Configuration** or **Serial Configuration** will be reflected in both.

2. Click the name of the port that you want to configure.




The serial port is enabled by default. To disable, toggle off **Enable**.

3. For **Mode**, select **RealPort**.
4. Select an option from the **Sharing Mode** list box to determine which user(s) can change the port settings, and whether users can receive data from the port.
   - **None**: Only the user that opened the port can change the port settings. All other users are rejected. No other users can receive data from the port. This is the default.
   - **Primary**: Only the user that opened the port can change the port settings. All other users that try to open the port receive all of the data read to the port.
   - **Peer**: Any user that tries to open the port can change the port settings. All users that try to open the port receive all of the data read to the port.
5. (Optional) For **Label**, enter a label that will be used when referring to this port.
6. Enable **Altpin** to use the Altpin feature. **Altpin** is disabled by default. If you enable **Altpin** in EIA-232 mode, the DCD and DSR signals are swapped. This allows use of DCD with 8-wire cables. **Altpin** has no impact on 422 or 485 mode. For more information, see Serial connector pinout.
7. For **Signalling**, select the electrical signaling interface type used on this serial port:
   - **RS-232**
     - Enable **RTS Toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control.
     - For **RTS Pre-delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**.
     - For **RTS Post-delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**.

- **RS-422**
  - Enable **Termination** if you want to enable electrical termination on this serial port.
- **RS-485**
  - Enable **Termination** if you want to enable electrical termination on this serial port.
  - Enable **Full Duplex** if you want to enable full duplex communication on this serial port.

The default is **RS-232**.

8. Expand **Logging Settings** to configure logging for this serial port.
   a. To enable logging, click to toggle on **Enable**.
   b. In the **Log file name** field, enter a descriptive name for the log file.
   c. For **Log file size**, type the size of the log file. When the log file reaches the size limit, the current file is saved and a new file is created. The default is 65536 bytes.
   d. From the **Type of data to log** list box, specify the type of data that should be saved.
      - **Received**
      - **Transmitted**
      - **Both**
      - **Both with arrows**. This is the default.
   e. If you want to log the time at which date was received or transmitted, click the **Timestamps** toggle to **Enable**.
   f. If you want to log the data as hexadecimal values, click the **Hexadecimal** toggle to **Enable**.

   Note You can review the message log in the **Serial Port Log** page. See Review the serial port message log.

9. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The serial port is enabled by default. To disable:

```
(config)> serial port1 enable false
(config)>
```

4. Set the mode:

```
(config)> serial port1 mode realport
(config)>
```

5. Set the sharing mode:

```
(config)> serial port1 sharing value
(config)>
```

where **value** is one of:

- **none**: Only the user that opened the port can change the port settings. All other users are rejected. No other users can receive data from the port. This is the default.
- **peer**: Any user that tries to open the port can change the port settings. All users that try to open the port receive all of the data read to the port.
- **primary**: Only the user that opened the port can change the port settings. All other users that try to open the port receive all of the data read to the port.

6. Set the signal mode:

```
(config)> serial port1 signal mode value
(config)>
```

where **value** is one of:

Set the signaling interface type used on this serial port:

- **rs-232**
  - Enable **rts_toggle** if you want to enable RTS toggling during transmission on this serial port. If enabled, this setting overrides RTS\CTS flow control:

```
(config)> serial port1 rts_toggle true
(config)>
```

  - For **rts_pre_delay**, enter the amount of time RTS is asserted before starting data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 "rts_pre_delay value
(config)>
```

  - For **rts_post_delay**, enter the amount of time RTS is deasserted before completing data transmission. The time is measured in milliseconds. The default is **0ms**:

```
(config)> serial port1 rts_post_delay value
(config)>
```

- **rs-422**
  - Enable **Termination** if you want to enable electrical termination on this serial port.

- **rs-485**
  - Enable **termination** if you want to enable electrical termination on this serial port:

```
(config)> serial port1 termination true
(config)>
```

  - Enable **full_duplex** if you want to enable full duplex communication on this serial port:

```
(config)> serial port1 full_duplex true
(config)>
```

The default is **rs-232**.

7. Set a label that will be used when referring to this port.

```
(config)> serial port1 label label
(config)>
```

8. (Optional) Set a label that will be used when referring to this port.

```
(config)> serial port1 label label
(config)>
```

9. Configure serial port logging:
   a. Enable serial port logging:

```
(config)>serial port1 logging enable true
(config)>
```

   b. Set the file name:

```
(config)>serial port1 logging filename string
(config)>
```

   c. Set the maximum allowed log size for the serial port log when starting the log:

```
(config)>serial port1 logging size value
(config)>
```

   where *value* is the size of the log file in bytes. The default is **65536**.

   d. Specify the data type:

```
(config)>serial port1 logging type value
(config)>
```

   where *value* is one of:
   - received
   - transmitted
   - both
   - arrows. This is the default.

   e. Log the time at which date was received or transmitted:

```
(config)>serial port1 logging hex true
(config)>
```

f. Log data as hexadecimal values:

```
(config)>serial port1 logging timestamp true
(config)>
```

10. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure the RealPort service

After you have configured RealPort mode on the Connect EZ 16/32, you must enable and configure the RealPort service. When this step is complete, all of the serial ports on the Connect EZ 16/32 are configured to use the RealPort service.

### Web

1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. On the menu, click **System** > **Configuration** > **Device Configuration**.
3. Expand **Services**.
4. Expand **RealPort**.
5. Click **Enable** to enable the RealPort service.
6. For **RealPort Server Port,** enter **1027**. This is the default.
7. For **Minimum TLS version**, select the minimum TLS version that the RealPort service will accept. The default is TLS version 1.0.
8. Enable **Encryption** to enable encryption of data. This is enabled by default.
9. (Optional) Configure the authentication method the RealPort server uses to authenticate clients.
   a. From the **Authentication Method** list box, select the **Shared Secret - SHA256** option.
   b. For **Shared Secret**, enter the authentication password to ensure secure communication. Leave this field blank to disable authentication.
10. Enable **Exclusive Mode** to ensure that any connection from an IP address is closed when opening a new connection from the same IP address. This disabled by default.
11. Enable **RealPort Keepalive** to send RealPort keepalive packets. This is enabled by default.
12. Enable **TCP Port Keepalive** to send TCP keepalive packets. This is disabled by default.
13. Enable **Device Initiated connections** so users can remotely connect to serial devices as if they had a native COM/TTY port on their PC. This is disabled by default.
14. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. RealPort is enabled by default. To disable:

```
(config)> service realport enable false
(config)>
```

4. Set the RealPort server port.

```
(config)> service realport port value
(config)>
```

   where **value** is the port you want to use for the RealPort service. The default is **1027**.
5. Set the select the minimum TLS version that the RealPort service will accept:

```
(config)> service realport minimum_tls_version value
(config)>
```

   where **value** is one of:
   - **TLS-1_0**. This is the default.
   - **TLS-1_1**
   - **TLS-1_2**
   - **TLS-1_3**
6. Data encryption is enabled by default. To disable:

```
(config)> service realport encryption false
(config)>
```

7. (Optional) Configure authentication.

```
(config)> service realport auth value
(config)>
```

   where **value** is one of:
   - **none**: Do not use authentication. This is the default.
   - **shared_secret_sha256**: You must also define the authentication password to ensure secure communication. Leave this field blank to disable authentication.

     ```
     (config)> service realport auth shared_secret_sha256 value
     (config)
     ```

     where **value** is the authentication password.

8. Exclusive mode is disabled by default. This mode ensures that any connection from an IP address is closed when opening a new connection from the same IP address. To enable:

```
(config)> service realport exclusive true
(config)
```

9. Use RealPort keepalive to send RealPort keepalive packets. This is enabled by default. To disable:

```
(config)> service realport realport_keepalive false
(config)>
```

10. TCP port keepalive to send TCP keepalive packets is disabled by default. To enable:

```
(config)> service realport tcp_keepalive true
(config)>
```

11. Device initiated connections allow users to remotely connect to serial devices as if they had a native COM/TTY port on their PC. This is disabled by default. To enable:

```
(config)> service realport device_initiated_enable true
(config)>
```

12. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

13. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Disconnect a user from a serial port

From the **Serial Status** page, you can disconnect any users connected to a serial port configured for one of these modes: Login, Remote Access, PPP Dial-in, or Modem Emulator.

### Web

1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. On the menu, click **Status** > **Connections**> **Serial**. The **Serial Status** page displays.
3. Find the port for which you want to disconnect one or more users. Verify that the port is configured for one of the following modes: Login, Remote Access, PPP Dial-in, or Modem Emulator.
4. Click the down arrow next to the user name in the **Users** column to display a pop-up box.
5. A list of the users currently connected to the port display in the pop-up box. Information about each user's connection displays. If more than one user is connected, a check box displays for each user.
   - **User**: The user's log in name or a connection type, such as Telnet, TCP, or SSH.
   - **Remote IP**: The user's IP address.

- **Connected**: The length of time that the user has been connected to the port. The time is measured in seconds.
- **Idle**: The length of time that connection has been idle. The time is measured in seconds.

6. Determine the user(s) that you want to disconnect.
   - If only one user is listed, that user will be selected for the disconnect by default.
   - If more than one user is connected to the port, by default the check box for each user is selected. Click on a check box to deselect a user. Click **All** to deselect or select all of the users.
7. Click **Disconnect**. The single user or set of selected users are disconnected from the serial port.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. (Optional) Review the users currently connected to the port.

   ```
   show serial port
   >
   ```

   Where *port* is the port number you want to review, such as "port2"; a string, such as "console"; or the name of a user-configured serial port, such as USB.
3. (Optional) Review information about the disconnect command.

   ```
   > system serial disconnect ?
   >
   ```

4. Disconnect a specific user from a port.

   ```
   >system serial disconnect port remoteip STRING user STRING
   >
   ```

   Where *port* is the port number you want to review, such as "port2"; a string, such as "console"; or the name of a user-configured serial port, such as USB.

   Enter one or both of the following:
   - *remoteip STRING*: The remote IP address to disconnect.
   - *user*: The user name of the user that you want to disconnect.
5. Disconnect all users from a port.

   ```
   system serial disconnect port
   >
   ```

   Where *port*: is the port number you want to review, such as "port2"; a string, such as "console"; or the name of a user-configured serial port, such as USB.
6. Type **exit** to exit the Admin CLI.Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Show serial port status and statistics

To show the status and statistics for the serial port:

### Web

1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. On the main menu, click **Status** > **Connections** > **Serial**. The **Serial Status** page displays. See Serial Status page for information about the features in this page.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the show serial command:

```
> show serial

Label     Port   Enable  Mode   Baudrate
--------  -----  ------  -----  --------
Serial 1  port1  true    login  9600
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Serial Status page

The **Serial Status** page contains status information about all of the serial ports available on the device.

To navigate to the **Serial Status** page, log into the device's web UI and click **Status** > **Connection**> **Serial**.

| Item | Description |
|---|---|
| configuration icon | Click the (configuration) icon in the upper right corner of the page to access the **Serial Configuration** page. See Serial port for more information. |
| **Search ports** | Use the Search ports field to limit the list of ports displayed on the page. |
| **Ports per page** | Select the number of **Ports per page** that you want to display. Click the appropriate number or click **ALL** to display all ports. You can also click **Next** or **Back** to display the next or previous set of ports.<br><br>Note The number ports you can display is determined by the number of ports available on the device. |

| Item | Description |
|---|---|
| **Status** | Displays the connection status.<br>■ **CONNECTED**: A telnet, terminal, SSH, or TCP session is active.<br>■ **DISABLED**: The port is not enabled.<br>■ **NO SIGNAL**: CTS or DCD is not active on the port. |
| **Port** | A list of the ports on the device.<br>The port number and name displays as a link when the port is configured for remote access. You can click the port number or name to connect to the port in the terminal page.<br>1. Click the link to connect to the port in the terminal page.<br>2. In the terminal screen, enter **~b?** to display additional commands. See Access the terminal screen from the web UI for more information about the commands.<br>While you are connected to the terminal, the port status displays in the **Status** column as CONNECTED, and the name of the user logged into the device displays in the **User** column.<br>**Console port**<br>The console port on the **Serial Status** screen corresponds to the console port on the device. You can use this console port to log in to the Connect EZ when a network isn't available. See Log into the Connect EZ from the Console port. |
| **Label** | A description for the port.<br>You can change this from the **Serial Configuration** page. Click the (configuration) icon in the upper right corner of the page to access that page.<br>The port number and name displays as a link when the port is configured for remote access. You can click the port number or name to connect to the port in the terminal page. See the description for Port (above) for more information. |
| **Log** | If configured, you can open the **Serial Port Log** page for that port. Options are:<br>■ **Green Log button**: The serial port mode selected for the port supports serial port logging, and logging is enabled. Click the **Log** button to open the **Serial Port Log** page for that port. See Review the serial port message log for information about that page.<br>■ **Gray Log button**: The serial port mode selected for the port supports serial port logging, but logging is not enabled.<br>■ **No button**: The serial port mode selected for the port does not support serial port logging. |
| **User** | When the port is connected to a Telnet, terminal, SSH, or TCP connection the name of the user logged into the device displays.<br>See the description for Port (above) for more information.<br>If a serial port is configured for one of these modes: Login, Remote Access, PPP Dial-in, or Modem Emulator, you can disconnect one or more users from the serial port using the **Disconnect** feature. See Disconnect a user from a serial port. |

| Item | Description |
|---|---|
| **TX/RX Bytes** | Displays the total number of bytes that have been transmitted and received. |
| **Signals** | Indicates the types of communication that the device is ready to send.<br>DCD: Carrier Detected<br>CTS: Clear to Send<br>DTR: Data Terminal Ready<br>RTS: Ready to Dend |

# Review the serial port message log

Serial port messages can be reviewed from the **Serial Port Log** page.

A serial port message log is created and saved when serial port logging has been enabled and configured for one of the following serial port modes: Login, Remote Access, RealPort, or UDP Serial. You can view the log file from the **Log** column in the **Serial Status** page.

## Web

1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. On the main menu, click **Status**
3. Under **Connections**, click **Serial**. The **Serial Status** page displays.
4. If a green **Log** button is displayed, the serial port mode selected for the port supports serial port logging, and logging is enabled. Click the **Log** button to open the **Serial Port Log** page for that port. The **Serial port log** window displays.

   Note If the **Log** button is gray, the serial port mode selected for the port supports serial port logging, but logging is not enabled. If there is no **Log** button, the serial port mode selected for the port does not support serial port logging.

5. Review the messages in the window.
   - Click **Refresh** to refresh the log display.
   - Click **Download** to download the serial port log to your local device. The log file is saved to the /opt/serial directory. Because this is being save to the device's memory, you should use serial logging for diagnostic purposes, rather than having it permanently enabled.
   - Click **Restart** to clear and restart the serial port log.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. To show the serial port's contents and logging status:

```
> system serial show port-number
Logging is active on port-number
>
```

3. To save the log to your local device:

```
> system serial save port-number path
>
```

If a relative path is provided, /etc/config/serial will be used as the root directory for the path and file. (Required)

The log file is saved to the /opt/serial directory. Because this is being save to the device's memory, you should use serial logging for diagnostic purposes, rather than having it permanently enabled.

4. To clear and restart the log:

```
> system serial clear port-number
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Search for a port

In the **Serial Status** page, you can use the **Search ports** search box to search for a port, or a set of ports, that match the search entry. The search feature looks for matches in the following columns: **Status**, **Port**, **Label**, and **User**.

1. Access the Serial Status page in the web UI.
2. Enter your search entry in the **Search ports** field. As you type, the ports displayed in the page are limited to only the ports with information that matches the search entry.

# Routing

This chapter contains the following topics:

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# IP routing

The Connect EZ 16/32 device uses IP routes to decide where to send a packet it receives for a remote network. The process for deciding on a route to send the packet is as follows:

1. The device examines the destination IP address in the IP packet, and looks through the IP routing table to find a match for it.
2. If it finds a route for the destination, it forwards the IP packet to the configured IP gateway or interface.
3. If it cannot find a route for the destination, it uses a default route.
4. If there are two or more routes to a destination, the device uses the route with the longest mask.
5. If there are two or more routes to a destination with the same mask, the device uses the route with the lowest metric.

This section contains the following topics:

Configure a static route ..... 322
Delete a static route ..... 325
Policy-based routing ..... 326
Configure a routing policy ..... 327
Routing services ..... 335
Configure routing services ..... 335

## Configure a static route

A static route is a manually configured routing entry. Information about the route is manually entered rather than obtained from dynamic routing traffic.

### Required configuration items

- The destination address or network.
- The interface to use to reach the destination.

### Additional configuration items

- A label used to identify this route.
- The IPv4 address of the gateway used to reach the destination.
- The metric for the route. When multiple routes are available to reach the same destination, the route with the lowest metric is used.
- The Maximum Transmission Units (MTU) of network packets using this route.

To configure a static route:

### Web

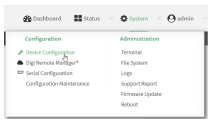
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

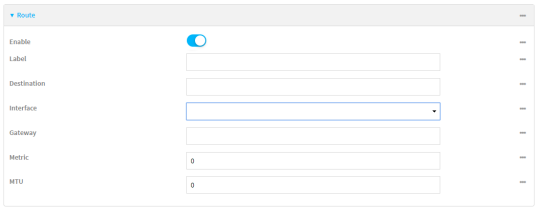
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Routes** > **Static routes**.

4. Click the ✚ to add a new static route.

The new static route configuration page is displayed:




New static route configurations are enabled by default. To disable, toggle off **Enable**.

5. (Optional) For **Label**, type a label that will be used to identify this route.
6. For **Destination**, type the IP address or network of the destination of this route.

   For example, to route traffic to the 192.168.47.0 network that uses a subnet mask of 255.255.255.0, type **192.168.47.0/24**. The **any** keyword can also be used to route packets to any destination with this static route.
7. For **Interface**, select the interface on the Connect EZ 16/32 device that will be used with this static route.
8. (Optional) For **Gateway**, type the IPv4 address of the gateway used to reach the destination. Set to blank if the destination can be accessed without a gateway.
9. (Optional) For **Metric**, type the metric for the route. When multiple routes are available to reach the same destination, the route with the lowest metric is used.
10. (Optional) For **MTU**, type the Maximum Transmission Units (MTU) of network packets using this route.
11. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a new static route:

```
(config)> add network route static end
(config network route static 0)>
```

New static route instances are enabled by default. To disable:

```
(config network route static 0)> enable false
(config network route static 0)>
```

4. (Optional) set a label that will be used to identify this route. For example:

```
(config network route static 0)> label "route to accounting network"
(config network route static 0)>
```

5. Set the IP address or network of the destination of this route. For example:

```
(config network route static 0)> destination ip_address[/netmask]
(config network route static 0)>
```

For example, to route traffic to the 192.168.47.0 network that uses a subnet mask of 255.255.255.0:

```
(config network route static 0)> dst 192.168.47.0/24
(config network route static 0)>
```

The **any** keyword can also be used to route packets to any destination with this static route.

6. Set the interface on the Connect EZ 16/32 device that will be used with this static route:
   a. Use the **?** to determine available interfaces:
   b. Set the interface. For example:

```
(config network route static 0)> interface /network/interface/eth1
(config network route static 0)>
```

7. (Optional) Set the IPv4 address of the gateway used to reach the destination. Set to blank if the destination can be accessed without a gateway.

```
(config network route static 0)> gateway IPv4_address
(config network route static 0)>
```

8. (Optional) Set the metric for the route. When multiple routes are available to reach the same destination, the route with the lowest metric is used.

```
(config network route static 0)> metric value
(config network route static 0)>
```

where *value* is an interger between **0** and **65535**. The default is **0**.

9. (Optional) Set the Maximum Transmission Units (MTU) of network packets using this route:

```
(config network route static 0)> mtu integer
(config network route static 0)>
```

10. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Delete a static route

### Web

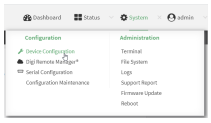
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Routes** > **Static routes**.
4. Click the menu icon (**...**) for a static route and select **Delete**.

5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Determine the index number of the static route to be deleted:

```
(config)> show network route static
0
    dst 10.0.0.1
    enable true
    no gateway
    interface /network/interface/lan1
    label new_static_route
    metric 0
    mtu 0
1
    dst 192.168.5.1
    enable true
    gateway 192.168.5.1
    interface /network/interface/lan2
    label new_static_route_1
    metric 0
    mtu 0
(config)>
```

4. Use the index number to delete the static route:

```
(config)> del network route static 0
(config)>
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Policy-based routing

Normally, a routing device determines how to route a network packet based on its destination address. However, you can use policy-based routing to forward the packet based on other criteria, such as the source of the packet. For example, you can configure the Connect EZ 16/32 device so that high-priority traffic is routed through the cellular connection, while all other traffic is routed through an Ethernet (WAN) connection.

Policy-based routing for the Connect EZ 16/32 device uses the following criteria to determine how to route traffic:

- Firewall zone (for example, internal/outbound traffic, external/inbound traffic, or IPSec tunnel traffic).

- Network interface (for example, the cellular connection, the WAN, or the LAN).
- IPv4 address.
- IPv6 address.
- MAC address.
- Domain.
- Protocol type (TCP, UDP, ICMP, or all).

The order of the policies is important. Routing policies are processed sequentially; as a result, if a packet matches an earlier policy, it will be routed using that policy's rules. It will not be processed by any subsequent rules.

## Configure a routing policy

**Required configuration items**

- The packet matching parameters. It can any combination of the following:
  - Source interface.
  - Source address. This can be a firewall zone, an interface, a single IPv4/IPv6 address or network, or a MAC address.
  - Destination address. This can be a firewall zone, an interface, a single IPv4/IPv6 address or network, or a domain.
  - Protocol. This can be **any**, **tcp**, **udp** or **icmp**.
  - Source port. This is only used if the protocol is set to **tcp** or **udp**.
  - Destination port. This is only used if protocol is set to **tcp** or **udp**.
- The network interface used to reach the destination.

**Additional configuration items**

- A label for the routing policy.
- Whether packets that match this policy should be dropped when the gateway interface is disconnected, rather than forwarded through other interfaces.

To configure a routing policy:

### Web

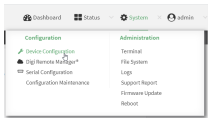
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network** > **Routes** > **Policy-based routing**.
4. Click the ✚ to add a new route policy.

The new route policy page is displayed:

New route policies are enabled by default. To disable, toggle off **Enable**.

5. (Optional) For **Label**, type a label that will be used to identify this route policy.
6. For **Interface**, select the interface on the Connect EZ 16/32 device that will be used with this route policy.
7. (Optional) Enable **Exclusive** to configure the policy to drop packets that match the policy when the gateway interface is disconnected, rather than forwarded through other interfaces.
8. For **IP version**, select **Any**, **IPv4**, or **IPv6**.
9. For **Protocol**, select **Any**, **TCP**, **UDP**, or **ICMP**.
   - If **TCP** or **UDP** is selected for **Protocol**, type the port numbers of the **Source port** and **Destination port**, or set to **any** to match for any port.
   - If **ICMP** is selected for **Protocol**, type the ICMP type and optional code, or set to **any** to match for any ICMP type.
10. For **DSCP**, type the 6-bit hexadecimal Differentiated Services Code Point (DSCP) field match criteria. This will match packets based on the DHCP field within the ToS field of the IP header.
11. Configure source address information:
    a. Click to expand **Source address**.
    b. For **Type**, select one of the following:
       - **Zone**: Matches the source IP address to the selected firewall zone. See Firewall configuration for more information about firewall zones.
       - **Interface**: Matches the source IP address to the selected interface's network address.
       - **IPv4 address**: Matches the source IP address to the specified IP address or network. Use the format ***IPv4_address*[/*netmask*]**, or use **any** to match any IPv4 address.

- **IPv6 address**: Matches the source IP address to the specified IP address or network. Use the format ***IPv6_address*[/*prefix_length*]**, or use **any** to match any IPv6 address.
- **MAC address**: Matches the source MAC address to the specified MAC address.

12. Configure the destination address information:
    a. Click to expand **Destination address**.
    b. For **Type**, select one of the following:
        - **Zone**: Matches the destination IP address to the selected firewall zone. See Firewall configuration for more information about firewall zones.
        - **Interface**: Matches the destination IP address to the selected interface's network address.
        - **IPv4 address**: Matches the destination IP address to the specified IP address or network. Use the format *IPv4_address*/[*netmask*], or use **any** to match any IPv4 address.
        - **IPv6 address**: Matches the destination IP address to the specified IP address or network. Use the format *IPv6_address*/[*prefix_length*], or use **any** to match any IPv6 address.
        - **Domain**: Matches the destination IP address to the specified domain names. To specify domains:
            i. Click to expand **Domains**.
            ii. Click the ✚ to add a domain.
            iii. For **Domain**, type the domain name.
            iv. Repeat to add additional domains.
        - **Default route**: Matches packets destined for the default route, excluding routes for local networks.
13. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a new routing policy:

```
(config)> add network route policy end
(config network route policy 0)>
```

New route policies are enabled by default. To disable:

```
(config network route policy 0)> enable false
(config network route policy 0)>
```

4. (Optional) Set the label that will be used to identify this route policy:

```
(config network route policy 0)> label "New route policy"
(config network route policy 0)>
```

5. Set the interface on the Connect EZ 16/32 device that will be used with this route policy:
   a. Use the **?** to determine available interfaces:
   b. Set the interface. For example:

```
(config network route policy 0)> interface /network/interface/eth1
(config network route policy 0)>
```

6. (Optional) Enable **exclusive** to configure the policy to drop packets that match the policy when the gateway interface is disconnected, rather than forwarded through other interfaces:

```
(config network route policy 0)> exclusive true
(config network route policy 0)>
```

7. Select the IP version:

```
(config network route policy 0)> ip_version value
(config network route policy 0)>
```

where *value* is one of **any**, **ipv4**, or **ipv6**.

8. Set the protocol:

```
(config network route policy 0)> protocol value
(config network route policy 0)>
```

where *value* is one of:

- **any**: All protocols are matched.
- **tcp**: Source and destination ports are matched:
  a. Set the source port:

```
(config network route policy 0)> src_port value
(config network route policy 0)>
```

  where *value* is the port number, or the keyword **any** to match any port as the source port.
  b. Set the destination port:

```
(config network route policy 0)> dst_port value
(config network route policy 0)>
```

  where *value* is the port number, or the keyword **any** to match any port as the destination port.

- **upd**: Source and destination ports are matched:
  a. Set the source port:

```
(config network route policy 0)> src_port value
(config network route policy 0)>
```

  where *value* is the port number, or the keyword **any** to match any port as the source port.

  b. Set the destination port:

```
(config network route policy 0)> dst_port value
(config network route policy 0)>
```

  where *value* is the port number, or the keyword **any** to match any port as the destination port.

- **icmp**: The ICMP protocol is matched. Identify the ICMP type:

```
(config network route policy 0)> icmp_type value
(config network route policy 0)>
```

  where *value* is the ICMP type and optional code, or set to **any** to match for any ICMP type.

9. Set the source address type:

```
(config network route policy 0)> src type value
(config network route policy 0)>
```

where *value* is one of:

- **zone**: Matches the source IP address to the selected firewall zone. Set the zone:
  a. Use the **?** to determine available zones:

```
(config network route policy 0)> src zone ?

Zone: Match the IP address to the specified firewall zone.
Format:
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

Default value: any
Current value: any

(config network route policy 0)> src zone
```

b. Set the zone. For example:

```
(config network route policy 0)> src zone external
(config network route policy 0)>
```

See Firewall configuration for more information about firewall zones.

- **interface**: Matches the source IP address to the selected interface's network address. Set the interface:
  a. Use the **?** to determine available interfaces:
  b. Set the interface. For example:

```
(config network route policy 0)> src interface
/network/interface/eth1
(config network route policy 0)>
```

- **address**: Matches the source IPv4 address to the specified IP address or network. Set the address that will be matched:

```
(config network route policy 0)> src address value
(config network route policy 0)>
```

where value uses the format ***IPv4_address*[/*netmask*]**, or **any** to match any IPv4 address.

- **address6**: Matches the source IPv6 address to the specified IP address or network. Set the address that will be matched:

```
(config network route policy 0)> src address6 value
(config network route policy 0)>
```

where value uses the format ***IPv6_address*[/*prefix_length*]**, or **any** to match any IPv6 address.

- **mac**: Matches the source MAC address to the specified MAC address. Set the MAC address to be matched:

```
(config network route policy 0)> src mac MAC_address
(config network route policy 0)>
```

10. Set the destination address type:

```
(config network route policy 0)> dst type value
(config network route policy 0)>
```

where *value* is one of:

- **zone**: Matches the destination IP address to the selected firewall zone. Set the zone:
  a. Use the **?** to determine available zones:

```
(config network route policy 0)> dst zone ?

Zone: Match the IP address to the specified firewall zone.
Format:
```

```
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

Default value: any
Current value: any

(config network route policy 0)> dst zone
```

b. Set the zone. For example:

```
(config network route policy 0)> dst zone external
(config network route policy 0)>
```

See Firewall configuration for more information about firewall zones.

- **interface**: Matches the destination IP address to the selected interface's network address. Set the interface:
  a. Use the **?** to determine available interfaces:
  b. Set the interface. For example:

```
(config network route policy 0)> dst interface
/network/interface/eth1
(config network route policy 0)>
```

- **address**: Matches the destination IPv4 address to the specified IP address or network. Set the address that will be matched:

```
(config network route policy 0)> dst address value
(config network route policy 0)>
```

where value uses the format ***IPv4_address***[**/*netmask***], or **any** to match any IPv4 address.

- **address6**: Matches the destination IPv6 address to the specified IP address or network. Set the address that will be matched:

```
(config network route policy 0)> dst address6 value
(config network route policy 0)>
```

where value uses the format ***IPv6_address***[**/*prefix_length***], or **any** to match any IPv6 address.

- **mac**: Matches the destination MAC address to the specified MAC address. Set the MAC address to be matched:

```
(config network route policy 0)> dst mac MAC_address
(config network route policy 0)>
```

11. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Routing services

Your Connect EZ 16/32 includes support for dynamic routing services and protocols. The following routing services are supported:

| Service or protocol | Information |
|---|---|
| BGP | The Border Gateway Protocol (BGP) service supports BGP-4 (RFC1771). |
| IS-IS | The IPv4 and IPv6 Intermediate System to Intermediate System (IS-IS) service (RFC1142). |
| NHRP | Next Hop Resolution Protocol (NHRP) (RFC2332). Does not support NHRP authentication. |
| OSPFv2 | The IPv4 Open Shortest Path First (OSPF) service supports OSPFv2 (RFC2328). |
| OSPFv3 | The IPv6 Open Shortest Path First (OSPF) service supports OSPFv3 (RFC2740). |
| RIP | The IPv4 Routing Information Protocol (RIP) service supports RIPv2 (RFC2453) and RIPv1 (RFC1058). |
| RIPng | The IPv6 Routing Information Protocol (RIP) service supports RIPng (RFC2080). |

## Configure routing services

**Required configuration items**

- Enable routing services.
- Enable and configure the types of routing services that will be used.

### Web

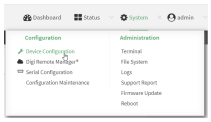
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

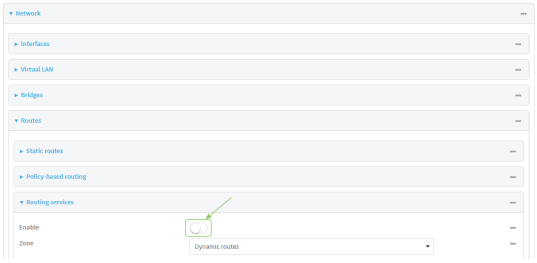
   Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network** > **Routes** > **Routing services**.
4. Click **Enable**.



The default firewall zone setting, **Dynamic routes**, is specifically designed to work with routing services and should be left as the default.

5. Configure the routing services that will be used:
   a. Click to expand a routing service.
   b. **Enable** the routing service.
   c. Complete the configuration of the routing service.
6. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable routing services:

```
(config)> network route service enable true
(config)>
```

4. Configure routing services that will be used:
   a. Use the **?** to display available routing services:

```
(config)> network route service ?

Routing services: Settings for dynamic routing services and protocols.
```

```
 Parameters                Current Value
 ------------------------------------------------------------------------
----------
 enable                    true            Enable
 zone                      dynamic_routes  Zone

 Additional Configuration
 ------------------------------------------------------------------------
----------
 bgp                       BGP
 isis                      IS-IS
 nhrp                      NHRP
 ospfv2                    OSPFv2
 ospfv3                    OSPFv3
 rip                       RIP
 ripng                     RIPng

(config)>
```

b. Enable a routing service that will be used. For example, to enable the RIP service:

```
(config)> network route service rip enable true
(config)>
```

c. Complete the configuration of the routing service. For example, use the **?** to view the available parameters for the RIP service:

```
(config)> network route service rip ?

 Parameters                Current Value
 ------------------------------------------------------------------------
----------
 ecmp                      false          Allow ECMP
 enable                    true           Enable

 Additional Configuration
 ------------------------------------------------------------------------
----------
 interface                 Interfaces
 neighbour                 Neighbours
 redis                     Route redistribution
 timer                     Timers

(config)>
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Show the routing table

To display the routing table:

## Web

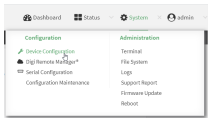
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Status** > **Routes**.

   The **Network Routing** window is displayed.
4. Click **IPv4 Load Balance** to view IPv4 load balancing.
5. Click **IPv6 Load Balance** to view IPv6 load balancing.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type show route:

   You can limit the display to only IPv4 entries by using **show route ipv4**, or to IPv6 entries by using **show route ipv6**. You can also display more information by adding the **verbose** option to the **show route** and **show route *ip_type*** commands.

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Dynamic DNS

**WARNING!** The Dynamic Domain Name System uses unencrypted HTTP communication. Please ensure you are utilizing a VPN to secure your communications.

The Domain Name System (DNS) uses name servers to provide a mapping between computer-readable IP addresses and human-readable hostnames. This allows users to access websites and personal networks with easy-to-remember URLs. Unfortunately, IP addresses change frequently, invalidating these mappings when they do. Dynamic DNS has become the standard method of addressing this problem, allowing devices to update name servers with their new IP addresses.

By providing the Connect EZ 16/32 device with the domain name and credentials obtained from a dynamic DNS provider, the router can automatically update the remote nameserver whenever your WAN or public IP address changes.

Your Connect EZ 16/32 device supports a number of Dynamic DNS providers as well as the ability to provide a custom provider that is not included on the list of providers.

## Configure dynamic DNS

This section describes how to cofigure dynamic DNS on a Connect EZ 16/32 device.

#### Required configuration items

- Add a new Dynamic DNS service.
- The interface that has its IP address registered with the Dynamic DNS provider.
- The name of a Dynamic DNS provider.
- The domain name that is linked to the interface's IP address.
- The username and password to authenticate with the Dynamic DNS provider.

#### Additional configuration items

- If the Dynamic DNS service provider is set to **custom**, identify the URL that should be used to update the IP address with the Dynamic DNS provider.
- The amount of time to wait to check if the interface's IP address needs to be updated.
- The amount of time to wait to force an update of the interface's IP address.
- The amount of time to wait for an IP address update to succeed before retrying the update.
- The number of times to retry a failed IP address update.

## Web

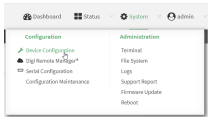
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

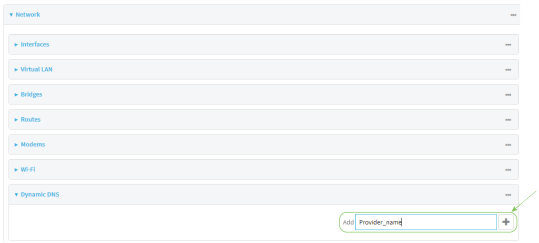
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

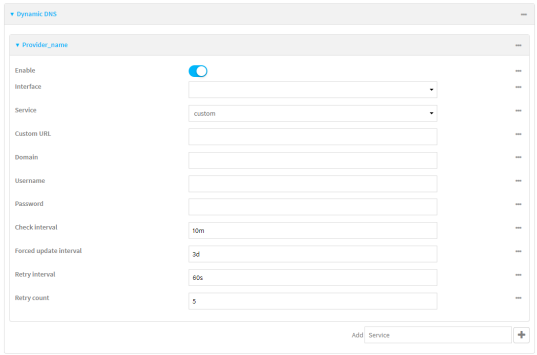
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Dynamic DNS**.
4. Type a name for this Dynamic DNS instance in **Add Service** and click ✚.

   The Dynamic DNS configuration page displays.

   New Dynamic DNS configurations are enabled by default. To disable, toggle off **Enable**.
5. For **Interface**, select the interface that has its IP address registered with the Dynamic DNS provider.

6. For **Service**, select the Dynamic DNS provider, or select **custom** to enter a custom URL for the Dynamic DNS provider.
7. If **custom** is selected for **Service**, type the **Custom URL** that should be used to update the IP address with the Dynamic DNS provider.
8. Type the **Domain** name that is linked to the interface's IP address.
9. Type the **Username** and **Password** used to authenticate with the Dynamic DNS provider.
10. (Optional) For **Check Interval**, type the amount of time to wait to check if the interface's IP address needs to be updated.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Check interval** to ten minutes, enter **10m** or **600s**.
11. (Optional) For **Forced update interval**, type the amount of time to wait to force an update of the interface's IP address.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Forced update interval** to ten minutes, enter **10m** or **600s**.

    The setting for **Forced update interval** must be larger than the setting for **Check Interval**.
12. (Optional) For **Retry interval**, type the amount of time to wait for an IP address update to succeed before retrying the update.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Retry interval** to ten minutes, enter **10m** or **600s**.
13. (Optional) For **Retry count**, type the number of times to retry a failed IP address update.
14. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a new Dynamic DNS instance. For example, to add an instance named **new_ddns_instance**:

```
(config)> add network ddns new_ddns_instance
(config network ddns new_ddns_instance)>
```

   New Dynamic DNS instances are enabled by default. To disable:

```
(config network ddns new_ddns_instance)> enable false
(config network ddns new_ddns_instance)>
```

4. Set the interface for the Dynamic DNS instance:
   a. Use the **?** to determine available interfaces:
   b. Set the interface. For example:

```
(config network ddns new_ddns_instance)> interface eth1
(config network ddns new_ddns_instance)>
```

5. Set the Dynamic DNS provider service:
   a. Use the **?** to determine available services:

```
(config network ddns new_ddns_instance)> service ?

Service: The provider of the dynamic DNS service.
Format:
  custom
  3322.org
  changeip.com
  ddns.com.br
  dnsdynamic.org
  ...

Default value: custom
Current value: custom

(config network ddns new_ddns_instance)> service
```

   b. Set the service:

```
(config network ddns new_ddns_instance)> service service_name
(config network ddns new_ddns_instance)>
```

6. If **custom** is configured for **service**, set the custom URL that should be used to update the IP address with the Dynamic DNS provider:

```
(config network ddns new_ddns_instance)> custom url
(config network ddns new_ddns_instance)>
```

7. Set the domain name that is linked to the interface's IP address:

```
(config network ddns new_ddns_instance)> domain domain_name
(config network ddns new_ddns_instance)>
```

8. Set the username to authenticate with the Dynamic DNS provider:

```
(config network ddns new_ddns_instance)> username name
(config network ddns new_ddns_instance)>
```

9. Set the password to authenticate with the Dynamic DNS provider:

```
(config network ddns new_ddns_instance)> password pwd
(config network ddns new_ddns_instance)>
```

10. (Optional) Set the amount of time to wait to check if the interface's IP address needs to be updated:

```
(config network ddns new_ddns_instance)> check_interval value
(config network ddns new_ddns_instance)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **check_interval** to ten minutes, enter either **10m** or **600s**:

```
(config network ddns new_ddns_instance)> check_interval 600s
(config network ddns new_ddns_instance)>
```

The default is **10m**.

11. (Optional) Set the amount of time to wait to force an update of the interface's IP address:

```
(config network ddns new_ddns_instance)> force_interval value
(config network ddns new_ddns_instance)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **force_interval** to ten minutes, enter either **10m** or **600s**:

```
(config network ddns new_ddns_instance)> force_interval 600s
(config network ddns new_ddns_instance)>
```

The default is **3d**.

12. (Optional) Set the amount of time to wait for an IP address update to succeed before retrying the update:

```
(config network ddns new_ddns_instance)> retry_interval value
(config network ddns new_ddns_instance)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **retry_interval** to ten minutes, enter either **10m** or **600s**:

```
(config network ddns new_ddns_instance)> retry_interval 600s
(config network ddns new_ddns_instance)>
```

The default is **60s**.

13. (Optional) Set the number of times to retry a failed IP address update:

```
(config network ddns new_ddns_instance)> retry_count value
(config network ddns new_ddns_instance)>
```

where *value* is any interger. The default is **5**.

14. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

15. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Virtual Router Redundancy Protocol (VRRP)

Virtual Router Redundancy Protocol (VRRP) is a standard for gateway device redundancy and failover that creates a "virtual router" with a floating IP address. Devices connected to the LAN then use this virtual router as their default gateway. Responsibility for the virtual router is assigned to one of the VRRP-enabled devices on a LAN (the "master router"), and this responsibility transparently fails over to backup VRRP devices if the master router fails. This prevents the default gateway from being a single point of failure, without requiring configuration of dynamic routing or router discovery protocols on every host.

Multiple Connect EZ 16/32 devices can be configured as VRRP devices and assigned a priority. The router with the highest priority will be used as the master router. If the master router fails, then the IP address of the virtual router is mapped to the backup device with the next highest priority. Each VRRP router is configured with a unique LAN IP address, and the same shared VRRP address.

## VRRP+

VRRP+ is an extension to the VRRP standard that uses network probing to monitor connections through VRRP-enabled devices and can dynamically change the priority of the devices, including changing devices from master to backup, and from backup to master, even if the device has not failed. For example, if a host becomes unreachable on the far end of a network link, then the physical default gateway can be changed by adjusting the VRRP priority of the Connect EZ device connected to the failing link. This provides failover capabilities based on the status of connections behind the router, in addition to the basic VRRP device failover. For Connect EZ 16/32 devices, SureLink is used to probe network connections.

VRRP+ can be configured to probe a specified IP address by either sending an ICMP echo request (ping) or attempting to open a TCP socket to the IP address.

## Configure VRRP

This section describes how to configure VRRP on a Connect EZ 16/32 device.

### Required configuration items

- Enable VRRP.
- The interface used by VRRP.
- The Router ID that identifies the virtual router instance. The Router ID must be the same on all VRRP devices that participate in the same VRRP device pool.
- The VRRP priority of this device.
- The shared virtual IP address for the VRRP virtual router. Devices connected to the LAN will use this virtual IP address as their default gateway.

See Configure VRRP+ for information about configuring VRRP+, an extension to VRRP that uses network probing to monitor connections through VRRP-enabled devices and dynamically change the VRRP priorty of devices based on the status of their network connectivity.

## Web

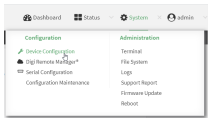
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

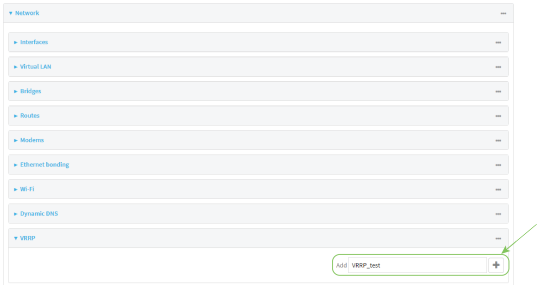
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

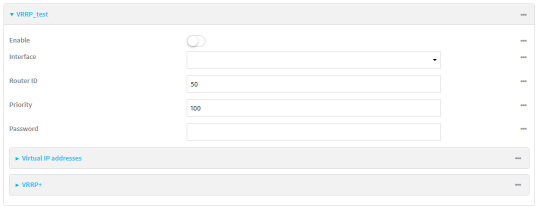
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **VRRP**.
4. For **Add VRRP instance**, type a name for the VRRP instance and click **+**.

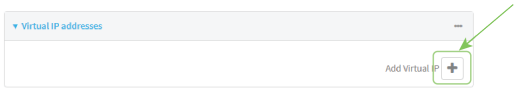
   

   The new VRRP instance configuration is displayed.

5. Click **Enable**.
6. For **Interface**, select the interface on which this VRRP instance should run.

7. For **Router ID** field, type the ID of the virtual router instance. The Router ID must be the same on all VRRP devices that participate in the same VRRP device pool. Allowed values are from **1** and **255**, and it is configured to **50** by default.
8. For **Priority**, type the priority for this router in the group. The router with the highest priority will be used as the master router. If the master router fails, then the IP address of the virtual router is mapped to the backup device with the next highest priority. If this device's actual IP address is being used as the virtual IP address of the VRRP pool, then the priority of this device should be set to **255** . Allowed values are from **1** and **255**, and it is configured to **100** by default.
9. (Optional) For **Password**, type a password that will be used to authenticate this VRRP router with VRRP peers. If the password length exceeds 8 characters, it will be truncated to 8 characters.
10. Configure the virtual IP addresses associated with this VRRP instance:
    a. Click to expand **Virtual IP addresses**.
    b. Click **+** to add a virtual IP address.




    c. For **Virtual IP**, type the IPv4 or IPv6 address for a virtual IP of this VRRP instance.
    d. (Optional) Repeat to add additional virtual IPs.
11. See Configure VRRP+ for information about configuring VRRP+.
12. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a VRRP instance. For example:

```
(config)> add network vrrp VRRP_test
(config network vrrp VRRP_test)>
```

4. Enable the VRRP instance:

```
(config network vrrp VRRP_test)> enable true
(config network vrrp VRRP_test)>
```

5. Set the interface on which this VRRP instance should run:
    a. Use the **?** to determine available interfaces:

b. Set the interface, for example:

```
(config network vrrp VRRP_test)> interface /network/interface/eth2
(config network vrrp VRRP_test)>
```

c. Repeat for additional interfaces.

6. Set the router ID. The Router ID must be the same on all VRRP devices that participate in the same VRRP device pool. Allowed values are from **1** and **255**, and it is configured to **50** by default.

```
(config network vrrp VRRP_test)> router_id int
(config network vrrp VRRP_test)>
```

7. Set the priority for this router in the group. The router with the highest priority will be used as the master router. If the master router fails, then the IP address of the virtual router is mapped to the backup device with the next highest priority. If this device's actual IP address is being used as the virtual IP address of the VRRP pool, then the priority of this device should be set to **255** . Allowed values are from **1** and **255**, and it is configured to **100** by default.

```
(config network vrrp VRRP_test)> priority int
(config network vrrp VRRP_test)>
```

8. (Optional) Set a password that will be used to authenticate this VRRP router with VRRP peers. If the password length exceeds 8 characters, it will be truncated to 8 characters.

```
(config network vrrp VRRP_test)> password pwd
(config network vrrp VRRP_test)>
```

9. Add a virtual IP address associated with this VRRP instance. This can be an IPv4 or IPv6 address.

```
(config network vrrp VRRP_test)> add virtual_address end ip_address
(config network vrrp VRRP_test)>
```

Additional virtual IP addresses can be added by repeating this step with different values for *ip_address*.

10. Save the configuration and apply the change.

```
(config network vrrp new_vrrp_instance)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure VRRP+

VRRP+ is an extension to the VRRP standard that uses SureLink network probing to monitor connections through VRRP-enabled devices and adjust devices' VRRP priority based on the status of the SureLink tests.

This section describes how to configure VRRP+ on a Connect EZ 16/32 device.

**Required configuration items**

- Both master and backup devices:
  - A configured and enabled instance of VRRP. See Configure VRRP for information.
  - Enable VRRP+.
  - WAN interfaces to be monitored by using VRRP+.

    **Note** SureLink is enabled by default on all WAN interfaces, and should not be disabled on the WAN interfaces that are being monitored by VRRP+.

    If multiple WAN interfaces are being monitored on the same device, the VRRP priority will be adjusted only if all WAN interfaces fail SureLink tests.

  - The amount that the VRRP priority will be modified when SureLink determines that the VRRP interface is not functioning correctly.
  - Configure the VRRP interface's DHCP server to use a custom gateway that corresponds to one of the VRRP virtual IP addresses.
- Backup devices only:
  - Enable and configure SureLink on the VRRP interface.
  - Set the IP gateway to the IP address of the VRRP interface on the master device.

**Additional configuration items**

- For backup VRRP devices, enable the ability to monitor the VRRP master, so that a backup device can increase its priority when the master device fails SureLink tests.

## Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

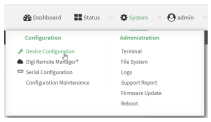
   b. Click the **Device ID**.

   c. Click **Settings**.

   d. Click to expand **Config**.

   Local Web UI:

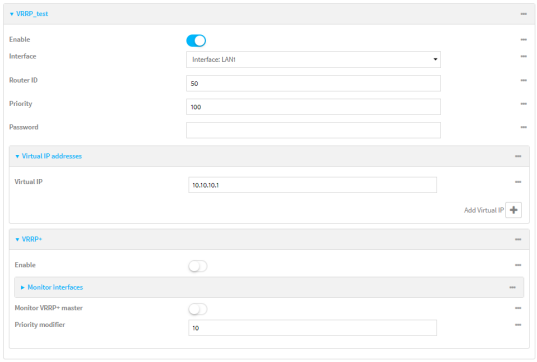
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

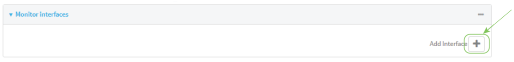
   The **Configuration** window is displayed.

3. Click **Network** > **VRRP**.
4. Create a new VRRP instance, or click to expand an existing VRRP instance.

   See Configure VRRP for information about creating a new VRRP instance.
5. Click to expand **VRRP+**.



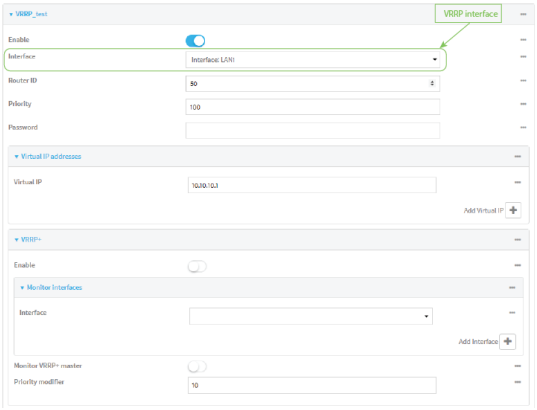

6. Click **Enable**.
7. Add interfaces to monitor:
   a. Click to expand **Monitor interfaces**.
   b. Click ✚ to add an interface for monitoring.




   c. For **Interface**, select the local interface to monitor. Generally, this will be a cellular or WAN interface.
   d. (Optional) Click ✚ again to add additional interfaces.
8. (Optional) For backup devices, click to enable **Monitor VRRP+ master**.

   This parameter allows a backup VRRP device to monitor the master device, and increase its priority when the master device is failing SureLink tests. This can allow a device functioning as a backup device to promote itself to master.
9. For **Priority modifier**, type or select the amount that the device's priority should be decreased due to SureLink connectivity failure, and increased when SureLink succeeds again.

   Along with the priority settings for devices in this VRRP pool, the amount entered here should be large enough to automatically demote a master device when SureLink connectivity fails. For example, if the VRRP master device has a priority of **100** and the backup device has a priority of **80**, then the **Priority modifier** should be set to an amount greater than **20** so that if SureLink fails on the master, it will lower its priority to below **80**, and the backup device will assume the master role.
10. Configure the VRRP interface. The VRRP interface is defined in the **Interface** parameter of the VRRP configuration, and generally should be a LAN interface:

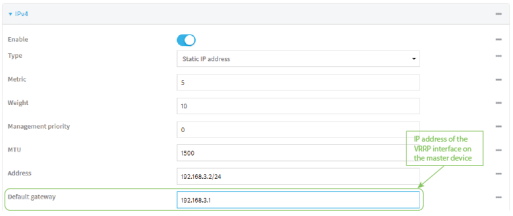



To configure the VRRP interface:

a. Click to expand **Network** > **Interfaces**.

b. Click to expand the appropriate VRRP interface (for example, **LAN1**).

c. For backup devices, for **Default Gateway**, type the IP address of the VRRP interface on the master device.

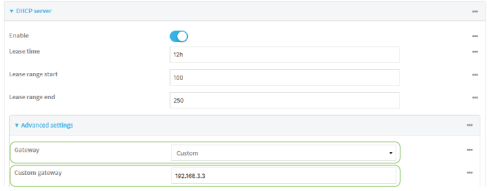



d. Configure the VRRP interface's DHCP server to use a custom gateway that corresponds to one of the VRRP virtual IP addresses:

   i. Click to expand **DHCP Server** > **Advanced settings**.

   ii. For **Gateway**, select **Custom**.

   iii. For **Custom gateway**, enter the IP address of one of the virtual IPs used by this VRRP instance.




e. For backup devices, enable and configure SureLink on the VRRP interface. Generally, this should be a LAN interface; VRRP+ will then monitor the LAN using SureLink to determine if the interface has network connectivity and promote a backup to master if SureLink fails.

   i. Click to expand **IPv4** > **SureLink**.

   ii. Click **Enable**.

iii. For **Interval**, type a the amount of time to wait between connectivity tests. To guarantee seamless internet access for VRRP+ purposes, SureLink tests should occur more often than the default of 15 minutes.

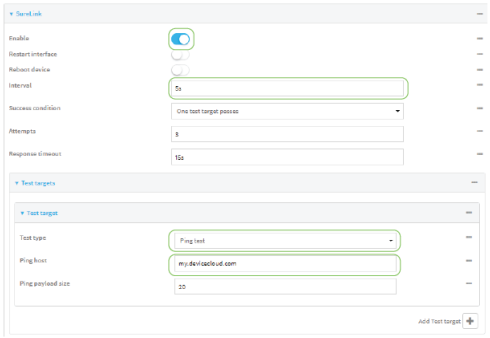
Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}. For example, to set **Interval** to five seconds, enter **5s**.

iv. Click to expand **Test targets** > **Test target**.

v. Configure the test target. For example, to configure SureLink to verify internet connectivity on the LAN by pinging https://remotemanager.digi.com:

i. For **Test Type**, select **Ping test**.

ii. For **Ping host**, type **https://remotemanager.digi.com**.



11. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new VRRP instance, or edit an existing one. See Configure VRRP for information about creating a new VRRP instance.

4. Enable VRRP+:

```
(config)> network vrrp VRRP_test vrrp_plus enable true
(config)>
```

5. Add interfaces to monitor. Generally, this will be a cellular or WAN interface.

   a. Use the **?** to determine available interfaces:

   b. Set the interface, for example:

```
(config)> add network vrrp VRRP_test vrrp_plus monitor_interface end
/network/interface/modem
(config)>
```

c. (Optional) Repeat for additional interfaces.

6. Set the amount that the device's priority should be decreased or increased due to SureLink connectivity failure or success:

```
(config)> network vrrp VRRP_test vrrp_plus weight value
(config)>
```

where *value* is an integer between **1** and **254**. The default is **10**.

Along with the priority settings for devices in this VRRP pool, the amount entered here should be large enough to automatically demote a master device when SureLink connectivity fails. For example, if the VRRP master device has a priority of **100** and the backup device has a priority of **80**, then **weight** should be set to an amount greater than **20** so that if SureLink fails on the master, it will lower its priority to below **80**, and the backup device will assume the master role.

7. (Optional) For backup devices, enable the ability for the device to monitor the master device. This allows a backup VRRP device to monitor the master device, and increase its priority when the master device is failing SureLink tests. This can allow a device functioning as a backup device to promote itself to master.

```
(config)> network vrrp VRRP_test vrrp_plus monitor_master true
(config)>
```

8. Configure the VRRP interface:
   a. Configure the VRRP interface's DHCP server to use a custom gateway that corresponds to one of the VRRP virtual IP addresses:
      i. Set the DHCP server gateway type to custom:

```
(config)> network interface eth2 ipv4 dhcp_server advanced gateway
custom
(config)>
```

      ii. Determine the VRRP virtual IP addresses:

```
(config)> show network vrrp VRRP_test virtual_address
0 192.168.3.3
1 10.10.10.1

(config)>
```

      iii. Set the custom gateway to one of the VRRP virtual IP addresses. For example:

```
(config)> network interface eth2 ipv4 dhcp_server advanced
gateway_custom 192.168.3.3
(config)>
```

   b. For backup devices, set the default gateway to the IP address of the VRRP interface on the master device. For example:

```
(config)> network interface eth2 ipv4 gateway 192.168.3.1
(config)>
```

c. For backup devices, enable and configure SureLink on the VRRP interface.

i. Determine the VRRP interface. Generally, this should be a LAN interface; VRRP+ will then monitor the LAN using SureLink to determine if the interface has network connectivity and promote a backup to master if SureLink fails.

```
(config)> show network vrrp VRRP_test interface
/network/interface/eth2
(config)>
```

ii. Enable SureLink on the interface:

```
(config)> network interface eth2 ipv4 surelink enable true
(config)>
```

iii. Set the amount of time to wait between connectivity tests:

```
(config)> network interface eth2 ipv4 surelink interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **interval** to ten minutes, enter **5s**:

```
(config)> network interface eth2 ipv4 surelink interval 5s
(config)>
```

iv. Create a SureLink test target:

```
(config)> add network interface eth2 ipv4 surelink target end
(config network interface eth2 ipv4 surelink target 0)>
```

v. Configure the type of test for the test target:

```
(config network interface eth2 ipv4 surelink target 0)> test value
(config network interface eth2 ipv4 surelink target 0)>
```

where *value* is one of:

- **ping**: Tests connectivity by sending an ICMP echo request to a specified hostname or IP address.
  - Specify the hostname or IP address:

    ```
    (config network interface eth2 ipv4 surelink target 0)>
    ping_host host
    (config network interface eth2 ipv4 surelink target 0)>
    ```

  - (Optional) Set the size, in bytes, of the ping packet:

    ```
    (config network interface eth2 ipv4 surelink target 0)>
    ping_size [num]
    (config network interface eth2 ipv4 surelink target 0)>
    ```

- **dns**: Tests connectivity by sending a DNS query to the specified DNS server.
  - Specify the DNS server. Allowed value is the IP address of the DNS server.

```
(config network interface eth2 ipv4 surelinktarget 0)>
dns_server ip_address
(config network interface eth2 ipv4 surelinktarget 0)>
```

- **dns_configured**: Tests connectivity by sending a DNS query to the DNS servers configured for this interface.
- **http**: Tests connectivity by sending an HTTP or HTTPS GET request to the specified URL.
  - Specify the url:

```
(config network interface eth2 ipv4 surelink target 0)>
http_url value
(config network interface eth2 ipv4 surelink target 0)>
```

  where *value* uses the format **http[s]://*hostname*/[*path*]**
- **interface_up**: The interface is considered to be down based on the interfaces down time, and the amount of time an initial connection to the interface takes before this test is considered to have failed.
  - (Optional) Set the amount of time that the interface can be down before this test is considered to have failed:

```
(config network interface eth2 ipv4 surelink target 0)>
interface_down_time value
(config network interface eth2 ipv4 surelink target 0)>
```

  where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

  For example, to set **interface_down_time** to ten minutes, enter either **10m** or **600s**:

```
(config network interface eth2 ipv4 surelink target 0)>
interface_down_time 600s
(config network interface eth2 ipv4 surelink target 0)>
```

  The default is 60 seconds.
  - (Optional) Set the amount of time to wait for an initial connection to the interface before this test is considered to have failed:

```
(config network interface eth2 ipv4 surelink target 0)>
interface_timeout value
(config network interface eth2 ipv4 surelink target 0)>
```

  where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **interface_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config network interface eth2 ipv4 surelink target 0)>
interface_timeout 600s
(config network interface eth2 ipv4 surelink target 0)>
```

The default is 60 seconds.

9. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Example: VRRP/VRRP+ configuration

This example configuration creates a VRRP pool containing two Connect EZ 16/32 devices:

## Configure device one (master device)

### Web

#### *Task 1: Configure VRRP on device one*

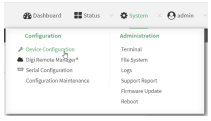
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

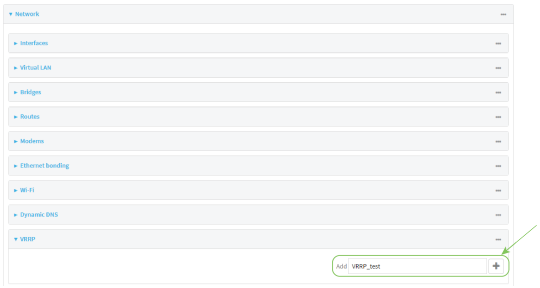
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

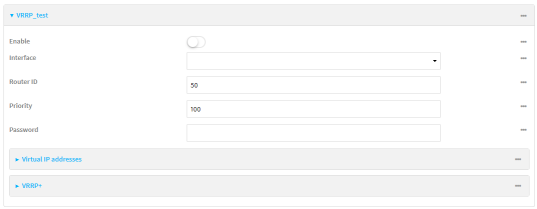
   

   The **Configuration** window is displayed.
3. Click **Network** > **VRRP**.

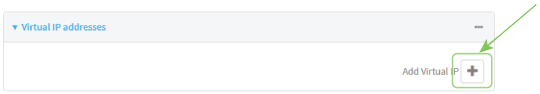
4. For **Add VRRP instance**, type a name for the VRRP instance and click **+**.




The new VRRP instance configuration is displayed.



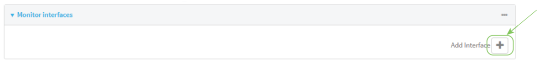

5. Click **Enable**.
6. For **Interface**, select **Interface: ETH2**.
7. For **Router ID**, leave at the default setting of **50**.
8. For **Priority**, leave at the default setting of **100**.
9. Click to expand **Virtual IP addresses**.
10. Click **+** to add a virtual IP address.




11. For **Virtual IP**, type **192.168.3.3**.

## *Task 2: Configure VRRP+ on device one*

1. Click to expand **VRRP+**.
2. Click **Enable**.
3. Click to expand **Monitor interfaces**.
4. Click **+** to add an interface for monitoring.



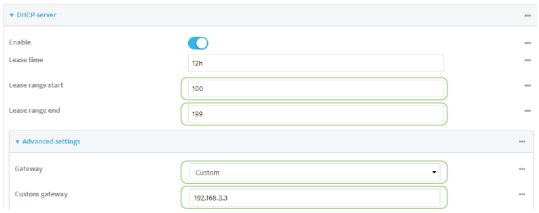

5. Select **Interface: Modem**.
6. For **Priority modifier**, type **30**.

### Task 3: Configure the IP address for the VRRP interface, ETH2, on device one

1. Click **Network** > **Interfaces** > **ETH2** > **IPv4**
2. For **Address**, type **192.168.3.1/24**.

### Task 4: Configure the DHCP server for ETH2 on device one

1. Click to expand **Network** > **Interfaces** > **ETH2** > **IPv4** > **DHCP Server**
2. For **Lease range start**, leave at the default of **100**.
3. For **Lease range end**, type **199**.
4. Click to expand **Advanced settings**.
5. For **Gateway**, select **Custom**.
6. For **Custom gateway**, enter **192.168.3.3**.




7. Click **Apply** to save the configuration and apply the change.

## Command line

### Task 1: Configure VRRP on device one

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create the VRRP instance:

```
(config)> add network vrrp VRRP_test
(config network vrrp VRRP_test)>
```

4. Enable the VRRP instance:

```
(config network vrrp VRRP_test)> enable true
(config network vrrp VRRP_test)>
```

5. Set the VRRP interface to ETH2:

```
(config network vrrp VRRP_test)> interface /network/interface/eth2
(config network vrrp VRRP_test)>
```

6. Add the virtual IP address associated with this VRRP instance.

```
(config network vrrp VRRP_test)> add virtual_address end 192.168.3.3
(config network vrrp VRRP_test)>
```

### *Task 2: Configure VRRP+ on device one*

1. Enable VRRP+:

```
(config network vrrp VRRP_test)> vrrp_plus enable true
(config network vrrp VRRP_test )>
```

2. Add the interface to monitor:

```
(config network vrrp VRRP_test)> add vrrp_plus monitor_interface end
/network/interface/modem
(config network vrrp VRRP_test)>
```

3. Set the amount that the device's priority should be decreased or increased due to SureLink connectivity failure or success to **30**:

```
(config network vrrp VRRP_test )> network vrrp VRRP_test vrrp_plus weight
30
(config network vrrp VRRP_test )>
```

### *Task 3: Configure the IP address for the VRRP interface, ETH2, on device one*

1. Type **...** to return to the root of the config prompt:

```
(config network vrrp VRRP_test )> ...
(config)>
```

2. Set the IP address for ETH2:

```
(config)> network interface eth2 ipv4 address 192.168.3.1/24
(config)>
```

### Task 4: Configure the DHCP server for ETH2 on device one

1. Set the start and end addresses of the DHCP pool to use to assign DHCP addresses to clients:
   a. Set the start address to **100**:

```
(config)> network interface eth2 ipv4 dhcp_server lease_start 100
(config)>
```

   b. Set the end address to **199**:

```
(config)> network interface eth2 ipv4 dhcp_server lease_end 199
(config)>
```

2. Set the DHCP server gateway type to custom:

```
(config)> network interface eth2 ipv4 dhcp_server advanced gateway custom
(config)>
```

3. Set the custom gateway to **192.168.3.3**:

```
(config)> network interface eth2 ipv4 dhcp_server advanced gateway_custom
192.168.3.3
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure device two (backup device)

Web

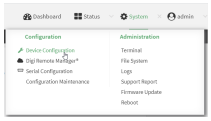
### Task 1: Configure VRRP on device two

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

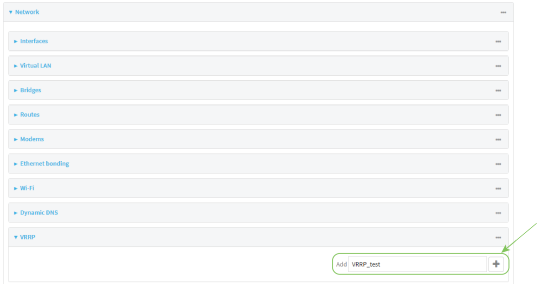
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

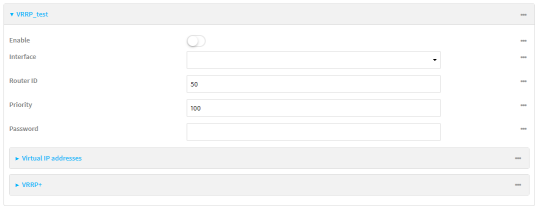


The **Configuration** window is displayed.

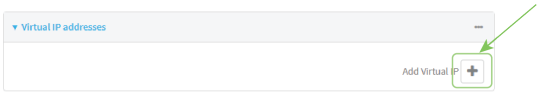
3. Click **Network** > **VRRP**.
4. For **Add VRRP instance**, type a name for the VRRP instance and click **+**.



The new VRRP instance configuration is displayed.



5. Click **Enable**.
6. For **Interface**, select **Interface: ETH2**.
7. For **Router ID**, leave at the default setting of **50**.
8. For **Priority**, type **80**.
9. Click to expand **Virtual IP addresses**.
10. Click **+** to add a virtual IP address.



11. For **Virtual IP**, type **192.168.3.3**.

## *Task 2: Configure VRRP+ on device two*

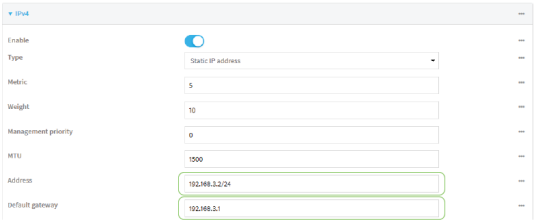
1. Click to expand **VRRP+**.
2. Click **Enable**.
3. Click to expand **Monitor interfaces**.

4. Click ✚ to add an interface for monitoring.

5. Select **Interface: Modem**.
6. Click to enable **Monitor VRRP+ master**.
7. For **Priority modifier**, type **30**.

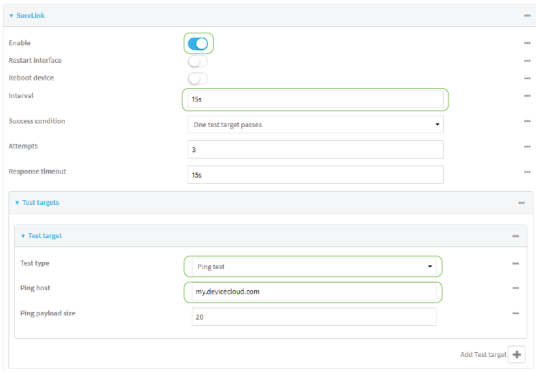
### *Task 3: Configure the IP address for the VRRP interface, ETH2, on device two*

1. Click **Network** > **Interfaces** > **ETH2** > **IPv4**
2. For **Address**, type **192.168.3.2/24**.
3. For **Default gateway**, type the IP address of the VRRP interface on the master device, configured above in Task 3, step 2 (**192.168.3.1**).




### *Task 4: Configure SureLink for ETH2 on device two*

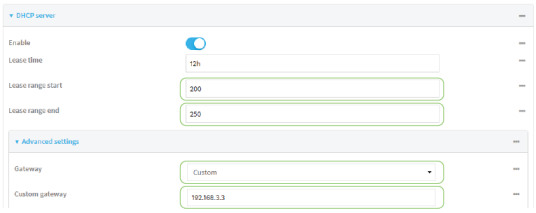
1. Click **Network** > **Interfaces** > **ETH2** > **IPv4** > **SureLink**.
2. Click **Enable**.
3. For **Interval**, type **15s**.
4. Click to expand **Test targets** > **Test target**.
5. For **Test Type**, select **Ping test**.
6. For **Ping host**, type **https://remotemanager.digi.com**.




### *Task 5: Configure the DHCP server for ETH2 on device two*

1. Click to expand **Network** > **Interfaces** > **ETH2** > **IPv4** > **DHCP Server**
2. For **Lease range start**, type **200**.

3. For **Lease range end**, type **250**.
4. Click **Advanced settings**.
5. For **Gateway**, select **Custom**.
6. For **Custom gateway**, enter **192.168.3.3**.




7. Click **Apply** to save the configuration and apply the change.

## Command line

### *Task 1: Configure VRRP on device two*

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create the VRRP instance:

```
(config)> add network vrrp VRRP_test
(config network vrrp VRRP_test)>
```

4. Enable the VRRP instance:

```
(config network vrrp VRRP_test)> enable true
(config network vrrp VRRP_test)>
```

5. Set the VRRP interface to ETH2:

```
(config network vrrp VRRP_test)> interface /network/interface/eth2
(config network vrrp VRRP_test)>
```

6. Add the virtual IP address associated with this VRRP instance.

```
(config network vrrp VRRP_test)> add virtual_address end 192.168.3.3
(config network vrrp VRRP_test)>
```

### Task 2: Configure VRRP+ on device two

1. Enable VRRP+:

```
(config network vrrp VRRP_test)> vrrp_plus enable true
(config network vrrp VRRP_test )>
```

2. Add the interface to monitor:

```
(config network vrrp VRRP_test)> add vrrp_plus monitor_interface end
/network/interface/modem
(config network vrrp VRRP_test)>
```

3. Enable the ability to monitor the master device:

```
(config network vrrp VRRP_test)> vrrp_plus monitor_master true
(config network vrrp VRRP_test)>
```

4. Set the amount that the device's priority should be decreased or increased due to SureLink connectivity failure or success to **30**:

```
(config network vrrp VRRP_test )> network vrrp VRRP_test vrrp_plus weight
30
(config network vrrp VRRP_test )>
```

### Task 3: Configure the IP address for the VRRP interface, ETH2, on device two

1. Type **...** to return to the root of the config prompt:

```
(config network vrrp VRRP_test )> ...
(config)>
```

2. Set the IP address for ETH2:

```
(config)> network interface eth2 ipv4 address 192.168.3.2
(config)>
```

3. Set the default gateway to the IP address of the VRRP interface on the master device, configured above in Task 3, step 2 (**192.168.3.1**).

```
(config)> network interface eth2 ipv4 gateway 192.168.3.1
(config)>
```

### Task 4: Configure SureLink for ETH2 on device two

1. Enable SureLink on the ETH2 interface:

```
(config)> network interface eth2 ipv4 surelink enable true
(config)>
```

2. Create a SureLink test target:

```
(config)> add network interface eth2 ipv4 surelink target end
(config network interface eth2 ipv4 surelink target 0)>
```

3. Set the type of test to ping:

```
(config network interface eth2 ipv4 surelink target 0)> test ping
(config network interface eth2 ipv4 surelink target 0)>
```

4. Set **https://remotemanager.digi.com** as the hostname to ping:

```
(config network interface eth2 ipv4 surelink target 0)> ping_host
https://remotemanager.digi.com(config network interface eth2 ipv4
surelink target 0)>
```

### *Task 5: Configure the DHCP server for ETH2 on device two*

1. Type **...** to return to the root of the configuration prompt:

```
(config network interface eth2 ipv4 surelink target 0)> ...
(config)>
```

2. Set the start and end addresses of the DHCP pool to use to assign DHCP addresses to clients:
   a. Set the start address to **200**:

```
(config)> network interface eth2 ipv4 dhcp_server lease_start 200
(config)>
```

   b. Set the end address to **250**:

```
(config)> network interface eth2 ipv4 dhcp_server lease_end 250
(config)>
```

3. Set the DHCP server gateway type to custom:

```
(config)> network interface eth2 ipv4 dhcp_server advanced gateway custom
(config)>
```

4. Set the custom gateway to **192.168.3.3**:

```
(config)> network interface eth2 ipv4 dhcp_server advanced gateway_custom
192.168.3.3
(config)>
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show VRRP status and statistics

This section describes how to display VRRP status and statistics for a Connect EZ device. VRRP status is available from the Web UI only.

### Web

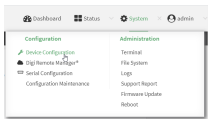
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

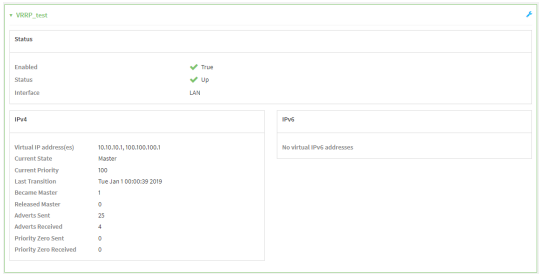
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Status** > **VRRP**.

   The **Virtual Router Redundancy Protocol** window is displayed.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, type show vrrp:

```
> show vrrp

 VRRP       Status  Proto  State   Virtual IP
 ----       ------  -----  ------  -------------
 VRRP_test  Up      IPv4   Backup  10.10.10.1
 VRRP_test  Up      IPv4   Backup  100.100.100.1
>
```

3. To display additional information about a specific VRRP instance, at the Admin CLI prompt, type show vrrp name *name*:

```
> show vrrp name VRRP_test

 VRRP_test VRRP Status
 ---------------------
 Enabled                  : True
 Status                   : Up
 Interface                : lan

 IPv4
   ----
   Virtual IP address(es) : 10.10.10.1, 100.100.100.1
   Current State          : Master
   Current Priority       : 100
   Last Transition        : Tue Jan  1 00:00:39 2019
   Became Master          : 1
   Released Master        : 0
   Adverts Sent           : 71
   Adverts Received       : 4
   Priority Zero Sent     : 0
   Priority zero Received : 0

>
```

# Virtual Private Networks (VPN)

Virtual Private Networks (VPNs) are used to securely connect two private networks together so that devices can connect from one network to the other using secure channels.

This chapter contains the following topics: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L2TPv3 Ethernet ..... 514
MACsec ..... 520
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# IPsec

IPsec is a suite of protocols for creating a secure communication link—an IPsec tunnel—between a host and a remote IP network or between two IP networks across a public network such as the Internet.

## IPsec data protection

IPsec protects the data being sent across a public network by providing the following:

**Data origin authentication**
Authentication of data to validate the origin of data when it is received.

**Data integrity**
Authentication of data to ensure it has not been modified during transmission.

**Data confidentiality**
Encryption of data sent across the IPsec tunnel to ensure that an unauthorized device cannot read the data.

**Anti-Replay**
Authentication of data to ensure an unauthorized device has not injected it into the IPsec tunnel.

## IPsec mode

The Connect EZ 16/32 supports IPsec mode. You can set this mode to run using either the **Tunnel** or **Transport** options.

**Tunnel**
The entire IP packet is encrypted and/or authenticated and then encapsulated as the payload in a new IP packet.

**Transport**
Only the payload of the IP packet is encrypted and/or authenticated. The IP header is left untouched. This mode has limitations when using an authentication header, because the IP addresses in the IP header cannot be translated (for example, with Network Address Translation (NAT), as it would invalidate the authentication hash value.

## Internet Key Exchange (IKE) settings

IKE is a key management protocol that allows IPsec to negotiate the security associations (SAs) that are used to create the secure IPsec tunnel. Both IKEv1 and IKEv2 are supported.

SA negotiations are performed in two phases, known as **phase 1** and **phase 2**.

### *Phase 1*

In phase 1, IKE creates a secure authenticated communication channel between the device and the peer (the remote device which is at the other end of the IPsec tunnel) using the configured pre-shared key and the Diffie-Hellman key exchange. This creates the IKE SAs that are used to encrypt further IKE communications.

For IKEv1, there are two modes for the phase 1 negotiation: **Main mode** and **Aggressive mode**. IKEv2 does not use these modes.

**Main mode**
Main mode is the default mode. It is slower than aggressive mode, but more secure, in that all sensitive information sent between the device and its peer is encrypted.

**Aggressive mode**

Aggressive mode is faster than main mode, but is not as secure as main mode, because the device and its peer exchange their IDs and hash information in clear text instead of being encrypted. Aggressive mode is usually used when one or both of the devices have a dynamic external IP address.

### *Phase 2*

In phase 2, IKE negotiates the SAs for IPsec. This creates two unidirectional SAs, one for each direction. Once the phase 2 negotiation is complete, the IPsec tunnel should be fully functional.

### *IPsec and IKE renegotiation*

To reduce the chances of an IPsec tunnel being compromised, the IPsec SAs and IKE SA are renegotiated at a regular interval. This results in different encryption keys being used in the IPsec tunnel.

## Authentication

### *Client authenticaton*

XAUTH (extended authentication) pre-shared key authentication mode provides additional security by using client authentication credentials in addition to the standard pre-shared key. The Connect EZ 16/32 device can be configured to authenticate with the remote peer as an XAUTH client.

### *RSA Signatures*

With RSA signatures authentication, the Connect EZ 16/32 device uses a private RSA key to authenticate with a remote peer that is using a corresponding public key.

### *Certificate-based Authentication*

X.509 certificate-based authentication makes use of private keys on both the server and client which are secured and never shared. Both the server and client have a certificate which is generated with their respective private key and signed by a Certificate Authority (CA).

The Connect EZ 16/32 implementation of IPsec can be configured to use X.509 certificate-based authentication using the private keys and certificates, along with a root CA certificate from the signing authority and, if available, a Certificate Revocation List (CRL).

## Configure an IPsec tunnel

Configuring an IPsec tunnel with a remote device involves configuring the following items:

**Required configuration items**

- **IPsec tunnel configuration items:**
  - A name for the tunnel.

    Note If the tunnel name is more than eight characters, the name will be truncated in the underlying network interface to the first six characters followed by three digits, incrementing from 000. This affects any custom scripts or firewall rules that may be trying to adjust the tunnel's interface or routing table entries.

  - The mode: either tunnel or transport.

- Enable the IPsec tunnel.

  The IPsec tunnel is enabled by default.
- The firewall zone of the IPsec tunnel.
- The routing metric for routes associated with this IPsec tunnel.
- The authentication type and pre-shared key or other applicable keys and certificates.

  If SCEP certificates will be selected as the Authentication type, create the SCEP client prior to configuring the IPsec tunnel. See Configure a Simple Certificate Enrollment Protocol client for instructions.
- The local endpoint type and ID values, and the remote endpoint host and ID values.

- **IKE configuration items**
  - The IKE version, either IKEv1 or IKEv2.
  - Whether to initiate a key exchange or wait for an incoming request.
  - The IKE mode, either main aggressive.
  - The IKE authentication protocol to use for the IPsec tunnel negotiation during phase 1 and phase 2.
  - The IKE encryption protocol to use for the IPsec tunnel negotiation during phase 1 and phase 2.
  - The IKE Diffie-Hellman group to use for the IPsec tunnel negotiation during phase 1 and phase 2.
- Enable dead peer detection and configure the delay and timeout.
- Destination networks that require source NAT.
- Active recovery configuration. See Configure SureLink active recovery for IPsec for information about IPsec active recovery.

**Additional configuration items**

The following additional configuration settings are not typically configured to get an IPsec tunnel working, but can be configured as needed:

- Determine whether the device should use UDP encapsulation even when it does not detect that NAT is being used.
- If using IPsec failover, identify the primary tunnel during configuration of the backup tunnel.
- The Network Address Translation (NAT) keep alive time.
- The protocol, either Encapsulating Security Payload (ESP) or Authentication Header (AH).
- The management priority for the IPsec tunnel interface. The active interface with the highest management priority will have its address reported as the preferred contact address for central management and direct device access.
- Enable XAUTH client authentication, and the username and password to be used to authenticate with the remote peer.
- Enable Mode-configuration (MODECFG) to receive configuration information, such as the private IP address, from the remote peer.
- Disable the padding of IKE packets. This should normally not be done except for compatibility purposes.
- Destination networks that require source NAT.

- Depending on your network and firewall configuration, you may need to add a packet filtering rule to allow incoming IPsec traffic.
- **Tunnel and key renegotiating**
  - The lifetime of the IPsec tunnel before it is renegotiated.
  - The amount of time before the IKE phase 1 lifetime expires.
  - The amount of time before the IKE phase 2 lifetime expires
  - The lifetime margin, a randomizing amount of time before the IPsec tunnel is renegotiated.

**Note** If the remote networks for an IPsec tunnel overlap with the networks for a WAN internet connection (wired, cellular, or otherwise), you must configure a static route to direct the traffic either through the IPsec tunnel, or through the WAN (outside of the IPsec tunnel). See Configure a static route for information about configuring a static route.

## Web

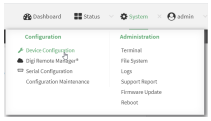
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

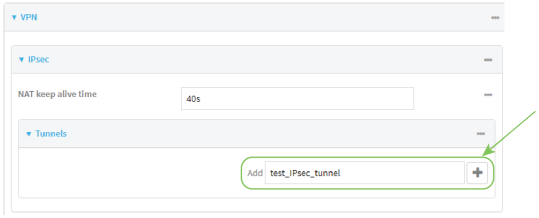
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

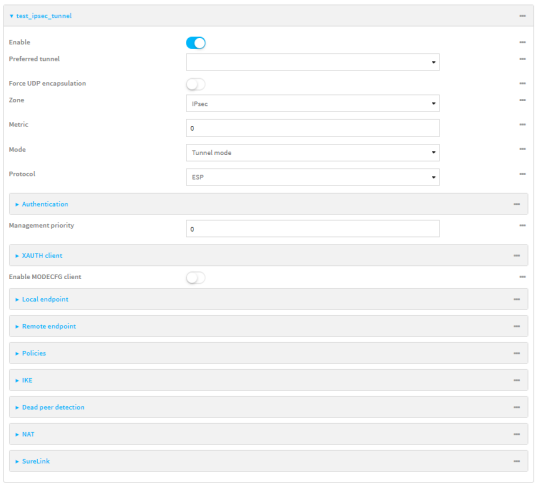
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **VPN** > **IPsec**.
4. Click to expand **Tunnels**.
5. For **Add IPsec tunnel**, type a name for the tunnel and click ✚.



The new IPsec tunnel configuration is displayed.



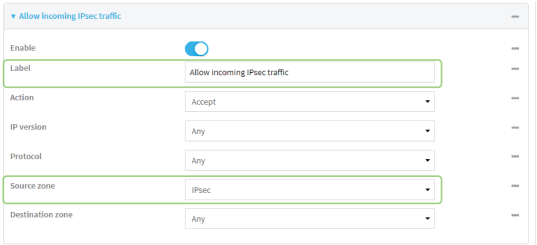

6. The IPsec tunnel is enabled by default. To disable, toggle off **Enable**.
7. (Optional) **Preferred tunnel** provides an optional mechanism for IPsec failover behavior. See Configure IPsec failover for more information.
8. (Optional) Enable **Force UDP encapsulation** to force the tunnel to use UDP encapsulation even when it does not detect that NAT is being used.
9. For **Zone**, select the firewall zone for the IPsec tunnel. Generally this should be left at the default of **IPsec**.

---

**Note** Depending on your network configuration, you may need to add a packet filtering rule to allow incoming traffic. For example, for the **IPsec** zone:

a. Click to expand **Firewall** > **Packet filtering**.
b. For **Add packet filter**, click ✚.
c. For **Label**, type **Allow incoming IPsec traffic**.
d. For **Source zone**, select **IPsec**.

Leave all other fields at their default settings.

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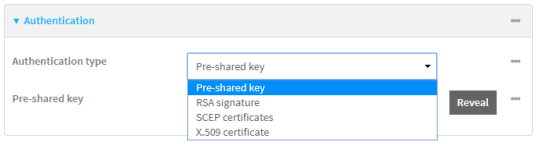
10. For **Metric**, enter or select the priority of routes associated with this IPsec tunnel. When more than one active route matches a destination, the route with the lowest metric is used.

    The metric can also be used in tandem with SureLink to configure IPsec failover behavior. See Configure IPsec failover for more information.
11. For **Mode**, select **Tunnel mode**. **Transport mode** is not currently supported.

12. Select the Mode, either:
    - **Tunnel mode**: The entire IP packet is encrypted and/or authenticated and then encapsulated as the payload in a new IP packet.
    - **Transport mode**: Only the payload of the IP packet is encrypted and/or authenticated. The IP header is unencrypted.
13. Select the **Protocol**, either:
    - **ESP** (Encapsulating Security Payload): Provides encryption as well as authentication and integrity.
    - **AH** (Authentication Header): Provides authentication and integrity only.
14. **Strict routing** is disabled by default. Toggle on to enable.

    Strict routing makes IPsec behave like a policy-based VPN, rather than a route-based VPN.
15. Click to expand **Authentication**.




    a. For **Authentication type**, select one of the following:
       - **Pre-shared key**: Uses a pre-shared key (PSK) to authenticate with the remote peer.
         i. Type the **Pre-shared key**.
       - **Asymmetric pre-shared keys**: Uses asymmetric pre-shared keys to authenticate with the remote peer.
         i. For **Local key**, type the local pre-shared key. This must be the same as the remote key on the remote host.
         ii. For **Remote key**, type the remote pre-shared key. This must be the same as the local key on the remote host.
       - **RSA signature**: Uses a private RSA key to authenticate with the remote peer.
         i. For **Private key**, paste the device's private RSA key in PEM format.
         ii. Type the **Private key passphrase** that is used to decrypt the private key. Leave blank if the private key is not encrypted.
         iii. For **Peer public key**, paste the peer's public RSA key in PEM format.
       - **SCEP certificates**: Uses Simple Certificate Enrollment Protocol (SCEP) to download a private key, certificates, and an optional Certificate Revocation List (CRL) to the Connect EZ 16/32 device from a SCEP server.

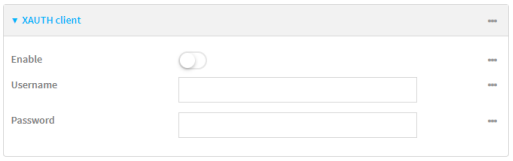
         You must create the SCEP client prior to configuring the IPsec tunnel. See Configure a Simple Certificate Enrollment Protocol client for instructions.
         i. For **SCEP Client**, select the SCEP client.
       - **X.509 certificate**: Uses private key and X.509 certificates to authenticate with the remote peer.
         i. For **Private key**, paste the device's private RSA key in PEM format.
         ii. Type the **Private key passphrase** that is used to decrypt the private key. Leave blank if the private key is not encrypted.

iii. For **Certificate**, paste the local X.509 certificate in PEM format.

iv. For Peer verification, select either:

- **Peer certificate**: For **Peer certificate**, paste the peer's X.509 certificate in PEM format.
- **Certificate Authority**: For **Certificate Authority chain**, paste the Certificate Authority (CA) certificates. These must include all peer certificates in the chain up to the root CA certificate, in PEM format.

16. (Optional) For **Management Priority**, set the management priority for this IPsec tunnel. A tunnel that is up and has the highest priority will be used for central management and direct device access.
17. (Optional) To configure the device to connect to its remote peer as an XAUTH client:
    a. Click to expand **XAUTH client**.




    b. Click **Enable**.
    c. Type the **Username** and **Password** that the device will use to authenticate as an XAUTH client with the peer.
18. (Optional) Click **Enable MODECFG client** to receive configuration information, such as the private IP address, from the remote peer.
19. Click to expand **Local endpoint**.
    a. For **Type**, select either:
        - **Default route**: Uses the same network interface as the default route.
        - **Interface**: Select the **Interface** to be used as the local endpoint.
    b. Click to expand **ID**.
        i. Select the ID type:
            - **Auto**: The ID will be automatically determined from the value of the tunnels endpoints.
            - **Raw**: Enter an ID and have it passed unmodified to the underlying IPsec stack.

              For **Raw ID value**, type the ID that will be passed.
            - **Any**: Any ID will be accepted.
            - **IPv4**: The ID will be interpreted as an IP address and sent as an ID_IPV4_ADDR IKE identity.

              For **IPv4 ID value**, type an IPv4 formatted ID. This can be a fully-qualified domain name or an IPv4 address.
            - **IPv6**: The ID will be interpreted as an IP address and sent as an ID_IPV6_ADDR IKE identity.

              For **IPv6 ID value**, type an IPv6 formatted ID. This can be a fully-qualified domain name or an IPv6 address.

- **RFC822/Email**: The ID will be interpreted as an RFC822 (email address).

  For **RFC822 ID value**, type the ID in internet email address format.
- **FQDN**: The ID will be interpreted as FQDN (Fully Qualified Domain Name) and sent as an ID_FQDN IKE identity.

  For **FQDN ID value**, type the ID as an FQDN.
- **KeyID**: The ID will be interpreted as a Key ID and sent as an ID_KEY_ID IKE identity.

  For **KEYID ID value**, type the key ID.
- **MAC address**: The device's primary MAC address will be used as the ID and sent as a ID_KEY_ID IKE identity.
- **Serial number**: The device's serial number will be used as the ID and sent as a ID_KEY_ID IKE identity.

20. Click to expand **Remote endpoint**.
    a. For **IP version**, select either **IPv4** or **IPv6**.
    b. For **Hostname list selection**, select one of the following:
       - **Round robin**: Attempts to connect to hostnames sequentially based on the list order.
       - **Random**: Randomly selects an IPsec peer to connect to from the hostname list.
       - **Priority ordered**: Selects the first hostname in the list that is resolvable.
    c. Click to expand **Hostname**.
       i. Click **+** next to **Add Hostname**.
       ii. For Hostname, type a hostname or IPv4 address. If your device is not configured to initiate the IPsec connection (see **IKE** > **Initiate connection**), you can also use the keyword **any**, which means that the hostname is dynamic or unknown.
       iii. Click **+** again to add additional hostnames.
    d. Click to expand **ID**.
       i. Select the ID type:
          - **Auto**: The ID will be automatically determined from the value of the tunnels endpoints.
          - **Raw**: Enter an ID and have it passed unmodified to the underlying IPsec stack.

            For **Raw ID value**, type the ID that will be passed.
          - **Any**: Any ID will be accepted.
          - **IPv4**: The ID will be interpreted as an IPv4 address and sent as an ID_IPV4_ADDR IKE identity.

            For **IPv4 ID value**, type an IPv4 formatted ID. This can be a fully-qualified domain name or an IPv4 address.
          - **IPv6**: The ID will be interpreted as an IPv6 address and sent as an ID_IPV6_ADDR IKE identity.

            For **IPv6 ID value**, type an IPv6 formatted ID. This can be a fully-qualified domain name or an IPv6 address.
          - **RFC822/Email**: The ID will be interpreted as an RFC822 (email address).

            For **RFC822 ID value**, type the ID in internet email address format.

- **FQDN**: The ID will be interpreted as FQDN (Fully Qualified Domain Name) and sent as an ID_FQDN IKE identity.

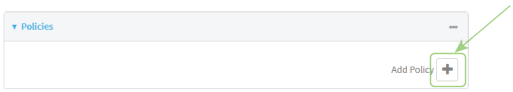
  For **FQDN ID value**, type the ID as an FQDN.
- **KeyID**: The ID will be interpreted as a Key ID and sent as an ID_KEY_ID IKE identity.

  For **KEYID ID value**, type the key ID.
- **MAC address**: The device's primary MAC address will be used as the ID and sent as a ID_KEY_ID IKE identity.
- **Serial number**: The device's serial number will be used as the ID and sent as a ID_KEY_ID IKE identity.

21. Click to expand **Policies**.

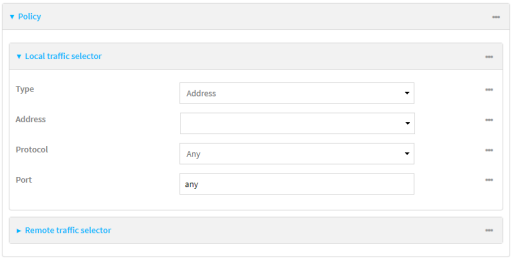
    Policies define the network traffic that will be encapsulated by this tunnel.

    a. Click ✚ to create a new policy.

    The new policy configuration is displayed.

    b. Click to expand **Local traffic selector**.

    c. For **Type**, select one of the following:
    - **Address**: The address of a local network interface.

      For **Address**, select the appropriate interface.
    - **Network**: The subnet of a local network interface.

      For **Address**, select the appropriate interface.
    - **Custom network**: A user-defined network.

      For **Custom network**, enter the IPv4 address and optional netmask.
    - **Request a network**: Requests a network from the remote peer.
    - **Dynamic**: Uses the address of the local endpoint.

    d. For **Protocol**, select one of the following:
    - **Any**: Matches any protocol.
    - **TCP**: Matches TCP protocol only.
    - **UDP**: Matches UDP protocol only.
    - **ICMP**: Matches ICMP requests only.

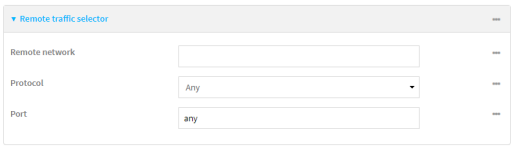
- **Other protocol**: Matches an unlisted protocol.

  If **Other protocol** is selected, type the number of the protocol.

e. For **Port**, type the port matching criteria.

   Allowed values are a port number, a range of port numbers, or **any**.

f. (Optional) Click to expand **Remote traffic selector**.




g. For **Remote network**, enter the IP address and optional netmask of the remote network.

h. For **Protocol**, select one of the following:

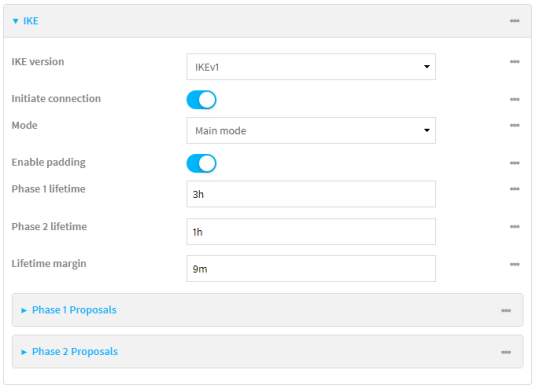
- **Any**: Matches any protocol.
- **TCP**: Matches TCP protocol only.
- **UDP**: Matches UDP protocol only.
- **ICMP**: Matches ICMP requests only.
- **Other protocol**: Matches an unlisted protocol.

  If **Other protocol** is selected, type the number of the protocol.

i. For **Port**, type the port matching criteria.

   Allowed values are a port number, a range of port numbers, or **any**.

22. Click to expand **IKE**.




a. For **IKE version**, select either IKEv1 or IKEv2. This setting must match the peer's IKE version.

b. **Initiate connection** instructs the device to initiate the key exchange, rather than waiting for an incoming request. This must be disabled if **Remote endpoint** > **Hostname** is set to **any**.

c. For **Mode**, select either **Main mode** or **Aggressive mode**.

d. For **IKE fragmentation**, select one of the following:

- **If supported by the peer**: Send oversized IKE messages in fragments, if the peer supports receiving them.

- **Always**: Always send IKEv1 messages in fragments. For IKEv2, this option is equivalent to **If supported by the peer**.
- **Never**: Do not send oversized IKE messages in fragments.
- **Accept**: Do not send oversized IKE messages in fragments, but announce support for fragmentation to the peer.

The default is **Always**.

e. For **Enable padding**, click to disable the padding of IKE packets. This should normally not be disabled except for compatibility purposes.

f. For Phase 1 lifetime, enter the amount of time that the IKE security association expires after a successful negotiation and must be re-authenticated.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

For example, to set **Phase 1 lifetime** to ten minutes, enter **10m** or **600s**.

g. For Phase 2 lifetime, enter the amount of time that the IKE security association expires after a successful negotiation and must be rekeyed.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

For example, to set **Phase 2 lifetime** to ten minutes, enter **10m** or **600s**.

h. For Lifetime margin, enter a randomizing amount of time before the IPsec tunnel is renegotiated.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

For example, to set **Lifetime margin** to ten minutes, enter **10m** or **600s**.

i. Click to expand **Phase 1 Proposals**.

i. Click **+** to create a new phase 1 proposal.

ii. For **Cipher**, select the type of encryption.

iii. For **Hash**, select the type of hash to use to verify communication integrity.

iv. For **Diffie-Hellman group**, select the type of Diffie-Hellman group to use for key exchange.

v. You can add additional Phase 1 proposals by clicking **+** next to **Add Phase 1 Proposal**.

j. Click to expand **Phase 2 Proposals**.

i. Click **+** to create a new phase 2 proposal.

ii. For **Cipher**, select the type of encryption.

iii. For **Hash**, select the type of hash to use to verify communication integrity.

iv. For **Diffie-Hellman group**, select the type of Diffie-Hellman group to use for key exchange.

v. You can add additional Phase 2 proposals by clicking **+** next to **Add Phase 2 Proposal**.

23. (Optional) Click to expand **Dead peer detection**. Dead peer detection is enabled by default. Dead peer detection uses periodic IKE transmissions to the remote endpoint to detect whether tunnel communications have failed, allowing the tunnel to be automatically

restarted when failure occurs.

a. To enable or disable dead peer detection, click **Enable**.

b. For **Delay**, type the number of seconds between transmissions of dead peer packets. Dead peer packets are only sent when the tunnel is idle.

c. For **Timeout**, type the number of seconds to wait for a response from a dead peer packet before assuming the tunnel has failed.

24. (Optional) Click to expand **NAT** to create a list of destination networks that require source NAT.

a. Click ✚ next to **Add NAT destination**.

b. For **Destination network**, type the IPv4 address and optional netmask of a destination network that requires source NAT. You can also use **any**, meaning that any destination network connected to the tunnel will use source NAT.

25. See Configure SureLink active recovery for IPsec for information about IPsec **Active recovery**.

26. (Optional) Click **Advanced** to set various IPsec-related time out, keep alive, and related values.

27. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add an IPsec tunnel. For example, to add an IPsec tunnel named **ipsec_example**:

```
(config)> add vpn ipsec tunnel ipsec_example
(config vpn ipsec tunnel ipsec_example)>
```

   The IPsec tunnel is enabled by default. To disable:

```
(config vpn ipsec tunnel ipsec_example)> enable false
(config vpn ipsec tunnel ipsec_example)>
```

4. (Optional) Set the tunnel to use UDP encapsulation even when it does not detect that NAT is being used:

```
(config vpn ipsec tunnel ipsec_example)> force_udp_encap true
(config vpn ipsec tunnel ipsec_example)>
```

5. Set the firewall zone for the IPsec tunnel. Generally this should be left at the default of **ipsec**.

```
(config vpn ipsec tunnel ipsec_example)> zone zone
(config vpn ipsec tunnel ipsec_example)>
```

   To view a list of available zones:

```
(config vpn ipsec tunnel ipsec_example)> zone ?

Zone: The firewall zone assigned to this IPsec tunnel. This can be used
by packet filtering rules
and access control lists to restrict network traffic on this tunnel.
Format:
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
Default value: ipsec
Current value: ipsec

(config vpn ipsec tunnel ipsec_example)>
```

**Note** Depending on your network configuration, you may need to add a packet filtering rule to allow incoming traffic. For example, for the **IPsec** zone:

a. Type **...** to move to the root of the configuration:

```
(config vpn ipsec tunnel ipsec_example)> ...
(config)>
```

b. Add a packet filter:

```
(config)> add firewall filter end
(config firewall filter 2)>
```

c. Set the label to **Allow incoming IPsec traffic**:

```
(config config firewall filter 2)> label "Allow incoming IPsec
traffic"
(config firewall filter 2)>
```

d. Set the source zone to **ipsec**:

```
(config config firewall filter 2)> src_zone ipsec
(config firewall filter 2)>
```

6. Set the metric for the IPsec tunnel. When more than one active route matches a destination, the route with the lowest metric is used. The metric can also be used in tandem with SureLink to configure IPsec failover behavior. See Configure IPsec failover for more information.

```
(config vpn ipsec tunnel ipsec_example)> metric value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is any integer between **0** and **65535**.

7. Set the mode:

```
(config vpn ipsec tunnel ipsec_example)> mode mode
(config vpn ipsec tunnel ipsec_example)>
```

where *mode* is either:

- **tunnel**: The entire IP packet is encrypted and/or authenticated and then encapsulated as the payload in a new IP packet.
- **transport**: Only the payload of the IP packet is encrypted and/or authenticated. The IP header is unencrypted.

The default is **tunnel**.

8. Set the protocol:

```
(config vpn ipsec tunnel ipsec_example)> type protocol
(config vpn ipsec tunnel ipsec_example)>
```

where *protocol* is either:

- **esp** (Encapsulating Security Payload): Provides encryption as well as authentication and integrity.
- **ah** (Authentication Header): Provides authentication and integrity only.

The default is **esp**.

9. (Optional) Set the management priority for this IPsec tunnel:

```
(config vpn ipsec tunnel ipsec_example)> mgmt value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is any interger between **0** and **1000**.

10. Set the authentication type:

```
(config vpn ipsec tunnel ipsec_example)> auth type value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is one of:

- **secret**: Uses a pre-shared key (PSK) to authenticate with the remote peer.
  a. Set the pre-shared key:

```
(config vpn ipsec tunnel ipsec_example)> auth secret key
(config vpn ipsec tunnel ipsec_example)>
```

- **asymmetric-secrets**: Uses asymmetric pre-shared keys to authenticate with the remote peer.
  a. Set the local pre-shared key. This must be the same as the remote key on the remote host.:

```
(config vpn ipsec tunnel ipsec_example)> auth local_secret key
(config vpn ipsec tunnel ipsec_example)>
```

  b. Set the remote pre-shared key. This must be the same as the local key on the remote host.:

```
(config vpn ipsec tunnel ipsec_example)> auth remote_secret key
(config vpn ipsec tunnel ipsec_example)>
```

- **rsasig**: Uses a private RSA key to authenticate with the remote peer.
  a. For the **private_key** parameter, paste the device's private RSA key in PEM format:

```
(config vpn ipsec tunnel ipsec_example)> auth private_key key
(config vpn ipsec tunnel ipsec_example)>
```

  b. Set the private key passphrase that is used to decrypt the private key. Leave blank if the private key is not encrypted.

```
(config vpn ipsec tunnel ipsec_example)> auth private_key_
passphrase passphrase
(config vpn ipsec tunnel ipsec_example)>
```

c. For the **peer_public_key** parameter, paste the peer's public RSA key in PEM format:

```
(config vpn ipsec tunnel ipsec_example)> auth peer_public_key
key
(config vpn ipsec tunnel ipsec_example)>
```

- **x509**: Uses private key and X.509 certificates to authenticate with the remote peer.
  a. For the **private_key** parameter, paste the device's private RSA key in PEM format:

```
(config vpn ipsec tunnel ipsec_example)> auth private_key key
(config vpn ipsec tunnel ipsec_example)>
```

  b. Set the private key passphrase that is used to decrypt the private key. Leave blank if the private key is not encrypted.

```
(config vpn ipsec tunnel ipsec_example)> auth private_key_
passphrase passphrase
(config vpn ipsec tunnel ipsec_example)>
```

  c. For the **cert** parameter, paste the local X.509 certificate in PEM format:

```
(config vpn ipsec tunnel ipsec_example)> auth cert certificate
(config vpn ipsec tunnel ipsec_example)>
```

  d. Set the method for verifying the peer's X.509 certificate:

```
(config vpn ipsec tunnel ipsec_example)> auth peer_verify value
(config vpn ipsec tunnel ipsec_example)>
```

  where *value* is either:

  - **cert**: Uses the peer's X.509 certificate in PEM format for verification.
    - For the **peer_cert** parameter, paste the peer's X.509 certificate in PEM format:

```
(config vpn ipsec tunnel ipsec_example)> auth peer_cert
certificate
(config vpn ipsec tunnel ipsec_example)>
```

  - **ca**: Uses the Certificate Authority chain for verification.
    - For the **ca_cert** parameter, paste the Certificate Authority (CA) certificates. These must include all peer certificates in the chain up to the root CA certificate, in PEM format.

```
(config vpn ipsec tunnel ipsec_example)> auth ca_cert cert_
chain
(config vpn ipsec tunnel ipsec_example)>
```

11. (Optional) Configure the device to connect to its remote peer as an XAUTH client:

a. Enable XAUTH client functionality:

```
(config vpn ipsec tunnel ipsec_example)> xauth_client enable true
(config vpn ipsec tunnel ipsec_example)>
```

b. Set the XAUTH client username:

```
(config vpn ipsec tunnel ipsec_example)> xauth_client username name
(config vpn ipsec tunnel ipsec_example)>
```

c. Set the XAUTH client password:

```
(config vpn ipsec tunnel ipsec_example)> xauth_client password pwd
(config vpn ipsec tunnel ipsec_example)>
```

12. (Optional) Enable MODECFG client functionality:

    MODECFG client functionality configures the device to receive configuration information, such as the private IP address, from the remote peer.

    a. Enable MODECFG client functionality:

```
(config vpn ipsec tunnel ipsec_example)> modecfg_client enable true
(config vpn ipsec tunnel ipsec_example)>
```

13. Configure the local endpoint:

    a. Set the method for determining the local network interface:

```
(config vpn ipsec tunnel ipsec_example)> local type value
(config vpn ipsec tunnel ipsec_example)>
```

    where *value* is either:

    - **defaultroute**: Uses the same network interface as the default route.
    - **interface**: Select the **Interface** to be used as the local endpoint.

    b. Set the ID type:

```
(config vpn ipsec tunnel ipsec_example)> local id type value
(config vpn ipsec tunnel ipsec_example)>
```

    where *value* is one of:

    - **auto**: The ID will be automatically determined from the value of the tunnels endpoints.
    - **raw**: Enter an ID and have it passed unmodified to the underlying IPsec stack.

      Set the unmodified ID that will be passed:

```
(config vpn ipsec tunnel ipsec_example)> local id type raw_id id
(config vpn ipsec tunnel ipsec_example)>
```

    - **any**: Any ID will be accepted.
    - **ipv4**: The ID will be interpreted as an IPv4 address and sent as an ID_IPV4_ADDR IKE identity.

Set an IPv4 formatted ID. This can be a fully-qualified domain name or an IPv4 address.

```
(config vpn ipsec tunnel ipsec_example)> local id type ipv4_id
id
(config vpn ipsec tunnel ipsec_example)>
```

- **ipv6**: The ID will be interpreted as an IPv6 address and sent as an ID_IPV6_ADDR IKE identity.

  Set an IPv6 formatted ID. This can be a fully-qualified domain name or an IPv6 address.

  ```
  (config vpn ipsec tunnel ipsec_example)> local id type ipv6_id
  id
  (config vpn ipsec tunnel ipsec_example)>
  ```

- **rfc822**: The ID will be interpreted as an RFC822 (email address).

  Set the ID in internet email address format:

  ```
  (config vpn ipsec tunnel ipsec_example)> local id type rfc822_id
  id
  (config vpn ipsec tunnel ipsec_example)>
  ```

- **fqdn**: The ID will be interpreted as FQDN (Fully Qualified Domain Name) and sent as an ID_FQDN IKE identity.
- **keyid**: The ID will be interpreted as a Key ID and sent as an ID_KEY_ID IKE identity.

  Set the key ID:

  ```
  (config vpn ipsec tunnel ipsec_example)> local id type keyid_id
  id
  (config vpn ipsec tunnel ipsec_example)>
  ```

- **mac_address**: The device's MAC address will be used for the Key ID and sent as an ID_KEY_ID IKE identity.
- **serial_number**: The ID device's serial number will be used for the Key ID and sent as an ID_KEY_ID IKE identity.

14. Configure the remote endpoint:
    a. Add a remote hostname:

    ```
    (config vpn ipsec tunnel ipsec_example)> add remote hostname end value
    (config vpn ipsec tunnel ipsec_example)>
    ```

    where *value* is the hostname or IPv4 address of the IPsec peer. If your device is not configured to initiate the IPsec connection (see ike initiate), you can also use the keyword **any**, which means that the hostname is dynamic or unknown.

    Repeat for additional hostnames.

b. Set the hostname selection type:

```
(config vpn ipsec tunnel ipsec_example)> remote hostname_selection
value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is one of:

- **round_robin**: Attempts to connect to hostnames sequentially based on the list order.
- **random**: Randomly selects an IPsec peer to connect to from the hostname list.
- **priority**: Selects the first hostname in the list that is resolvable.

c. Set the ID type:

```
(config vpn ipsec tunnel ipsec_example)> remote id type value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is one of:

- **auto**: The ID will be automatically determined from the value of the tunnels endpoints.
- **raw**: Enter an ID and have it passed unmodified to the underlying IPsec stack.

  Set the unmodified ID that will be passed:

  ```
  (config vpn ipsec tunnel ipsec_example)> remote id type raw_id
  id
  (config vpn ipsec tunnel ipsec_example)>
  ```

- **any**: Any ID will be accepted.
- **ipv4**: The ID will be interpreted as an IPv4 address and sent as an ID_IPV4_ADDR IKE identity.

  Set an IPv4 formatted ID. This can be a fully-qualified domain name or an IPv4 address.

  ```
  (config vpn ipsec tunnel ipsec_example)> remote id type ipv4_id
  id
  (config vpn ipsec tunnel ipsec_example)>
  ```

- **ipv6**: The ID will be interpreted as an IPv6 address and sent as an ID_IPV6_ADDR IKE identity.

  Set an IPv6 formatted ID. This can be a fully-qualified domain name or an IPv6 address.

  ```
  (config vpn ipsec tunnel ipsec_example)> remote id type ipv6_id
  id
  (config vpn ipsec tunnel ipsec_example)>
  ```

- **rfc822**: The ID will be interpreted as an RFC822 (email address).

  Set the ID in internet email address format:

  ```
  (config vpn ipsec tunnel ipsec_example)> remote id type rfc822_
  id id
  (config vpn ipsec tunnel ipsec_example)>
  ```

- **fqdn**: The ID will be interpreted as FQDN (Fully Qualified Domain Name) and sent as an ID_FQDN IKE identity.
- **keyid**: The ID will be interpreted as a Key ID and sent as an ID_KEY_ID IKE identity.

  Set the key ID:

  ```
  (config vpn ipsec tunnel ipsec_example)> remote id type keyid_id
  id
  (config vpn ipsec tunnel ipsec_example)>
  ```

- **mac_address**: The device's MAC address will be used for the Key ID and sent as an ID_KEY_ID IKE identity.
- **serial_number**: The ID device's serial number will be used for the Key ID and sent as an ID_KEY_ID IKE identity.

15. Configure IKE settings:
    a. Set the IKE version:

    ```
    (config vpn ipsec tunnel ipsec_example)> ike version value
    (config vpn ipsec tunnel ipsec_example)>
    ```

    where *value* is either **ikev1** or **ikev2**. This setting must match the peer's IKE version.

    b. Determine whether the device should initiate the key exchange, rather than waiting for an incoming request. By default, the device will initiate the key exchange. This must be disabled if remote hostname is set to **any**. To disable:

    ```
    (config vpn ipsec tunnel ipsec_example)> ike initiate false
    (config vpn ipsec tunnel ipsec_example)>
    ```

    c. Set the IKE phase 1 mode:

    ```
    (config vpn ipsec tunnel ipsec_example)> ike mode value
    (config vpn ipsec tunnel ipsec_example)>
    ```

    where *value* is either **aggressive** or **main**.

    d. Set the IKE fragmentation:

    ```
    (config vpn ipsec tunnel ipsec_example)> ike fragmentation value
    (config vpn ipsec tunnel ipsec_example)>
    ```

    where *value* is one of:

    - **if_supported**: Send oversized IKE messages in fragments, if the peer supports receiving them.
    - **always**: Always send IKEv1 messages in fragments. For IKEv2, this option is equivalent to **if supported**.

- **never**: Do not send oversized IKE messages in fragments.
- **accept**: Do not send oversized IKE messages in fragments, but announce support for fragmentation to the peer.

The default is **always**.

e. Padding of IKE packets is enabled by default and should normally not be disabled except for compatibility purposes. To disable:

```
(config vpn ipsec tunnel ipsec_example)> ike pad false
(config vpn ipsec tunnel ipsec_example)>
```

f. Set the amount of time that the IKE security association expires after a successful negotiation and must be re-authenticated:

```
(config vpn ipsec tunnel ipsec_example)> ike phase1_lifetime value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **phase1_lifetime** to ten minutes, enter either **10m** or **600s**:

```
(config vpn ipsec tunnel ipsec_example)> ike phase1_lifetime 600s
(config vpn ipsec tunnel ipsec_example)>
```

The default is three hours.

g. Set the amount of time that the IKE security association expires after a successful negotiation and must be rekeyed.

```
(config vpn ipsec tunnel ipsec_example)> ike phase2_lifetime value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **phase2_lifetime** to ten minutes, enter either **10m** or **600s**:

```
(config vpn ipsec tunnel ipsec_example)> ike phase2_lifetime 600s
(config vpn ipsec tunnel ipsec_example)>
```

The default is one hour.

h. Set a randomizing amount of time before the IPsec tunnel is renegotiated:

```
(config vpn ipsec tunnel ipsec_example)> ike lifetime_margin value
(config vpn ipsec tunnel ipsec_example)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **lifetime_margin** to ten minutes, enter either **10m** or **600s**:

```
(config vpn ipsec tunnel ipsec_example)> ike lifetime_margin 600s
(config vpn ipsec tunnel ipsec_example)>
```

The default is nine minutes.

i. Configure the types of encryption, hash, and Diffie-Hellman group to use during phase 1:

   i. Add a phase 1 proposal:

```
(config vpn ipsec tunnel ipsec_example)> add ike phase1_proposal
end
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
```

   ii. Set the type of encryption to use during phase 1:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
cipher value
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
```

   where *value* is one of:

   - **3des**
   - **aes128**
   - **aes128gcm128**
   - **aes128gcm64**
   - **aes128gcm96**
   - **aes192**
   - **aes192gcm128**
   - **aes192gcm64**
   - **aes192gcm96**
   - **aes256**
   - **aes256gcm128**
   - **aes256gcm64**
   - **aes256gcm96**
   - **null**

   The default is **3des**.

   iii. Set the type of hash to use during phase 1 to verify communication integrity:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
hash value
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
```

   where *value* is one of:

   - **md5**
   - **sha1**
   - **sha256**
   - **sha384**
   - **sha512**

   The default is **sha1**.

iv. Set the type of Diffie-Hellman group to use for key exchange during phase 1:

i. Use the **?** to determine available Diffie-Hellman group types:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
dh_group ?
curve25519
curve448
ecp192
ecp224
...
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
```

ii. Set the Diffie-Hellman group type:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
dh_group value
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
```

The default is **modp2048**.

v. (Optional) Add additional phase 1 proposals:

i. Move back one level in the schema:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)>
..
(config vpn ipsec tunnel ipsec_example ike phase1_proposal)>
```

ii. Add an additional proposal:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal)>
add end
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 1)>
```

Repeat the above steps to set the type of encryption, hash, and Diffie-Hellman group for the additional proposal.

iii. Repeat to add more phase 1 proposals.

j. Configure the types of encryption, hash, and Diffie-Hellman group to use during phase 2:

i. Move back two levels in the schema:

```
(config vpn ipsec tunnel ipsec_example ike phase1_proposal 0)> ..
..
(config vpn ipsec tunnel ipsec_example ike)>
```

ii. Add a phase 2 proposal:

```
(config vpn ipsec tunnel ipsec_example ike)> add ike phase2_
proposal end
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
```

iii. Set the type of encryption to use during phase 2:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
cipher value
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
```

where *value* is one of:

- **3des**
- **aes128**
- **aes128gcm128**
- **aes128gcm64**
- **aes128gcm96**
- **aes192**
- **aes192gcm128**
- **aes192gcm64**
- **aes192gcm96**
- **aes256**
- **aes256gcm128**
- **aes256gcm64**
- **aes256gcm96**
- **null**

The default is **3des**.

iv. Set the type of hash to use during phase 2 to verify communication integrity:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
hash value
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
```

where *value* is one of:

- **md5**
- **sha1**
- **sha256**
- **sha384**
- **sha512**

The default is **sha1**.

v. Set the type of Diffie-Hellman group to use for key exchange during phase 2:

i. Use the **?** to determine available Diffie-Hellman group types:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
dh_group ?
curve25519
curve448
ecp192
```

```
ecp224
...
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
```

ii. Set the Diffie-Hellman group type:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
dh_group value
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
```

The default is **modp2048**.

vi. (Optional) Add additional phase 2 proposals:

i. Move back one level in the schema:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)>
..
(config vpn ipsec tunnel ipsec_example ike phase2_proposal)>
```

ii. Add an additional proposal:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal)>
add end
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 1)>
```

Repeat the above steps to set the type of encryption, hash, and Diffie-Hellman group for the additional proposal.

iii. Repeat to add more phase 2 proposals.

16. (Optional) Configure dead peer detection:

Dead peer detection is enabled by default. Dead peer detection uses periodic IKE transmissions to the remote endpoint to detect whether tunnel communications have failed, allowing the tunnel to be automatically restarted when failure occurs.

a. Change to the root of the configuration schema:

```
(config vpn ipsec tunnel ipsec_example ike phase2_proposal 0)> ...
(config)>
```

b. To disable dead peer detection:

```
(config)> vpn ipsec tunnel ipsec_example dpd enable false
(config)>
```

c. Set the number of seconds between transmissions of dead peer packets. Dead peer packets are only sent when the tunnel is idle. The default is **60**.

```
(config)> vpn ipsec tunnel ipsec_example dpd delay value
(config)>
```

d. Set the number of seconds to wait for a response from a dead peer packet before assuming the tunnel has failed. The default is **90**.

```
(config)> vpn ipsec tunnel ipsec_example dpd timeout value
(config)>
```

17. (Optional) Create a list of destination networks that require source NAT:
    a. Add a destination network:

```
(config)> add vpn ipsec tunnel ipsec_example nat end
(config vpn ipsec tunnel ipsec_example nat 0)>
```

    b. Set the IPv4 address and optional netmask of a destination network that requires source NAT. You can also use **any**, meaning that any destination network connected to the tunnel will use source NAT.

```
(config vpn ipsec tunnel ipsec_example nat 0)> dst value
(config vpn ipsec tunnel ipsec_example nat 0)>
```

18. Configure policies that define the network traffic that will be encapsulated by this tunnel:
    a. Change to the root of the configuration schema:

```
(config vpn ipsec tunnel ipsec_example nat 0)> ...
(config)>
```

    b. Add a policy:

```
(config)> add vpn ipsec tunnel ipsec_example policy end
(config vpn ipsec tunnel ipsec_example policy 0)>
```

    c. Set the type of local traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> local type value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

    where *value* is one of:

    - **address**: The address of a local network interface.

      Set the address:

      i. Use the **?** to determine available interfaces:
      ii. Set the interface. For example:

```
(config vpn ipsec tunnel ipsec_example policy 0)> local
address eth1
(config vpn ipsec tunnel ipsec_example policy 0)>
```

    - **network**: The subnet of a local network interface.

      Set the network:

      i. Use the **?** to determine available interfaces:
      ii. Set the interface. For example:

```
(config vpn ipsec tunnel ipsec_example policy 0)> local
network eth1
(config vpn ipsec tunnel ipsec_example policy 0)>
```

- **custom**: A user-defined network.

  Set the custom network:

  ```
  (config vpn ipsec tunnel ipsec_example policy 0)> local custom
  value
  (config vpn ipsec tunnel ipsec_example policy 0)>
  ```

  where *value* is the IPv4 address and optional netmask. The keyword **any** can also be used.
- **request**: Requests a network from the remote peer.
- **dynamic**: Uses the address of the local endpoint.

d. Set the port matching criteria for the local traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> local port value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

where *value* is the port number, a range of port numbers, or the keyword **any**.

e. Set the protocol matching criteria for the local traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> local protocol value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

where *value* is one of:

- **any**: Matches any protocol.
- **tcp**: Matches TCP protocol only.
- **udp**: Matches UDP protocol only.
- **icmp**: Matches ICMP requests only.
- **other**: Matches an unlisted protocol.

  If **other** is used, set the number of the protocol:

  ```
  (config vpn ipsec tunnel ipsec_example policy 0)> local
  protocol_other int
  (config vpn ipsec tunnel ipsec_example policy 0)>
  ```

  Allowed values are an integer between **1** and **255**.

f. Set the IP address and optional netmask of the remote traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> remote network value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

g. Set the port matching criteria for the remote traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> remote port value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

where *value* is the port number, a range of port numbers, or the keyword **any**.

h. Set the protocol matching criteria for the remote traffic selector:

```
(config vpn ipsec tunnel ipsec_example policy 0)> remote protocol
value
(config vpn ipsec tunnel ipsec_example policy 0)>
```

where *value* is one of:

- **any**: Matches any protocol.
- **tcp**: Matches TCP protocol only.
- **udp**: Matches UDP protocol only.
- **icmp**: Matches ICMP requests only.
- **other**: Matches an unlisted protocol.

  If **other** is used, set the number of the protocol:

  ```
  (config vpn ipsec tunnel ipsec_example policy 0)> remote
  protocol_other int
  (config vpn ipsec tunnel ipsec_example policy 0)>
  ```

  Allowed values are an integer between **1** and **255**.

19. (Optional) You can also configure various IPsec related time out, keep alive, and related values:

a. Change to the root of the configuration schema:

```
(config vpn ipsec tunnel ipsec_example policy 0)> ...
(config)>
```

b. Use the **?** to determine available options:

```
(config)> vpn ipsec advanced ?

Advanced: Advanced configuration that applies to all IPsec tunnels.

 Parameters                Current Value
 ------------------------------------------------------------------------
---------
 debug                     none           Debug level
 ike_fragment_size         1280           Maximum IKE fragment size
 ike_retransmit_tries      5              IKE retransmit tries
 keep_alive                40s            NAT keep alive time

 Additional Configuration
 ------------------------------------------------------------------------
----------
 connection_retry_timeout  Connection retry timeout
 connection_try_interval   Connection try interval
 ike_timeout               IKE timeout

(config)>
```

Generally, the default settings for these should be sufficient.

c. You can also enable debugging for IPsec:

```
(config)> vpn ipsec advanced debug value
(config)>
```

where *value* is one of:

- **none**
- **basic_auditing**
- **detailed_control**
- **generic_control**
- **raw_data**
- **sensitive_data**

20. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

21. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure IPsec failover

You can configure the Connect EZ 16/32 device to fail over from a primary IPsec tunnel to a backup tunnel:

- **SureLink** active recovery—You can use SureLink along with the IPsec tunnel's metric to configure two or more tunnels so that when the primary tunnel is determined to be inactive by SureLink, a secondary tunnel can begin serving traffic that the primary tunnel was serving.
- **Preferred tunnel**—When multiple IPsec tunnels are configured, one tunnel can be configured as a backup to another tunnel by defining a preferred tunnel for the backup device.

**Required configuration items**

- Two or more configured IPsec tunnels: The primary tunnel, and one or more backup tunnels.
- Either:
  - SureLink configured on the primary tunnel with **Restart Interface** enabled, and the metric for all tunnels set appropriately to determine which IPsec tunnel has priority. With this failover configuration, both tunnels are active simultaneously, and there is minimal downtime due to failover.
  - Identify the preferred tunnel during configuration of the backup tunnel. In this scenario, the backup tunnel is not active until the preferred tunnel fails.

### IPsec failover using SureLink

With this configuration, when two IPsec tunnels are configured with the same local and remote endpoints but different metrics, traffic addressed to the remote endpoint will be routed through the IPsec tunnel with the lower metric.

If **SureLink** > **Restart Interface** is enabled for the tunnel with the lower metric, and SureLink determines that the tunnel is not functioning properly (for example, pings to a host at the other end of the tunnel are failing), then:

1. SureLink will shut down the tunnel and renegotiate its IPsec connection.
2. While the tunnel with the lower metric is down, traffic addressed to the remote endpoint will be routed through the tunnel with the higher metric.

For example:

- Tunnel_1:
  - **Metric**: 10
  - **Local endpoint** > **Interface**: ETH2
  - **Remote endpoint** > **Hostname**: 192.168.10.1
  - **SureLink** configuration:
    - **Restart Interface** enabled
    - **Test target**:
      - **Test type**: Ping test
      - **Ping host**: 192.168.10.2
- Tunnel_2:

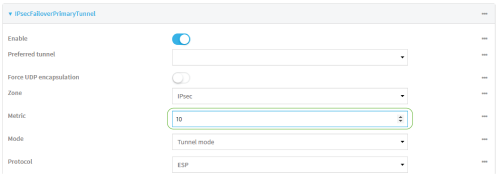
- **Metric**: 20
- **Local endpoint** > **Interface**: ETH2
- **Remote endpoint** > **Hostname**: 192.168.10.1

In this configuration:

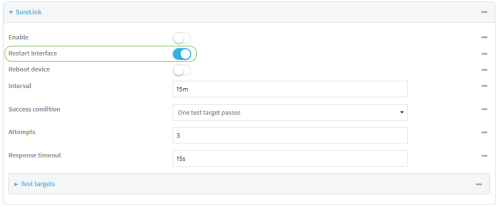
1. Tunnel_1 will normally be used for traffic destined for the 192.168.10.1 endpoint.
2. If pings to 192.168.10.2 fail, SureLink will shut down the tunnel and renegotiate its IPsec connection.
3. While Tunnel_1 is down, Tunnel_2 will be used for traffic destined for the 192.168.10.1 endpoint.

## Web

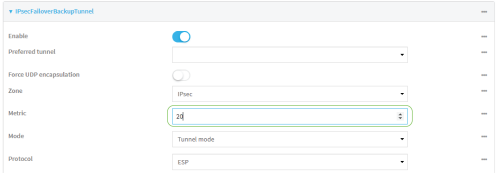
1. Configure the primary IPsec tunnel. See Configure an IPsec tunnel for instructions.
   - During configuration of the IPsec tunnel, set the metric to a low value (for example, **10**).




   - Configure SureLink for the primary IPsec tunnel and enable **Restart interface**. See Configure SureLink active recovery for IPsec for instructions.




2. Create a backup IPsec tunnel. Configure this tunnel to use the same local and remote endpoints as the primary tunnel. See Configure an IPsec tunnel for instructions.
   - During configuration of the IPsec tunnel, set the metric to a value that is higher than the metric of the primary tunnel (for example, **20**).




## Command line

1. Configure the primary IPsec tunnel. See Configure an IPsec tunnel for instructions.
   - During configuration of the IPsec tunnel, set the metric to a low value (for example, **10**):

```
(config vpn ipsec tunnel IPsecFailoverPrimaryTunnel)> metric 10
(config vpn ipsec tunnel IPsecFailoverPrimaryTunnel)>
```

- Configure SureLink for the primary IPsec tunnel and enable **Restart interface**. See Configure SureLink active recovery for IPsec for instructions.

```
(config vpn ipsec tunnel IPsecFailoverPrimaryTunnel)> surelink
restart true
(config vpn ipsec tunnel IPsecFailoverPrimaryTunnel)>
```

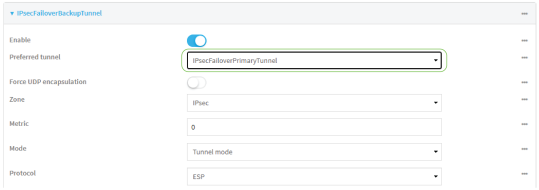
2. Create a backup IPsec tunnel. Configure this tunnel to use the same local and remote endpoints as the primary tunnel. See Configure an IPsec tunnel for instructions.
   - During configuration of the IPsec tunnel, set the metric to a value that is higher than the metric of the primary tunnel (for example, **20**):

```
(config vpn ipsec tunnel IPsecFailoverBackupTunnel)> metric 20
(config vpn ipsec tunnel IPsecFailoverBackupTunnel)>
```

### IPsec failover using Preferred tunnel

#### Web

1. Configure the primary IPsec tunnel. See Configure an IPsec tunnel for instructions.
2. Create a backup IPsec tunnel. See Configure an IPsec tunnel for instructions.
3. During configuration of the backup IPsec tunnel, identify the primary IPsec tunnel in the **Preferred tunnel** parameter:




#### Command line

1. Configure the primary IPsec tunnel. See Configure an IPsec tunnel for instructions.
2. Create a backup IPsec tunnel. See Configure an IPsec tunnel for instructions.
3. During configuration of the backup IPsec tunnel, identify the primary IPsec tunnel:
   a. Use the **?** to view a list of available tunnels:

```
(config vpn ipsec tunnel backup_ipsec_tunnel)> ipsec_failover ?

Preferred tunnel: This tunnel will not start until the preferred
tunnel has failed. It will continue
to operate until the preferred tunnel returns to full operation
status.
Format:
 primary_ipsec_tunnel
```

```
 backup_ipsec_tunnel
Optional: yes
Current value:

(config vpn ipsec tunnel backup_ipsec_tunnel)> ipsec_failover
```

b. Set the primary IPsec tunnel:

```
(config vpn ipsec tunnel backup_ipsec_tunnel)> ipsec_failover primary_
ipsec_tunnel
(config vpn ipsec tunnel backup_ipsec_tunnel)>
```

## Configure SureLink active recovery for IPsec

You can configure the Connect EZ 16/32 device to regularly probe IPsec tunnels to determine if the connection has failed and take remedial action.

You can also configure the IPsec tunnel to fail over to a backup tunnel. See Configure IPsec failover for further information.

### Required configuration items

- A valid IPsec configuration. See Configure an IPsec tunnel for configuration instructions.
- Enable IPsec SureLink.
- The behavior of the Connect EZ 16/32 device upon IPsec failure: either
  - Restart the IPsec interface
  - Reboot the device.

### Additional configuration items

- The interval between connectivity tests.
- Whether the interface should be considered to have failed if one of the test targets fails, or all of the test targets fail.
- The number of probe failures before the IPsec connection is considered to have failed.
- The amount of time that the device should wait for a response to a probe failures before considering it to have failed.

To configure the Connect EZ 16/32 device to regularly probe the IPsec connection:

### Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

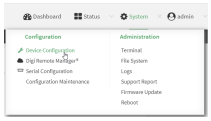
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

   b. Click the **Device ID**.

c. Click **Settings**.
d. Click to expand **Config**.

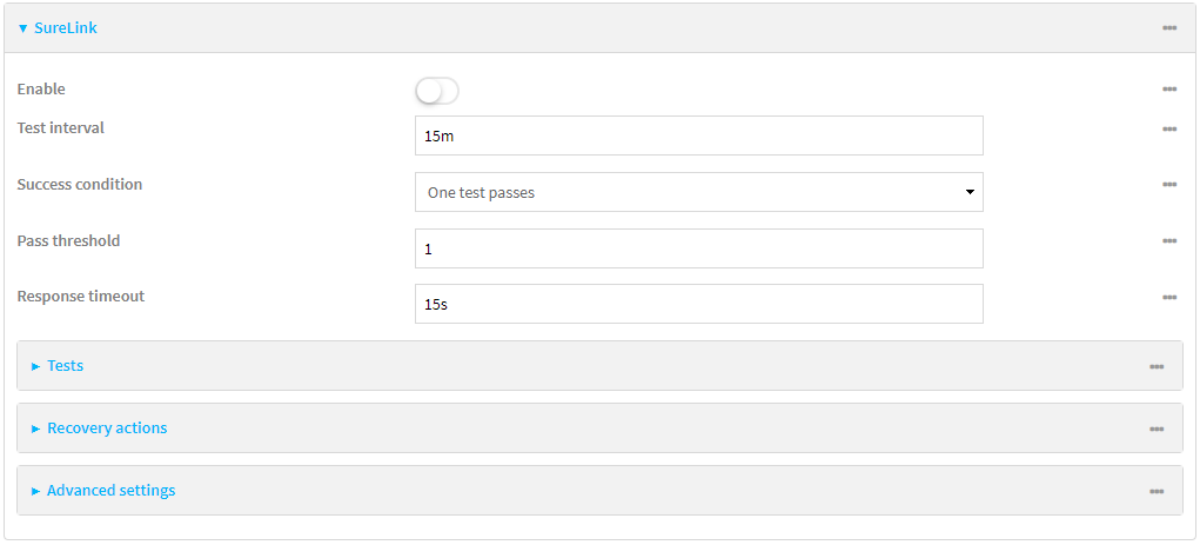
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **VPN** > **IPsec**.
4. Create a new IPsec tunnel or select an existing one:
   - To create a new IPsec tunnel, see Configure an IPsec tunnel.
   - To edit an existing IPsec tunnel, click to expand the appropriate tunnel.
5. After creating or selecting the IPsec tunnel, click **SureLink**.




6. **Enable** SureLink.
7. (Optional) Change the **Test interval** between connectivity tests.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

   For example, to set **Interval** to ten minutes, enter **10m** or **600s**.

   The default is 15 minutes.
8. (Optional) If more than one test target is configured, for **Success condition**, select either:
   - **One test passes**: Only one test needs to pass for Surelink to consider an interface to be up.
   - **All test pass**: All tests need to pass for SureLink to consider the interface to be up.
9. (Optional) For **Pass threshold**, type or select the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.

10. (Optional) For **Response timeout**, type the amount of time that the device should wait for a response to a test failure before considering it to have failed.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Response timeout** to ten minutes, enter **10m** or **600s**.

    The default is 15 seconds.

11. Click to expand **Tests**.

    By default, **Test DNS servers configured for this interface** is automatically configured and enabled. This test communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

    a. Click ✚.

    New tests are enabled by default. To disable, click to toggle off **Enable**.

    b. Type a **Label** for the test.

    c. Click to toggle on **IPv6** if the test should apply to both IPv6 rather than IPv4.

    d. Select the **Test type**.

    Available test types:

    - **Ping test**: Uses ICMP to determine connectivity.

      If **Ping test** is selected, complete the following:

      - **Ping target:** The type of target for the ping, one of:
        - **Hostname or IP address** of an external server.
          - **Ping host**: hostname or IP address of the server.
        - The **Interface gateway**. If **Interface gateway** is selected, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
        - The **Interface address**.
        - The **Interface DNS** server.
      - **Ping payload size:** The number of bytes to send as part of the ping payload.

    - **DNS test**: Performs a DNS query to the named DNS server.

      If **DNS test** is selected, complete the following:

      - **DNS server**: The IP address of the DNS server.

    - **HTTP test**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.

      If **HTTP test** is selected, complete the following:

      - **Web server**: The URL of the web server.

    - **Test DNS servers configured for this interface**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

- **Test the interface status**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

  If **Test the interface status** is selected, complete the following:

  - **Down time**: The amount of time that the interface is down before the test can be considered to have failed.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Down time** to ten minutes, enter **10m** or **600s**.
  - **Initial connection time**: The amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Initial connection time** to ten minutes, enter **10m** or **600s**.
- **Custom test**: Tests the interface with custom commands.

  If **Custom test** is selected, complete the following:

  - The **Commands to run to test**.
- **TCP connection test**: Tests that the interface can reach a destination port on the configured host.

  If **TCP connection test** is selected, complete the following:

  - **TCP connect host**: The hostname or IP address of the host to create a TCP connection to.
  - **TCP connect port**: The TCP port to create a TCP connection to.
- **Test another interface's status**: Tests the status of another interface.

  If **Test another interface's status** is selected, complete the following:

  - **Test interface**: The interface to test.
  - **IP version**: The type of IP connection, one of:
    - **Any**: Either the IPv4 or IPv6 connection must be up.
    - **Both**: Both the IPv4 or IPv6 connection must be up.
    - **IPv4**: The IPv4 connection must be up.
    - **IPv6**: The IPv6 connection must be up.
  - **Expected status**: The status required for the test to past.
    - **Up**: The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
    - **Down**: The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

e. Repeat for each additional test.

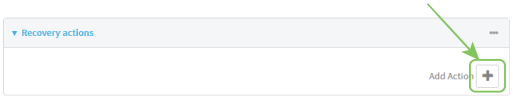
12. Add recovery actions:

    a. Click to expand **Recovery actions**.

    By default, there are two preconfigured recovery actions:

- **Update routing**: Uses the **Change default gateway** action, which increases the interface's metric by 100 to change the default gateway.
- **Restart interface**.

b. Click ✚.




New recovery actions are enabled by default. To disable, click to toggle off **Enable**.

c. Type a **Label** for the recovery action.

d. For **Recovery type**, select **Reboot device**.

e. For **Recovery type**, select the type of recovery action. If multiple recovery actions are configured, they are performed in the order that they are listed.

- **Change default gateway**: Increases the interface's metric to change the default gateway.

  If **Change default gateway** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Increase metric to change active default gateway**: Increase the interface's metric by this amount. This should be set to a number large enough to change the routing table to use another default gateway. The default is **100**.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Restart interface**.

  If **Restart interface** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Reset modem**: This recovery action is available for WWAN interfaces only.

  If **Reset modem** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Switch to alternate SIM**: Switches to an alternate SIM. This recovery action is available for WWAN interfaces only.

  If **Switch to alternate SIM** is selected, complete the following:

- **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
- **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Reboot device**.

  If **Reboot device** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- Execute custom **Recovery commands**.

  If **Recovery commands** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - The **Commands to run to recovery connectivity**.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Powercycle the modem**. This recovery action is available for WWAN interfaces only.

  If **Powercycle the modem** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

f. Repeat for each additional recovery action.

13. (Optional) Configure advanced SureLink parameters:

a. Click to expand **Advanced settings**.

b. For **Delayed Start**, type the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

For example, to set **Delayed start** to ten minutes, enter **10m** or **600s**.

The default is 300 seconds.

c. For **Backoff interval**, type the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

For example, to set **Backoff interval** to ten minutes, enter **10m** or **600s**.

The default is 300 seconds.

d. **Test interface gateway by pinging** is used by the **Interface gateway Ping test** as the endpoint for traceroute to use to determine the interface gateway. The default is 8.8.8.8, and should only be changed if this IP address is not accessible due to networking issues.

14. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new IPsec tunnel, or edit an existing one:
   - To create a new IPsec tunnel, see Configure an IPsec tunnel.
   - To edit an existing IPsec tunnel, change to the IPsec tunnel's node in the configuration schema. For example, for an IPsec tunnel named **ipsec_example**, change to the **ipsec_example** node in the configuration schema:

```
(config)> vpn ipsec tunnel ipsec_example
(config vpn ipsec tunnel ipsec_example)>
```

4. Enable SureLink:

```
(config vpn ipsec tunnel ipsec_example)> surelink enable true
(config vpn ipsec tunnel ipsec_example)>
```

5. By default, the **Test DNS servers configured for this interface** test is automatically configured and enabled. This tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

   To add additional tests:

   a. Add a test:

```
(config vpn ipsec tunnel ipsec_example)> add surelink tests end
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

   b. New tests are enabled by default. To disable:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> enable false
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

c. Create a label for the test:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> label string
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

d. if the test should apply to both IPv6 rather than IPv4, enable IPv6:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> ipv6 true
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

e. Set the test type:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> test value
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

where *value* is one of:

- **ping**: Uses ICMP to determine connectivity.

  If **ping** is selected, complete the following:

  - Set the **ping_method**:

    ```
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    ping_method value
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    ```

    where *value* is one of:

    - **hostname**: The hostname or IP address of an external server.
      - Set **ping_host** to the hostname or IP address of the server:

        ```
        (config vpn ipsec tunnel ipsec_example surelink tests 1)>
        ping_host hostname/IP_address
        (config vpn ipsec tunnel ipsec_example surelink tests 1)>
        ```

    - **interface_gateway**. If set, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
    - **interface_address**.
    - **interface_dns**: The interface's DNS server.

  - Set the number of bytes to send as part of the ping payload:

    ```
    (config vpn ipsec tunnel ipsec_example ipsec tunnel ipsec_
    example surelink tests 1)> ping_size int
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    ```

- **dns**: Performs a DNS query to the named DNS server.

  If **dns** is set, set the IPv4 or IPv6 address of the DNS server:

  ```
  (config vpn ipsec tunnel ipsec_example surelink tests 1)> dns_
  server IP_address
  (config vpn ipsec tunnel ipsec_example surelink tests 1)>
  ```

- **http**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.

  If **http** is set, set the URL of the web server.

  ```
  (config vpn ipsec tunnel ipsec_example surelink tests 1)> http
  url
  (config vpn ipsec tunnel ipsec_example surelink tests 1)>
  ```

- **dns_configured**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **interface_up**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

  If **interface_up** is set, complete the following:

  - Set the amount of time that the interface is down before the test can be considered to have failed.

    ```
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    interface_down_time value
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    ```

    where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

    For example, to set **interface_down_time** to ten minutes, enter either **10m** or **600s**:

    ```
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    interface_down_time 600s
    (config)>
    ```

  - Set the amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

    ```
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    interface_timeout value
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    ```

    where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

    For example, to set **interface_timeout** to ten minutes, enter either **10m** or **600s**:

    ```
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    interface_timeout 600s
    (config)>
    ```

- **custom_test**: Tests the interface with custom commands.

  If **custom_test** is set, set the commands to run to perform the test:

```
(config vpn ipsec tunnel ipsec_example  surelink tests 1)>
custom_test_commands "string"
(config vpn ipsec tunnel ipsec_example surelink tests 1)>
```

- **tcp_connection**: Tests that the interface can reach a destination port on the configured host.

  If **tcp_connection** is selected, complete the following:

  - Set the hostname or IP address of the host to create a TCP connection to:

    ```
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    tcp_host hostname/IP_address
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    ```

  - Set the TCP port to create a TCP connection to.

    ```
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    tcp_port port
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    ```

- **other**: Tests the status of another interface.

  If **other** is selected, complete the following:

  - Set the interface to test.
    i. Use the **?** to determine available interfaces:
    ii. Set the interface. For example:

    ```
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    other_interface /network/interface/eth1
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    ```

  - Set the type of IP connection:

    ```
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    other_ip_version value
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    ```

    where *value* is one of:

    - **any**: Either the IPv4 or IPv6 connection must be up.
    - **both**: Both the IPv4 or IPv6 connection must be up.
    - **ipv4** The IPv4 connection must be up.
    - **ipv6**: The IPv6 connection must be up.

  - The status required for the test to past.

    ```
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    other_status value
    (config vpn ipsec tunnel ipsec_example surelink tests 1)>
    ```

    where *value* is one of:

- **up**: The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
- **down**: The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

f. Repeat for each additional test.

6. Add recovery actions:

a. Type **...** to return to the root of the configuration:

```
(config vpn ipsec tunnel ipsec_example surelink tests 1)> ...
(config)>
```

b. Add a recovery action:

```
(config)> add vpn ipsec tunnel ipsec_example surelink actions end
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

c. New actions are enabled by default. To disable:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> enable
false
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

d. Create a label for the action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> label
string
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

e. Set the type of recovery action to **reboot_device**:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> action
reboot_device
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
test_failures int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
override_interval int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

f. Set the type of recovery action. If multiple recovery actions are configured, they are performed in the order that they are listed. The command varies depending on whether

the interface is a WAN or WWAN:

- WAN interfaces:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
action value
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

- WWAN interfaces:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
modem_action value
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

where *value* is one of:

- **update_routing_table**: Increases the interface's metric to change the default gateway.

  If **update_routing_table** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

    ```
    (config vpn ipsec tunnel ipsec_example surelink actions 0)>
    test_failures int
    (config vpn ipsec tunnel ipsec_example surelink actions 0)>
    ```

    The default is **3**.

  - Set the amount that the interface's metric should be increased. This should be set to a number large enough to change the routing table to use another default gateway.

    ```
    (config vpn ipsec tunnel ipsec_example surelink actions 0)>
    metric_adjustment_modem int
    (config vpn ipsec tunnel ipsec_example surelink actions 0)>
    ```

    The default is **100**.

  - Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

    ```
    (config vpn ipsec tunnel ipsec_example surelink actions 0)>
    override_interval int
    (config vpn ipsec tunnel ipsec_example surelink actions 0)>
    ```

- **restart_interface**.

  If **restart_interface** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

    ```
    (config vpn ipsec tunnel ipsec_example surelink actions 0)>
    test_failures int
    (config vpn ipsec tunnel ipsec_example surelink actions 0)>
    ```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
override_interval int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

- **reset_modem**: This recovery action is available for WWAN interfaces only.

  If **reset_modem** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
test_failures int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

    The default is **3**.

  - Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
override_interval int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

- **switch_sim**: Switches to an alternate SIM. This recovery action is available for WWAN interfaces only.

  If **switch_sim** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
test_failures int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

    The default is **3**.

  - Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
override_interval int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

- **modem_power_cycle**: This recovery action is available for WWAN interfaces only.

  If **modem_power_cycle** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
test_failures int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
override_interval int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

- **reboot_device**.

  If **reboot_device** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
test_failures int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

    The default is **3**.

  - Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
override_interval int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

- **custom_action**: Execute custom recovery commands.

  If **custom_action** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
test_failures int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

    The default is **3**.

  - Set the commands to run to attempt to recovery connectivity.

```
(config network interface my_wan surelink actions 0)> custom_
action_commands_modem "string"
(config network interface my_wan surelink actions 0)>
```

  - Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
override_interval int
(config vpn ipsec tunnel ipsec_example surelink actions 0)>
```

g. Repeat for each additional recovery action.

7. Optional SureLink configuration parameters:

a. Type **...** to return to the root of the configuration:

```
(config vpn ipsec tunnel ipsec_example surelink actions 0)> ...
(config)>
```

b. Set the test interval between connectivity tests:

```
(config)> vpn ipsec tunnel ipsec_example surelink interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn ipsec tunnel ipsec_example surelink interval 600s
(config)>
```

The default is **15m**.

c. If more than one test target is configured, set the success condition:

```
(config)> vpn ipsec tunnel ipsec_example surelink success_condition
value
(config)>
```

where *value* is either:

- **one**: Only one test needs to pass for Surelink to consider an interface to be up.
- **all**: All tests need to pass for SureLink to consider the interface to be up.

d. Set the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.

```
(config)> vpn ipsec tunnel ipsec_example surelink pass_threshold int
(config)>
```

The default is **1**.

e. Set the amount of time that the device should wait for a response to a test attempt before considering it to have failed:

```
(config)> vpn ipsec tunnel ipsec_example surelink timeout value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn ipsec tunnel ipsec_example surelink timeout 600s
(config)>
```

The default is **15s**.

f. Set the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.

```
(config)> vpn ipsec tunnel ipsec_example surelink advanced delayed_
start value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **delayed_start** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn ipsec tunnel ipsec_example surelink advanced delayed_
start 600s
(config)>
```

The default is **300s**.

g. Set the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.

```
(config)> vpn ipsec tunnel ipsec_example surelink advanced backoff_
interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **backoff_interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn ipsec tunnel ipsec_example surelink advanced backoff_
interval 600s
(config)>
```

The default is 300 seconds.

h. The **interface_gateway** parameter is used by the Interface gateway Ping test as the endpoint for traceroute to use to determine the interface gateway. The default is **8.8.8.8**, and should only be changed if this IP address is not accessible due to networking issues. To set to an alternate host:

```
(config)> vpn ipsec tunnel ipsec_example surelink advanced interface_
gateway hostname/IP_address
(config)>
```

8. Save the configuration and apply the change.

```
(config vpn ipsec tunnel ipsec_example connection_monitor target 0)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show IPsec status and statistics

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, select **Status** > **IPsec**.

   The **IPsec** page appears.
2. To view configuration details about an IPsec tunnel, click the (configuration) icon in the upper right of the tunnel's status pane.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured IPsec tunnels, type the following at the prompt:

```
> show ipsec all

 Name    Enable  Status   Hostname
 ------  ------  -------  ---------------
 ipsec1  true    up       192.168.2.1
 vpn1    false   pending  192.168.3.1

>
```

3. To display details about a specific tunnel:

```
> show ipsec tunnel ipsec1

 Tunnel                  : ipsec1
 Enable                  : true
 Status                  : pending
 Hostname                : 192.168.2.1
 Zone                    : ipsec
 Mode                    : tunnel
 Type                    : esp

>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Debug an IPsec configuration

If you experience issues with an IPsec tunnel not being successfully negotiated with the remote end of the tunnel, you can enable IPsec debug messages to be written to the system log. See View system and event logs for more information about viewing the system log.

### Web

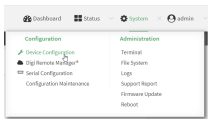
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **VPN** > **IPsec**.
4. Click to expand **Advanced**.
5. For **Debug level**, select one of the following:
   - **Disable debug messages**.
   - **Basic auditing debug**: Logs basic auditing information, (for example, SA up/SA down).
   - **Generic control flow** : Select this for basic debugging information.
   - **Detailed control flow** : More detailed debugging control flow.
   - **Raw data**: Includes raw data dumps in hexadecimal format.
   - **Sensitive material**: Also includes sensitive material in dumps (for example, encryption keys).
6. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set the IPsec debug value:

```
config> vpn ipsec advanced debug value
config>
```

where *value* is one of:

- **none**. (Default) No debug messages are written.
- **basic_auditing**: Logs basic auditing information, (for example, SA up/SA down).
- **generic_control**: Select this for basic debugging information.
- **detailed_control**: More detailed debugging control flow.
- **raw_data**: Includes raw data dumps in hexadecimal format.
- **sensitive_data**: Also includes sensitive material in dumps (for example, encryption keys).

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure a Simple Certificate Enrollment Protocol client

**WARNING!** The Simple Certificate Enrollment Protocol (SCEP) uses unencrypted HTTP communication. Please ensure you are utilizing a VPN to secure your communications.

Simple Certificate Enrollment Protocol (SCEP) is a mechanism that allows for large-scale X.509 certificate deployment. You can configure Connect EZ 16/32 device to function as a SCEP client that will connect to a SCEP server that is used to sign Certificate Signing Requests (CSRs), provide Certificate Revocation Lists (CRLs), and distribute valid certificates from a Certificate Authority (CA).

### *Required configuration*

- Enable the SCEP client.
- The fully-qualified domain name of the SCEP server to be used for certificate requests.
- The challenge password provided by the SCEP server that the SCEP client will use when making SCEP requests.
- The distinguished name to be used for the CSR.

### Additional configuration

- The number of days that the certificate enrollment can be renewed, prior to the request expiring.

## Web

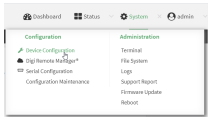
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

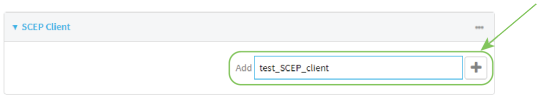
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

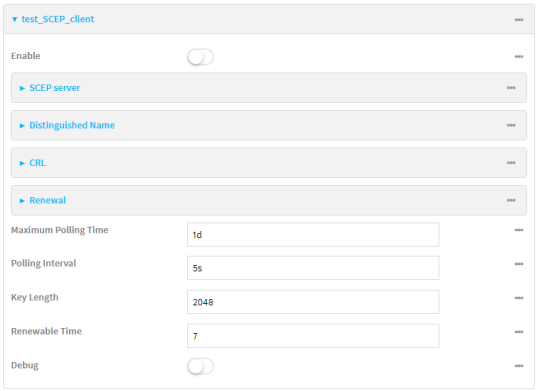
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **SCEP Client**.
4. For **Add clients**, enter a name for the SCEP client and click ✚.

   The new SCEP client configuration is displayed.

   
   
5. Click **Enable** to enable the SCEP client.

6. For **Maximum Polling Time**, type the maximum time that the device will poll the SCEP server, when operating in manual mode.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

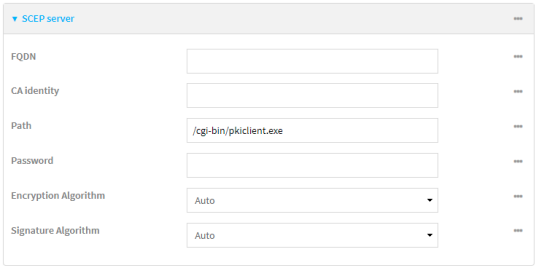
   For example, to set **Maximum Polling Time** to ten minutes, enter **10m** or **600s**.

   The default is **1d**.
7. For **Polling Interval**, type the amount of time that the device should wait between polling attempts, when operating in manual mode.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

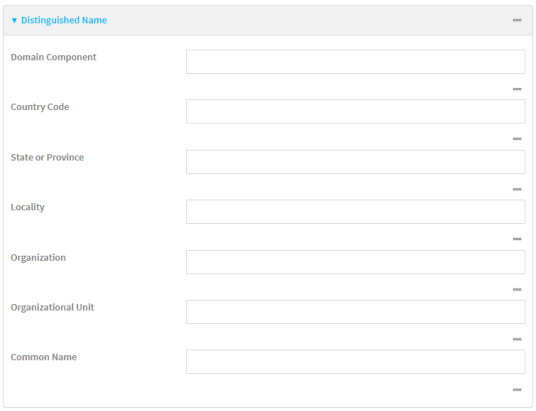
   For example, to set **Polling Interval** to ten minutes, enter **10m** or **600s**.

   The default is **5s**.
8. For **Key Length**, type the bit size of the private key. The default is **2048**.
9. For **Renewable Time**, type the number of days that the certificate enrollment can be renewed, prior to the request expiring. This value is configured on the SCEP server, and is used by the Connect EZ 16/32 device to determine when to start attempting to auto-renew an existing certificate. The default is **7**.
10. (Optional) Click **Debug** to enable verbose logging in /var/log/scep_client.
11. Click to expand **SCEP server**.




12. For **FQDN**, type the fully qualified domain name or IP address of the SCEP server.
13. (Optional) For **CA identity**, type a string that will be understood by the certificate authority. For example, it could be a domain name or a user name. If the certificate authority has multiple CA certificates, this field can be used to distinguish which is required.
14. For **Path**, Type the HTTP URL path required for accessing the certificate authority. You should leave this option at the default of **/cgi-bin/pkiclient.exe** unless directed by the CA to use another path.
15. For **Password**, type the challenge password as configured on the SCEP server.
16. For **Encryption Algorithm**, select the PKCS#7 encryption algorithm. The default is **Auto**, which automatically selects the best algorithm.
17. For **Signature Algorithm**, select the PKCS#7 signature algorithm. The default is **Auto**, which automatically selects the best algorithm.

18. Click to expand **Distinguished Name**.




19. Type the value for each appropriate Distinguished Name attribute.
20. (Optional) Configure the certificate revocation list (CRL):
    a. Click to expand **CRL**.
    b. Click **Enable** to enable the CRL.
    c. For **Type**, select the type of CRL:
        - **URL**: The URL to the file name used to access the certificate revocation list from the CA.
        - **CRLDP**: The CRL distribution point.
        - **getCRL**: A CRL query using the issuer name and serial number from the certificate whose revocation status is being queried.

       The default is **URL**.
    d. If **Type** is set to **URL**, for **URL**, type the URL to be used.
21. Configure certificate renewal:
    a. Click to expand **Renewal**.
    b. Click **Use New Private Key** to enable the creation of a new private key for renewal requests.
    c. **Use Client Certificate** is enabled by default. Click to disable the use of a client certificate for renewal requrests.
22. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a new SCEP client:

```
(config)> add network scep_client scep_client_name
(config network scep_client scep_client_name
)>
```

4. Enable the SCEP client:

```
(config network scep_client scep_client_name)> enable true
(config network scep_client scep_client_name)>
```

5. Set the url parameter to the fully qualified domain name or IP address of the SCEP server:

```
(config network scep_client scep_client_name)> server url
https://scep.example.com
(config network scep_client scep_client_name)>
```

6. (Optional) Set a CA identity string that will be understood by the certificate authority. For example, it could be a domain name or a user name. If the certificate authority has multiple CA certificates, this field can be used to distinguish which is required.

```
(config network scep_client scep_client_name)> server ca_ident string
(config network scep_client scep_client_name)>
```

7. Set the HTTP URL path required for accessing the certificate authority. You should leave this option at the default of **/cgi-bin/pkiclient.exe** unless directed by the CA to use another path.

```
(config network scep_client scep_client_name)> server path path
(config network scep_client scep_client_name)>
```

8. Set the challenge password as configured on the SCEP server:

```
(config network scep_client scep_client_name)> server password challenge_
password
(config network scep_client scep_client_name)>
```

9. Set Distinguished Name attributes:
   a. Set the Domain Component:

```
(config network scep_client scep_client_name)> distinguished_name dc
value
(config network scep_client scep_client_name)>
```

   b. Set the two letter Country Code:

```
(config network scep_client scep_client_name)> distinguished_name c
value
(config network scep_client scep_client_name)>
```

   c. Set the State or Province:

```
(config network scep_client scep_client_name)> distinguished_name st
value
(config network scep_clientscep_client_name )>
```

d. Set the Locality:

```
(config network scep_client scep_client_name)> distinguished_name l
value
(config network scep_client scep_client_name)>
```

e. Set the Organization:

```
(config network scep_client scep_client_name)> distinguished_name o
value
(config network scep_client scep_client_name)>
```

f. Set the Organizational Unit:

```
(config network scep_client scep_client_name)> distinguished_name ou
value
(config network scep_client scep_client_name)>
```

g. Set the Common Name:

```
(config network scep_client scep_client_name)> distinguished_name cn
value
(config network scep_client scep_client_name)>
```

10. (Optional) Configure the certificate revocation list (CRL):

a. Enable the CRL:

```
(config network scep_client scep_client_name)> crl enable true
(config network scep_client scep_client_name)>
```

b. Set the type of CRL:

```
(config network scep_client scep_client_name)> crl type value
(config network scep_client scep_client_name)>
```

where *value* is one of:

- **url**: The URL to the file name used to access the certificate revocation list from the CA.
- **crldp**: The CRL distribution point.
- **getCRL**: A CRL query using the issuer name and serial number from the certificate whose revocation status is being queried.

The default is **url**.

c. If **type** is set to **url**, set the URL that should be used:

```
(config network scep_client scep_client_name)> crl url value
(config network scep_client scep_client_name)>
```

11. Configure certificate renewal:

a. To enable the creation of a new private key for renewal requests:

```
(config network scep_client scep_client_name)> renewal new_key true
(config network scep_client scep_client_name)>
```

b. The use of a client certificate for renewal requests is enabled by default. To disable:

```
(config network scep_client scep_client_name)> renewal use_client_cert
false
(config network scep_client scep_client_name)>
```

12. Set the maximum time that the device will poll the SCEP server, when operating in manual mode:

```
(config network scep_client scep_client_name)> max_poll_time value
(config network scep_client scep_client_name)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **max_poll_time** to ten minutes, enter either **10m** or **600s**:

```
(config network scep_client scep_client_name)> max_poll_time 600s
(config network scep_client scep_client_name)>
```

The default is **1d**.

13. Set the amount of time that the device should wait between polling attempts, when operating in manual mode:

```
(config network scep_client scep_client_name)> polling_interval value
(config network scep_client scep_client_name)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **polling_interval** to ten minutes, enter either **10m** or **600s**:

```
(config network scep_client scep_client_name)> polling_interval 600s
(config network scep_client scep_client_name)>
```

The default is **5s**.

14. Set the bit size of the private key:

```
(config network scep_client scep_client_name)> key_length int
(config network scep_client scep_client_name)>
```

The default is **2048**.

15. Set the number of days that the certificate enrollment can be renewed, prior to the request expiring. This value is configured on the SCEP server, and is used by the Connect EZ 16/32 device to determine when to start attempting to auto-renew an existing certificate. The default is **7**.

```
(config network scep_client scep_client_name)> renewable_time integer
(config network scep_client scep_client_name)>
```

16. (Optional) Enable verbose logging in /var/log/scep_client:

```
(config network scep_client scep_client_name)> debug true
(config network scep_client scep_client_name)>
```

17. Save the configuration and apply the change.

```
(config network scep_client scep_client_name)> save
Configuration saved.
>
```

18. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Example: SCEP client configuration with Fortinet SCEP server

In this example configuration, we will configure the Connect EZ 16/32 device as a SCEP client that will connect to a Fortinet SCEP server.

### *Fortinet configuration*

On the Fortinet server:

1. Enable ports for SCEP services:
   a. From the menu, select **Network** > **Interfaces**.
   b. Select the appopriate port and click **Edit**.
   c. For **Access Rights** > **Services**, enable the following services:
      - **HTTPS** > **SCEP**
      - **HTTPS** > **CRL Downloads**
      - **HTTP** > **SCEP**
      - **HTTP** > **CRL Downloads**
   d. The remaining fields can be left at their defaults or changed as appropriate.
   e. Click **OK**.
2. Create a Certificate Authority (CA):
   a. From the menu, click **Certificate Authorities** > **Local CAs**.
   b. Click **Create New**.
   c. Type a **Certificate ID** for the CA, for example, **fortinet_example_ca**.
   d. Complete the **Subject Information** fields.
   e. The remaining fields can be left at their defaults or changed as appropriate.
   f. Click **OK**.
3. Edit SCEP settings:
   a. From the menu, click **SCEP** > **General**.
   b. Click **Enable SCEP** if it is not enabled.

c. For **Default enrollment password**, enter a password. The password entered here must correspond to the challenge password configured for the SCEP client on the Connect EZ 16/32 device.

d. The remaining fields can be left at their defaults or changed as appropriate.

e. Click **OK**.

4. Create an **Enrollment Request**:

a. From the menu, click **SCEP** > **Enrollment Requests**.

b. Click **Create New**.

c. For **Automatic request type**, select **Wildcard**.

d. For **Certificate authority**, select the CA created in step 1, above.

e. Complete the **Subject Information** fields. The Distinguished Name (DN) attributes entered here must correspond to the Distinguished Name attributes configured for the SCEP client on the Connect EZ 16/32 device.

f. For **Renewal** > **Allow renewal *x* days before the certified is expired**, type the number of days that the certificate enrollment can be renewed, prior to the request expiring. The **Renewable Time** setting on the Connect EZ 16/32 device must match the setting of this parameter.

g. The remaining fields can be left at their defaults or changed as appropriate.

h. Click **OK**.

### *Connect EZ 16/32 configuration*

On the Connect EZ 16/32 device:

#### Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

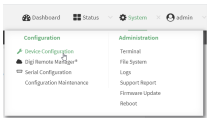
b. Click the **Device ID**.

c. Click **Settings**.

d. Click to expand **Config**.

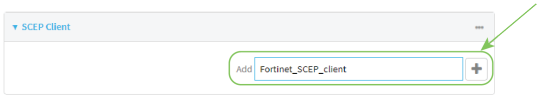
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

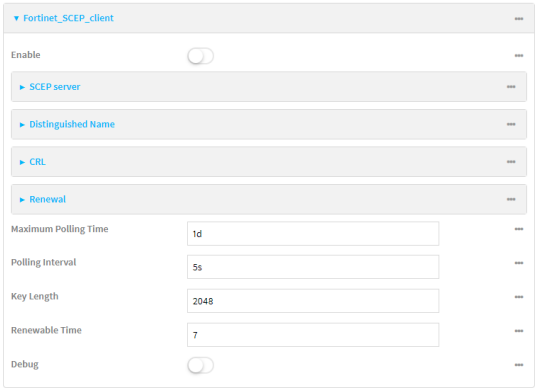


The **Configuration** window is displayed.

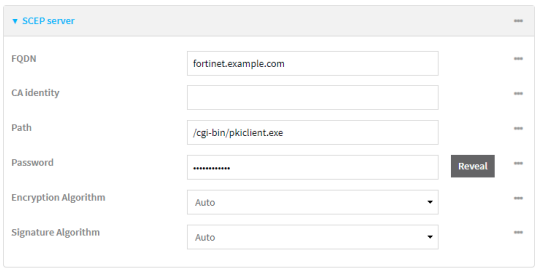
3. Click **Network** > **SCEP Client**.
4. For **Add clients**, enter a name for the SCEP client and click **+**.




The new SCEP client configuration is displayed.

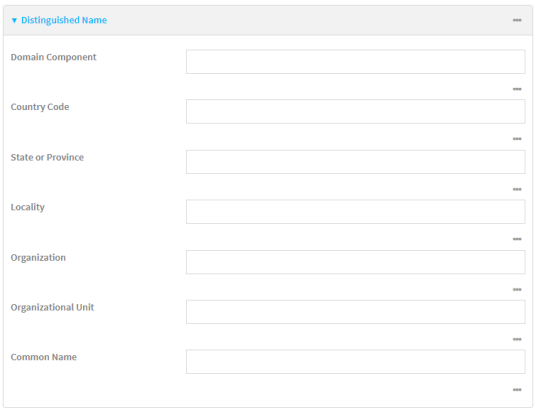



5. Click **Enable** to enable the SCEP client.
6. For **Renewable Time**, type the number of days that the certificate enrollment can be renewed, prior to the request expiring. This value must match the setting of the **Allow renewal *x* days before the certified is expired** option on the Fortinet server.
7. (Optional) Click **Debug** to enable verbose logging in /var/log/scep_client.
8. Click to expand **SCEP server**.




9. For **FQDN**, type the fully qualified domain name or IP address of the Fortinet server.
10. For **Password**, type the challenge password. This corresponds to the **Default enrollment password** on the Fortinet server.

11. Click to expand **Distinguished Name**.




12. Type the value for each appropriate Distinguished Name attribute. The values entered here must correspond to the DN attributes in the **Enrollment Request** on the Fortinet server.
13. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a new SCEP client, for example, **Fortinet_SCEP_client**:

```
(config)> add network scep_client Fortinet_SCEP_client
(config network scep_client Fortinet_SCEP_client
)>
```

4. Enable the SCEP client:

```
(config network scep_client Fortinet_SCEP_client)> enable true
(config network scep_client Fortinet_SCEP_client)>
```

5. Set the url parameter to the fully qualified domain name or IP address of the SCEP server:

```
(config network scep_client Fortinet_SCEP_client)> server url
https://fortinet.example.com
(config network scep_client Fortinet_SCEP_client)>
```

6. Set the challenge password as configured on the SCEP server. This corresponds to the **Default enrollment password** on the Fortinet server.

```
(config network scep_client Fortinet_SCEP_client)> server password
challenge_password
(config network scep_client Fortinet_SCEP_client)>
```

7. Set Distinguished Name attributes. The values entered here must correspond to the DN attributes in the **Enrollment Request** on the Fortinet server.
   a. Set the Domain Component:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name
dc value
(config network scep_client Fortinet_SCEP_client)>
```

   b. Set the two letter Country Code:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name
c value
(config network scep_client Fortinet_SCEP_client)>
```

   c. Set the State or Province:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name
st value
(config network scep_client  Fortinet_SCEP_client)>
```

d. Set the Locality:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name
l value
(config network scep_client Fortinet_SCEP_client)>
```

e. Set the Organization:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name
o value
(config network scep_client Fortinet_SCEP_client)>
```

f. Set the Organizational Unit:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name
ou value
(config network scep_client Fortinet_SCEP_client)>
```

g. Set the Common Name:

```
(config network scep_client Fortinet_SCEP_client)> distinguished_name
cn value
(config network scep_client Fortinet_SCEP_client)>
```

8. Set the number of days that the certificate enrollment can be renewed, prior to the request expiring. This value must match the setting of the **Allow renewal *x* days before the certified is expired** option on the Fortinet server.

```
(config network scep_client Fortinet_SCEP_client)> renewable_time integer
(config network scep_client Fortinet_SCEP_client)>
```

9. (Optional) Enable verbose logging in /var/log/scep_client:

```
(config network scep_client Fortinet_SCEP_client)> debug true
(config network scep_client Fortinet_SCEP_client)>
```

10. Save the configuration and apply the change.

```
(config network scep_client Fortinet_SCEP_client)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show SCEP client status and information

You can show general SCEP client information for all SCEP clients, and specific information for an individual SCEP client.

This procedure is only available from the Admin CLI.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured SCEP clients, type the following at the prompt:

```
> show scep-client

 SCEP   Enabled  Expiry
 -----  -------  -------
 test   true     Jun  4 19:05:25 2022 GMT
 test1  false

>
```

3. To display details about a specific SCEP client:

```
> show scep-client name name
```

   For example:

```
> show scep-client name test

 test SCEP Status
 ----------------
 Enabled     : true

 Client Certificate
 ------------------
 Subject     : C=US,ST=MA,L=BOS,O=Digi,OU=IT1,CN=dummy
 Issuer      : CN=TA-SCEP-1-CA
 Serial      : 1100000017A30C8EDD3805EB52000000000017
 Expiry      : Jun  4 19:05:25 2022 GMT

 Certificate Authority Certificate {1}
 --------------------------------------
 Subject     : C=US,CN=TA-SCEP-1-MSCEP-RA
 Issuer      : CN=TA-SCEP-1-CA
 Serial      : 1100000002A1E755981C0C3F34000000000002
 Expiry      : Apr 25 13:42:47 2023 GMT

 Certificate Authority Certificate {2}
 --------------------------------------
 Subject     : C=US,CN=TA-SCEP-1-MSCEP-RA
 Issuer      : CN=TA-SCEP-1-CA
 Serial      : 1100000003268AFB5E98BFCA73000000000003
 Expiry      : Apr 25 13:42:48 2023 GMT
```

```
Certificate Authority Certificate {3}
--------------------------------------
Subject     : CN=TA-SCEP-1-CA
Issuer      : CN=TA-SCEP-1-CA
Serial      : 681670E9EFB7FCB74E79C33DD9D54847
Expiry      : Apr 25 13:36:42 2027 GMT

Certificate Revocation List
---------------------------
Issuer      : CN=TA-SCEP-1-CA
Last Update : May 23 13:27:21 2022 GMT


>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# OpenVPN

OpenVPN is an open-source Virtual Private Network (VPN) technology that creates secure point-to-point or site-to-site connections in routed or bridged configurations. OpenVPN uses a custom security protocol that is Secure Socket Layer (SSL) / Transport Layer Security (TLS) for key exchange. It uses standard encryption and authentication algorithms for data privacy and authentication over TCP or UDP.

The OpenVPN server can push the network configuration, such as the topology and IP routes, to OpenVPN clients. This makes OpenVPN simpler to configure as it reduces the chances of a configuration mismatch between the client and server. OpenVPN also supports cipher negotiation between the client and server. This means you can configure the OpenVPN server and clients with a range of different cipher options and the server will negotiate with the client on the cipher to use for the connection.

For more information on OpenVPN, see www.openvpn.net.

### *OpenVPN modes:*

There are two modes for running OpenVPN:

- Routing mode, also known as TUN.
- Bridging mode, also known as TAP.

#### Routing (TUN) mode

In routing mode, each OpenVPN client is assigned a different IP subnet from the OpenVPN server and other OpenVPN clients. OpenVPN clients use Network Address Translation (NAT) to route traffic from devices connected on its LAN interfaces to the OpenVPN server.

The manner in which the IP subnets are defined depends on the OpenVPN topology in use. The Connect EZ 16/32 device supports two types of OpenVPN topology:

| OpenVPN Topology | Subnet definition method |
|---|---|
| net30 | Each OpenVPN client is assigned a **/30** subnet within the IP subnet specified in the OpenVPN server configuration. With net30 topology, pushed routes are used, with the exception of the default route. Automatic route pushing (exec) is not allowed, because this would not inform the firewall and would be blocked. |
| subnet | Each OpenVPN client connected to the OpenVPN server is assigned an IP address within the IP subnet specified in the OpenVPN server configuration. For the Connect EZ 16/32 device, pushed routes are not allowed; you will need to manually configure routes on the device. |

For more information on OpenVPN topologies, see OpenVPN topology.

#### Bridging (TAP) mode

In bridging mode, a LAN interface on the OpenVPN server is assigned to OpenVPN. The LAN interfaces of the OpenVPN clients are on the same IP subnet as the OpenVPN server's LAN interface. This means that devices connected to the OpenVPN client's LAN interface are on the same IP subnet as devices. The Connect EZ 16/32 device supports two mechanisms for configuring an OpenVPN server in TAP mode:

- OpenVPN managed—The Connect EZ 16/32 device creates the interface and then uses its standard configuration to set up the connection (for example, its standard DHCP server configuration).
- Device only—IP addressing is controlled by the system, not by OpenVPN.

### *Additional OpenVPN information*

For more information on OpenVPN, see these resources:

Bridging vs. routing

OpenVPN/Routing

## Configure an OpenVPN server

**Required configuration items**

- Enable the OpenVPN server.

  The OpenVPN server is enabled by default.
- The mode used by the OpenVPN server, one of:
  - **TUN (OpenVPN managed)**—Also known as routing mode. Each OpenVPN client is assigned a different IP subnet from the OpenVPN server and other OpenVPN clients. OpenVPN clients use Network Address Translation (NAT) to route traffic from devices connected on its LAN interfaces to the OpenVPN server.
  - **TAP - OpenVPN managed**—Also know as bridging mode. A more advanced implementation of OpenVPN. The Connect EZ 16/32 device creates an OpenVPN interface and uses standard interface configuration (for example, a standard DHCP server configuration).
  - **TAP - Device only**—An alternate form of OpenVPN bridging mode, in which the device, rather than OpenVPN, controls the interface configuration. If this method is is, the OpenVPN server must be included as a device in either an interface or a bridge.
- The firewall zone to be used by the OpenVPN server.
- The IP network and subnet mask of the OpenVPN server.
- The server's Certificate authority (CA) certificate, and public, private and Diffie-Hellman (DH) keys.
- An OpenVPN authentication group and an OpenVPN user.
- Determine the method of certificate management:
  - Certificates managed by the server.
  - Certificates created externally and added to the server.
- If certificates are created and added to the server, determine the level of authentication:
  - Certificate authentication only.
  - Username and password authentication only.
  - Certificate and username and password authentication.

  If username and password authentication is used, you must create an OpenVPN authentication group and user. See Configure an OpenVPN Authentication Group and User for instructions.

- Certificates and keys:
  - The **CA certificate** (usually in a ca.crt file).
  - The **Public key** (for example, server.crt)
  - The **Private key** (for example, server.key).
  - The **Diffie Hellman key** (usually in dh2048.pem).
- Active recovery configuration. See Configure SureLink active recovery for OpenVPN for information about OpenVPN active recovery.

**Additional configuration items**

- The route metric for the OpenVPN server.
- The range of IP addresses that the OpenVPN server will provide to clients.
- The TCP/UDP port to use. By default, the Connect EZ 16/32 device uses port **1194**.
- Access control list configuration to restrict access to the OpenVPN server through the firewall.
- Additional OpenVPN parameters.

## Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

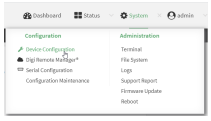
   b. Click the **Device ID**.

   c. Click **Settings**.

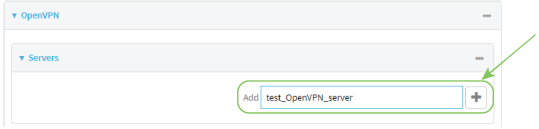
   d. Click to expand **Config**.

   Local Web UI:

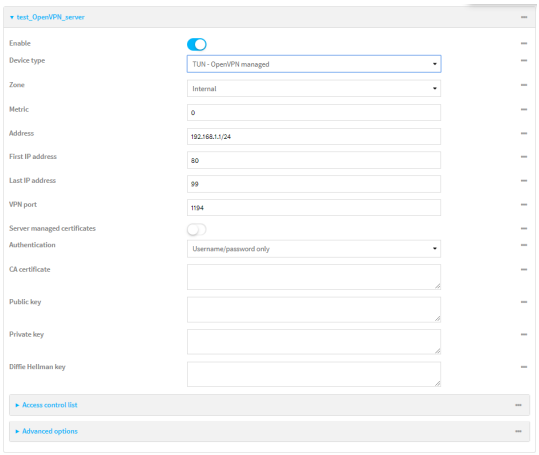
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **VPN** > **OpenVPN** > **Servers**.
4. For **Add**, type a name for the OpenVPN server and click **+**.



The new OpenVPN server configuration is displayed.




The OpenVPN server is enabled by default. To disable, toggle off **Enable**.

5. For **Device type**, select the mode used by the OpenVPN server, either:
   - **TUN (OpenVPN managed)**
   - **TAP - OpenVPN managed**
   - **TAP - Device only**

   See OpenVPN for information about OpenVPN server modes.
6. If **TUN (OpenVPN managed)** or **TAP - OpenVPN managed** is selected for **Device type**:
   a. For **Zone**, select the firewall zone for the OpenVPN server. For TUN device types, this should be set to **Internal** to treat clients as LAN devices.
   b. (Optional) Select the **Metric** for the OpenVPN server. If multiple active routes match a destination, the route with the lowest metric will be used. The default setting is **0**.
   c. For **Address**, type the IP address and subnet mask of the OpenVPN server.
   d. (Optional) For **First IP address** and **Last IP address**, set the range of IP addresses that the OpenVPN server will use when providing IP addresses to clients. The default is from **80** to **99**.
7. (Optional) Set the **VPN port** that the OpenVPN server will use. The default is **1194**.
8. For **Server managed certificates**, determine the method of certificate management. If enabled, the server will manage certificates. If not enabled, certificates must be created externally and added to the server.
9. If **Server managed certificates** is not enabled:
   a. Select the **Authentication** type:
      - **Certificate only**: Uses only certificates for client authentication. Each client requires a public and private key.
      - **Username/password only**: Uses a username and password for client authentication. You must create an OpenVPN authentication group and user. See Configure an OpenVPN Authentication Group and User for instructions.
      - **Certificate and username/password**: Uses both certificates and a username and password for client authentication. Each client requires a public and private key,

and you must create an OpenVPN authentication group and user. See Configure an OpenVPN Authentication Group and User for instructions.

b. Paste the contents of the **CA certificate** (usually in a ca.crt file), the **Public key** (for example, server.crt), the **Private key** (for example, server.key), and the **Diffie Hellman key** (usually in dh2048.pem) into their respective fields. The contents will be hidden when the configuration is saved.

10. (Optional) Click to expand **Access control list** to restrict access to the OpenVPN server:
    - To limit access to specified IPv4 addresses and networks:
      a. Click **IPv4 Addresses**.
      b. For **Add Address**, click ✚.
      c. For **Address**, enter the IPv4 address or network that can access the device's service-type. Allowed values are:
         - A single IP address or host name.
         - A network designation in CIDR notation, for example, 192.168.1.0/24.
         - **any**: No limit to IPv4 addresses that can access the service-type.
      d. Click ✚ again to list additional IP addresses or networks.
    - To limit access to specified IPv6 addresses and networks:
      a. Click **IPv6 Addresses**.
      b. For **Add Address**, click ✚.
      c. For **Address**, enter the IPv6 address or network that can access the device's service-type. Allowed values are:
         - A single IP address or host name.
         - A network designation in CIDR notation, for example, 2001:db8::/48.
         - **any**: No limit to IPv6 addresses that can access the service-type.
      d. Click ✚ again to list additional IP addresses or networks.
    - To limit access to hosts connected through a specified interface on the device:
      a. Click **Interfaces**.
      b. For **Add Interface**, click ✚.
      c. For **Interface**, select the appropriate interface from the dropdown.
      d. Click ✚ again to allow access through additional interfaces.
    - To limit access based on firewall zones:
      a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
      b. For **Add Zone**, click ✚.
      c. For **Zone**, select the appropriate firewall zone from the dropdown.
         See Firewall configuration for information about firewall zones.
      d. Click ✚ again to allow access through additional firewall zones.

11. (Optional) Click to expand **Advanced Options** to manually set additional OpenVPN parameters.
    a. Click **Enable** to enable the use of additional OpenVPN parameters.
    b. Click **Override** if the additional OpenVPN parameters should override default options.

c. For **OpenVPN parameters**, type the additional OpenVPN parameters.

12. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> add vpn openvpn server name
(config vpn openvpn server name)>
```

   where *name* is the name of the OpenVPN server.

   The OpenVPN server is enabled by default. To disable the server, type:

```
(config vpn openvpn server name)> enable false
(config vpn openvpn server name)>
```

4. Set the mode used by the OpenVPN server:

```
(config vpn openvpn server name)> device_type value
(config vpn openvpn server name)>
```

   where *value* is one of:

   - **TUN (OpenVPN managed)**—Also known as routing mode. Each OpenVPN client is assigned a different IP subnet from the OpenVPN server and other OpenVPN clients. OpenVPN clients use Network Address Translation (NAT) to route traffic from devices connected on its LAN interfaces to the OpenVPN server.
   - **TAP - OpenVPN managed**—Also know as bridging mode. A more advanced implementation of OpenVPN. The Connect EZ 16/32 device creates an OpenVPN interface and uses standard interface configuration (for example, a standard DHCP server configuration).
   - **TAP - Device only**—An alternate form of OpenVPN bridging mode, in which the device, rather than OpenVPN, controls the interface configuration. If this method is is, the OpenVPN server must be included as a device in either an interface or a bridge.

   See OpenVPN for information about OpenVPN modes. The default is **tun**.

5. If **tap** or **tun** are set for **device_type**:

   a. Set the IP address and subnet mask of the OpenVPN server.

```
(config vpn openvpn server name)> address ip_address/netmask
(config vpn openvpn server name)>
```

b. Set the firewall zone for the OpenVPN server. For TUN device types, this should be set to **internal** to treat clients as LAN devices.

```
(config vpn openvpn server name)> zone value
(config vpn openvpn server name)>
```

To view a list of available zones:

```
(config vpn openvpn server name)> firewall zone ?

Zone: The zone for the local TUN interface. To treat clients as LAN
devices this would usually be
set to internal.
Format:
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
Current value:

(config vpn openvpn server name)>
```

c. (Optional) Set the route metric for the OpenVPN server. If multiple active routes match a destination, the route with the lowest metric will be used.

```
(config vpn openvpn server name)> metric value
(config vpn openvpn server name)>
```

where *value* is an interger between **0** and **65535**. The default is **0**.

d. (Optional) Set the range of IP addresses that the OpenVPN server will use when providing IP addresses to clients:

i. Set the first address in the range limit:

```
(config vpn openvpn server name)> server_first_ip value
(config vpn openvpn server name)>
```

where *value* is a number between **1** and **255**. The number entered here will represent the first client IP address. For example, if **address** is set to **192.168.1.1/24** and **server_first_ip** is set to **80**, the first client IP address will be 192.168.1.80.

The default is from **80**.

ii. Set the last address in the range limit:

```
(config vpn openvpn server name)> server_last_ip value
(config vpn openvpn server name)>
```

where *value* is a number between **1** and **255**. The number entered here will represent the last client IP address. For example, if **address** is set to **192.168.1.1/24** and **server_last_ip** is set to **99**, the last client IP address will be 192.168.1.80.

The default is from **80**.

6. (Optional) Set the port that the OpenVPN server will use:

```
(config vpn openvpn server name)> port port
(config vpn openvpn server name)>
```

The default is **1194**.

7. Determine the method of certificate management:
   a. To allow the server to manage certificates:

```
(config vpn openvpn server name)> autogenerate true
(config vpn openvpn server name)>
```

   b. To create certificates externally and add them to the server

```
(config vpn openvpn server name)> autogenerate false
(config vpn openvpn server name)>
```

   The default setting is **false**.

   c. If **autogenerate** is set to false:
      i. Set the authentication type:

```
(config vpn openvpn server name)> authentication value
(config vpn openvpn server name)>
```

      where *value* is one of:

      - **cert**: Uses only certificates for client authentication. Each client requires a public and private key.
      - **passwd**: Uses a username and password for client authentication. You must create an OpenVPN authentication group and user. See Configure an OpenVPN Authentication Group and User for instructions.
      - **cert_passwd**: Uses both certificates and a username and password for client authentication. Each client requires a public and private key, and you must create an OpenVPN authentication group and user. See Configure an OpenVPN Authentication Group and User for instructions.

      ii. Paste the contents of the CA certificate (usually in a ca.crt file) into the value of the **cacert** parameter:

```
(config vpn openvpn server name)> cacert value
(config vpn openvpn server name)>
```

      iii. Paste the contents of the public key (for example, server.crt) into the value of the **server_cert** parameter:

```
(config vpn openvpn server name)> server_cert value
(config vpn openvpn server name)>
```

iv. Paste the contents of the private key (for example, server.key) into the value of the **server_key** parameter:

```
(config vpn openvpn server name)> server_key value
(config vpn openvpn server name)>
```

v. Paste the contents of the Diffie Hellman key (usually in dh2048.pem) into the value of the **diffie** parameter:

```
(config vpn openvpn server name)> diffie value
(config vpn openvpn server name)>
```

8. (Optional) Set the access control list to restrict access to the OpenVPN server:

- To limit access to specified IPv4 addresses and networks:

```
(config vpn openvpn server name)> add acl address end value
(config vpn openvpn server name)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config vpn openvpn server name)> add acl address6 end value
(config vpn openvpn server name)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config vpn openvpn server name)> add acl interface end value
(config vpn openvpn server name)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config vpn openvpn server name)> add acl zone end value
(config vpn openvpn server name)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config vpn openvpn server name)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------------------
-----------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config vpn openvpn server name)>
```

Repeat this step to include additional firewall zones.

9. (Optional) Set additional OpenVPN parameters.
   a. Enable the use of additional OpenVPN parameters:

   ```
   (config vpn openvpn server name)> advanced_options enable true
   (config vpn openvpn server name)>
   ```

   b. Configure whether the additional OpenVPN parameters should override default options:

   ```
   (config vpn openvpn server name)> advanced_options override true
   (config vpn openvpn server name)>
   ```

   c. Set the additional OpenVPN parameters:

   ```
   (config vpn openvpn server name)> extra parameters
   (config vpn openvpn server name)>
   ```

10. Save the configuration and apply the change.

    ```
    (config)> save
    Configuration saved.
    >
    ```

11. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure an OpenVPN Authentication Group and User

If username and password authentication is used for the OpenVPN server, you must create an OpenVPN authentication group and user.

See Configure an OpenVPN server for information about configuring an OpenVPN server to use username and password authentication. See Connect EZ 16/32 user authentication for more information about creating authentication groups and users.

### Web

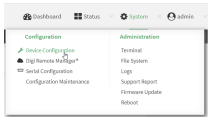
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

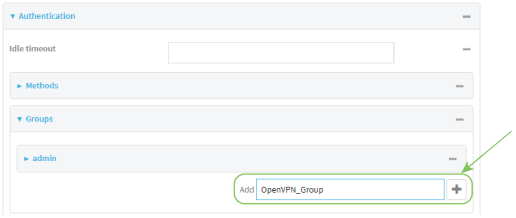
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

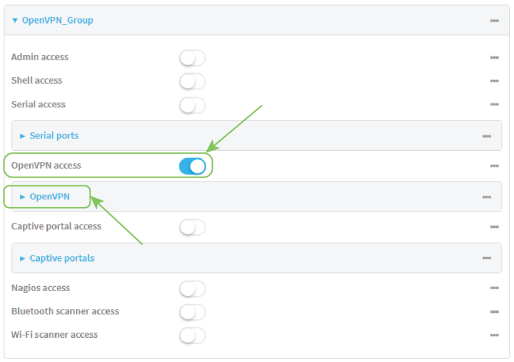
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Add an OpenVPN authentication group:
   a. Click **Authentication** > **Groups**.
   b. For **Add Group**, type a name for the group (for example, **OpenVPN_Group**) and click **+**.

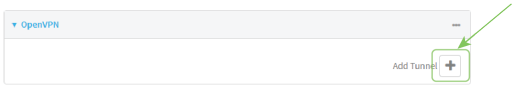
   The new authentication group configuration is displayed.



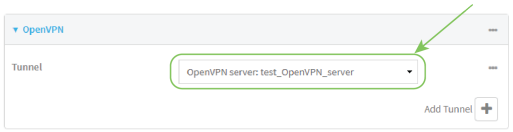

c. Click **OpenVPN access** to enable OpenVPN access rights for users of this group.

d. Click to expand the **OpenVPN** node.

e. Click **+** to add a tunnel.




f. For **Tunnel**, select an OpenVPN tunnel to which users of this group will have access.

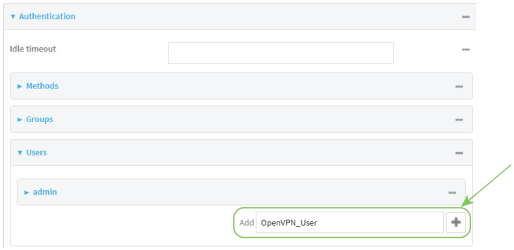



g. Repeat to add additional OpenVPN tunnels.

4. Add an OpenVPN authentication user:

a. Click **Authentication** > **Users**.

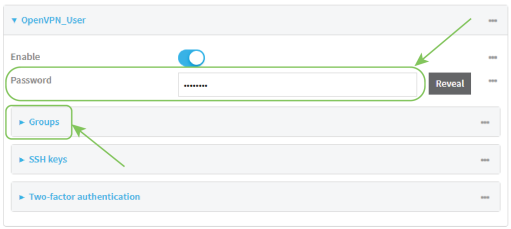
b. For **Add**, type a name for the user (for example, **OpenVPN_User**) and click **+**.



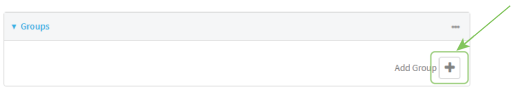

c. Type a password for the user.

This password is used for local authentication of the user. You can also configure the user to use RADIUS or TACACS+ authentication by configuring authentication methods. See User authentication methods for information.

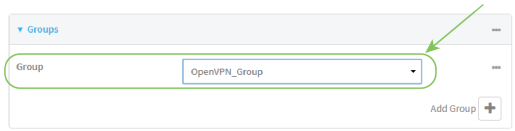
d. Click to expand the **Groups** node.




e. Click **+** to add a group to the user.




f. Select a **Group** with **OpenVPN access** enabled.




5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **add auth group** command to add a new authentication. For example, to add a group named **OpenVPN_Group**:

```
(config)> add auth group OpenVPN_Group
(config auth group OpenVPN_Group)>
```

4. Enable OpenVPN access rights for users of this group:

```
(config auth group OpenVPN_Group)> acl openvpn enable true
```

5. Add an OpenVPN tunnel to which users of this group will have access:
   a. Determine available tunnels:

```
(config auth group OpenVPN_Group)> .. .. .. vpn openvpn server ?

Servers: A list of openvpn servers

 Additional Configuration
 ------------------------------------------------------------------------
----------
 OpenVPN_server1           OpenVPN server

(config auth group OpenVPN_Group)>
```

   b. Add a tunnel:

```
(config auth group OpenVPN_Group)> add auth group test acl openvpn
tunnels end /vpn/openvpn/server/OpenVPN_server1
(config auth group OpenVPN_Group)>
```

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure an OpenVPN client by using an .ovpn file

### Required configuration items

- Enable the OpenVPN client.

  The OpenVPN client is enabled by default.
- The firewall zone to be used by the OpenVPN client.

### Additional configuration items

- The route metric for the OpenVPN client.
- The login credentials for the OpenVPN client, if configured on the OpenVPN server.

See Configure SureLink active recovery for OpenVPN for information about OpenVPN active recovery.

### Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

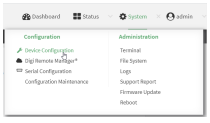
   b. Click the **Device ID**.

   c. Click **Settings**.

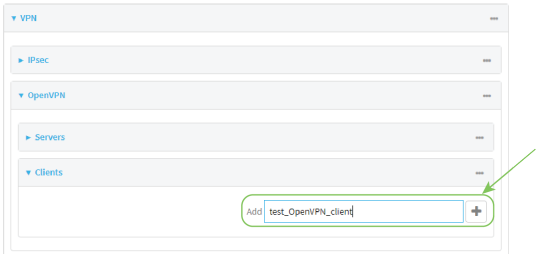
   d. Click to expand **Config**.

   Local Web UI:

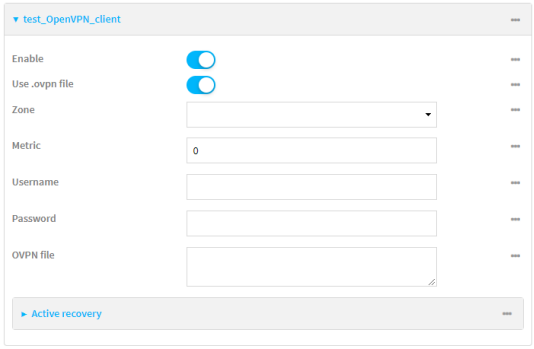
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **VPN** > **OpenVPN** > **Clients**.
4. For **Add**, type a name for the OpenVPN client and click ✚.



The new OpenVPN client configuration is displayed.




5. The OpenVPN client is enabled by default. To disable, toggle off **Enable**.
6. The default behavior is to use an OVPN file for client configuration. To disable this behavior and configure the client manually, click **Use .ovpn file** to disable. If **Use .ovpn file** is disabled, see Configure an OpenVPN client without using an .ovpn file for configuration information.
7. For **Zone**, select the firewall zone for the OpenVPN client.
8. (Optional) Select the **Metric** for the OpenVPN client. If multiple active routes match a destination, the route with the lowest metric will be used.
9. (Optional) For **Username** and **Password**, type the login credentials as configured on the OpenVPN server.
10. For **OVPN file**, paste the content of the client.ovpn file.
11. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> add vpn openvpn client name
(config vpn openvpn client name)>
```

   where *name* is the name of the OpenVPN server.

   The OpenVPN client is enabled by default. To disable the client, type:

```
(config vpn openvpn client name)> enable false
(config vpn openvpn client name)>
```

4. Set the firewall zone for the OpenVPN client:

```
(config vpn openvpn client name)> zone value
(config vpn openvpn client name)>
```

   To view a list of available zones:

```
(config vpn openvpn client name)> zone ?

Zone: The zone for the openvpn client interface.
Format:
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
Current value:

(config vpn openvpn client name)>
```

5. (Optional) Set the route metric for the OpenVPN server. If multiple active routes match a destination, the route with the lowest metric will be used.

```
(config vpn openvpn client name)> metric value
(config vpn openvpn client name)>
```

   where *value* is an interger between **0** and **65535**. The default is **0**.

6. (Optional) Set the login credentials as configured on the OpenVPN server:

```
(config vpn openvpn client name)> username value
(config vpn openvpn client name)> password value
(config vpn openvpn client name)>
```

7. Paste the content of the client.ovpn file into the value of the **config_file** parameter:

```
(config vpn openvpn client name)> config_file value
(config vpn openvpn client name)>
```

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure an OpenVPN client without using an .ovpn file

### Required configuration items

- Enable the OpenVPN client.

  The OpenVPN client is enabled by default.
- The mode used by the OpenVPN server, either routing (TUN), or bridging (TAP).
- The firewall zone to be used by the OpenVPN client.
- The IP address of the OpenVPN server.
- Certificates and keys:
  - The **CA certificate** (usually in a ca.crt file).
  - The **Public key** (for example, client.crt)
  - The **Private key** (for example, client.key).

### Additional configuration items

- The route metric for the OpenVPN client.
- The login credentials for the OpenVPN client, if configured on the OpenVPN server.
- Additional OpenVPN parameters.

See Configure SureLink active recovery for OpenVPN for information about OpenVPN active recovery.

### Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

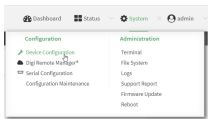
   b. Click the **Device ID**.

   c. Click **Settings**.

   d. Click to expand **Config**.

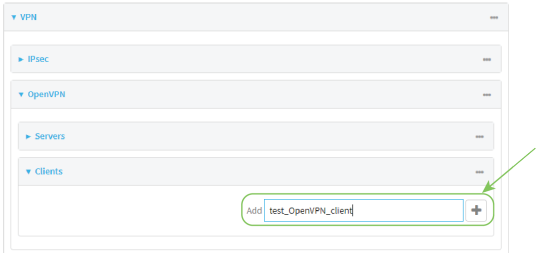
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

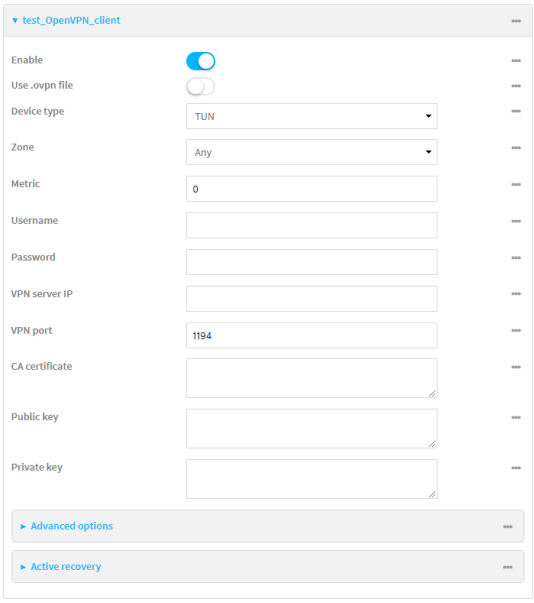
   

   The **Configuration** window is displayed.
3. Click **VPN** > **OpenVPN** > **Clients**.

4. For **Add**, type a name for the OpenVPN client and click **+**.




The new OpenVPN client configuration is displayed.




5. The OpenVPN client is enabled by default. To disable, toggle off **Enable**.
6. The default behavior is to use an OVPN file for client configuration. To disable this behavior and configure the client manually, click **Use .ovpn file** to disable.
7. For **Device type**, select the mode used by the OpenVPN server, either **TUN** or **TAP**.
8. For **Zone**, select the firewall zone for the OpenVPN client.
9. (Optional) Select the **Metric** for the OpenVPN client. If multiple active routes match a destination, the route with the lowest metric will be used.
10. (Optional) For **Username** and **Password**, type the login credentials as configured on the OpenVPN server.
11. For **VPN server IP**, type the IP address of the OpenVPN server.
12. (Optional) Set the **VPN port** used by the OpenVPN server. The default is **1194**.
13. Paste the contents of the **CA certificate** (usually in a ca.crt file), the **Public key** (for example, client.crt), and the **Private key** (for example, client.key) into their respective fields. The contents will be hidden when the configuration is saved.
14. (Optional) Click to expand **Advanced Options** to manually set additional OpenVPN parameters.

a. Click **Enable** to enable the use of additional OpenVPN parameters.
b. Click **Override** if the additional OpenVPN parameters should override default options.
c. For **OpenVPN parameters**, type the additional OpenVPN parameters. For example, to override the configuration by using a configuration file, enter **--config filename**, for example, **--config /etc/config/openvpn_config**.

15. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> add vpn openvpn client name
(config vpn openvpn client name)>
```

   where *name* is the name of the OpenVPN server.

   The OpenVPN client is enabled by default. To disable the client, type:

```
(config vpn openvpn client name)> enable false
(config vpn openvpn client name)>
```

4. The default behavior is to use an OVPN file for client configuration. To disable this behavior and configure the client manually:

```
(config vpn openvpn client name)> use_file false
(config vpn openvpn client name)>
```

5. Set the mode used by the OpenVPN server:

```
(config vpn openvpn client name)> device_type value
(config vpn openvpn client name)>
```

   where *value* is either **tun** or **tap**. The default is **tun**.

6. Set the firewall zone for the OpenVPN client:

```
(config vpn openvpn client name)> zone value
(config vpn openvpn client name)>
```

   To view a list of available zones:

```
(config vpn openvpn client name)> zone ?

Zone: The zone for the openvpn client interface.
```

```
Format:
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
Current value:

(config vpn openvpn client name)>
```

7. (Optional) Set the route metric for the OpenVPN server. If multiple active routes match a destination, the route with the lowest metric will be used.

```
(config vpn openvpn client name)> metric value
(config vpn openvpn client name)>
```

   where *value* is an interger between **0** and **65535**. The default is **0**.

8. (Optional) Set the login credentials as configured on the OpenVPN server:

```
(config vpn openvpn client name)> username value
(config vpn openvpn client name)> password value
(config vpn openvpn client name)>
```

9. Set the IP address of the OpenVPN server:

```
(config vpn openvpn client name)> server ip_address
(config vpn openvpn client name)>
```

10. (Optional) Set the port used by the OpenVPN server:

```
(config vpn openvpn client name)> port port
(config vpn openvpn client name)>
```

    The default is **1194**.

11. Paste the contents of the CA certificate (usually in a ca.crt file) into the value of the **cacert** parameter:

```
(config vpn openvpn client name)> cacert value
(config vpn openvpn client name)>
```

12. Paste the contents of the public key (for example, client.crt) into the value of the **public_cert** parameter:

```
(config vpn openvpn client name)> public_cert value
(config vpn openvpn client name)>
```

13. Paste the contents of the private key (for example, client.key) into the value of the **private_key** parameter:

```
(config vpn openvpn client name)> private_key value
(config vpn openvpn client name)>
```

14. (Optional) Set additional OpenVPN parameters.
    a. Enable the use of additional OpenVPN parameters:

    ```
    (config vpn openvpn client name)> advanced_options enable true
    (config vpn openvpn client name)>
    ```

    b. Configure whether the additional OpenVPN parameters should override default options:

    ```
    (config vpn openvpn client name)> advanced_options override true
    (config vpn openvpn client name)>
    ```

    c. Set the additional OpenVPN parameters:

    ```
    (config vpn openvpn client name)> advanced_options extra parameters
    (config vpn openvpn client name)>
    ```

15. Save the configuration and apply the change.

    ```
    (config)> save
    Configuration saved.
    >
    ```

16. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure SureLink active recovery for OpenVPN

You can configure the Connect EZ 16/32 device to regularly probe OpenVPN client connections to determine if the connection has failed and take remedial action.

#### Required configuration items

- A valid OpenVPN client configuration. See Configure an OpenVPN client by using an .ovpn file or Configure an OpenVPN client without using an .ovpn file for configuration instructions.
- Enable OpenVPN SureLink.
- The behavior of the Connect EZ 16/32 device upon OpenVPN failure: either
  - Restart the OpenVPN interface
  - Reboot the device.

#### Additional configuration items

- The interval between connectivity tests.
- Whether the interface should be considered to have failed if one of the test targets fails, or all of the test targets fail.
- The number of probe failures before the OpenVPN connection is considered to have failed.
- The amount of time that the device should wait for a response to a probe failures before considering it to have failed.

To configure the Connect EZ 16/32 device to regularly probe the OpenVPN connection:

## Web

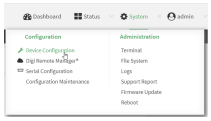
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

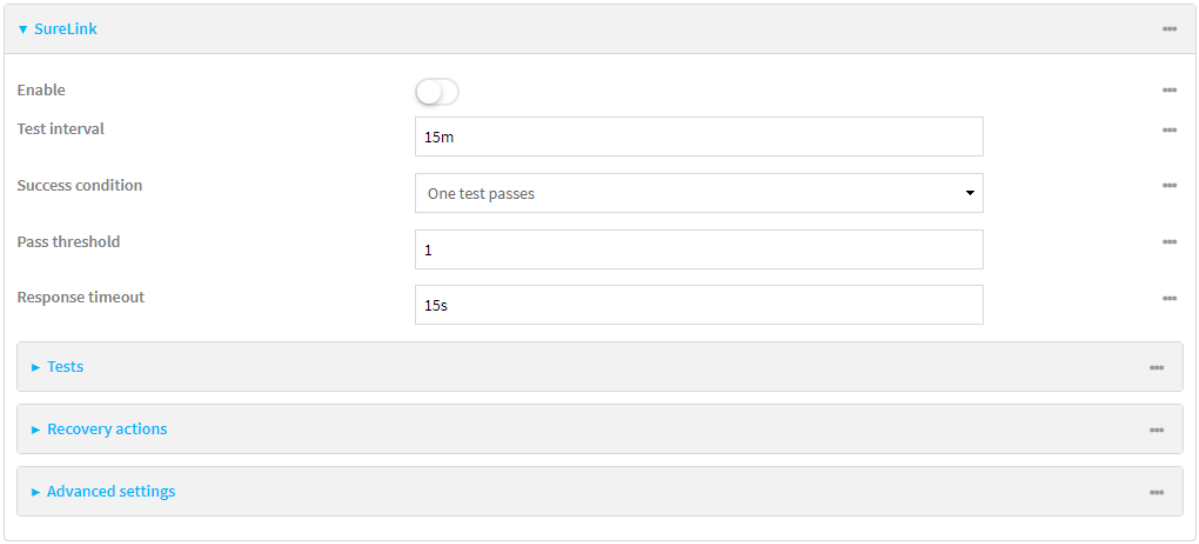
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **VPN** > **OpenVPN** > **Clients**.
4. Create a new OpenVPN client or select an existing one:
   - To create a new OpenVPN client, see Configure an OpenVPN client by using an .ovpn file or Configure an OpenVPN client without using an .ovpn file.
   - To edit an existing OpenVPN client, click to expand the appropriate client.
5. After creating or selecting the OpenVPN client, click **SureLink**.



6. **Enable** SureLink.
7. (Optional) Change the **Test interval** between connectivity tests.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

   For example, to set **Interval** to ten minutes, enter **10m** or **600s**.

   The default is 15 minutes.
8. (Optional) If more than one test target is configured, for **Success condition**, select either:
   - **One test passes**: Only one test needs to pass for Surelink to consider an interface to be up.
   - **All test pass**: All tests need to pass for SureLink to consider the interface to be up.
9. (Optional) For **Pass threshold**, type or select the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.
10. (Optional) For **Response timeout**, type the amount of time that the device should wait for a response to a test failure before considering it to have failed.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Response timeout** to ten minutes, enter **10m** or **600s**.

    The default is 15 seconds.
11. Click to expand **Tests**.

    By default, **Test DNS servers configured for this interface** is automatically configured and enabled. This test communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

    a. Click ✚.

    New tests are enabled by default. To disable, click to toggle off **Enable**.

    b. Type a **Label** for the test.

    c. Click to toggle on **IPv6** if the test should apply to both IPv6 rather than IPv4.

    d. Select the **Test type**.

    Available test types:

    - **Ping test**: Uses ICMP to determine connectivity.

      If **Ping test** is selected, complete the following:

      - **Ping target:** The type of target for the ping, one of:
        - **Hostname or IP address** of an external server.
          - **Ping host**: hostname or IP address of the server.
        - The **Interface gateway**. If **Interface gateway** is selected, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.

    - The **Interface address**.
    - The **Interface DNS** server.
  - **Ping payload size:** The number of bytes to send as part of the ping payload.
- **DNS test**: Performs a DNS query to the named DNS server.

  If **DNS test** is selected, complete the following:
  - **DNS server**: The IP address of the DNS server.
- **HTTP test**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.

  If **HTTP test** is selected, complete the following:
  - **Web server**: The URL of the web server.
- **Test DNS servers configured for this interface**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **Test the interface status**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

  If **Test the interface status** is selected, complete the following:
  - **Down time**: The amount of time that the interface is down before the test can be considered to have failed.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Down time** to ten minutes, enter **10m** or **600s**.
  - **Initial connection time**: The amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Initial connection time** to ten minutes, enter **10m** or **600s**.
- **Custom test**: Tests the interface with custom commands.

  If **Custom test** is selected, complete the following:
  - The **Commands to run to test**.
- **TCP connection test**: Tests that the interface can reach a destination port on the configured host.

  If **TCP connection test** is selected, complete the following:
  - **TCP connect host**: The hostname or IP address of the host to create a TCP connection to.
  - **TCP connect port**: The TCP port to create a TCP connection to.
- **Test another interface's status**: Tests the status of another interface.

  If **Test another interface's status** is selected, complete the following:

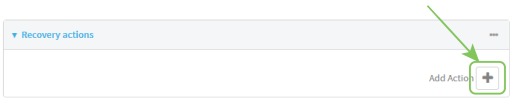
- **Test interface**: The interface to test.
- **IP version**: The type of IP connection, one of:
  - **Any**: Either the IPv4 or IPv6 connection must be up.
  - **Both**: Both the IPv4 or IPv6 connection must be up.
  - **IPv4**: The IPv4 connection must be up.
  - **IPv6**: The IPv6 connection must be up.
- **Expected status**: The status required for the test to past.
  - **Up**: The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
  - **Down**: The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

e. Repeat for each additional test.

12. Add recovery actions:
    a. Click to expand **Recovery actions**.

    By default, there are two preconfigured recovery actions:
    - **Update routing**: Uses the **Change default gateway** action, which increases the interface's metric by 100 to change the default gateway.
    - **Restart interface**.

    b. Click ✚.




    New recovery actions are enabled by default. To disable, click to toggle off **Enable**.

    c. Type a **Label** for the recovery action.

    d. For **Recovery type**, select **Reboot device**.

    e. For **Recovery type**, select the type of recovery action. If multiple recovery actions are configured, they are performed in the order that they are listed.
    - **Change default gateway**: Increases the interface's metric to change the default gateway.

      If **Change default gateway** is selected, complete the following:
      - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
      - **Increase metric to change active default gateway**: Increase the interface's metric by this amount. This should be set to a number large enough to change the routing table to use another default gateway. The default is **100**.
      - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
    - **Restart interface**.

      If **Restart interface** is selected, complete the following:

- **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
- **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

- **Reset modem**: This recovery action is available for WWAN interfaces only.

  If **Reset modem** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
- **Switch to alternate SIM**: Switches to an alternate SIM. This recovery action is available for WWAN interfaces only.

  If **Switch to alternate SIM** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
- **Reboot device**.

  If **Reboot device** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
- Execute custom **Recovery commands**.

  If **Recovery commands** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.
  - The **Commands to run to recovery connectivity**.
  - **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.
- **Powercycle the modem**. This recovery action is available for WWAN interfaces only.

  If **Powercycle the modem** is selected, complete the following:

  - **SureLink test failures**: The number of failures for this recovery action to perform, before moving to the next recovery action.

- **Override wait interval before performing the next recovery action**: The time to wait before the next test is run. If set to the default value of **0s**, the **Test interval** is used.

f. Repeat for each additional recovery action.

13. (Optional) Configure advanced SureLink parameters:
    a. Click to expand **Advanced settings**.
    b. For **Delayed Start**, type the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Delayed start** to ten minutes, enter **10m** or **600s**.

    The default is 300 seconds.
    c. For **Backoff interval**, type the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.

    Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

    For example, to set **Backoff interval** to ten minutes, enter **10m** or **600s**.

    The default is 300 seconds.
    d. **Test interface gateway by pinging** is used by the **Interface gateway Ping test** as the endpoint for traceroute to use to determine the interface gateway. The default is 8.8.8.8, and should only be changed if this IP address is not accessible due to networking issues.
14. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new OpenVPN client, or edit an existing one:
   - To create a new OpenVPN client, see Configure an OpenVPN client by using an .ovpn file or Configure an OpenVPN client without using an .ovpn file.
   - To edit an existing OpenVPN client, change to the OpenVPN client's node in the configuration schema. For example, for an OpenVPN client named **openvpn_client1**, change to the **openvpn_client1** node in the configuration schema:

```
(config)> vpn openvpn client openvpn_client1
(config vpn openvpn client openvpn_client1)>
```

4. Enable SureLink:

```
(config vpn openvpn client openvpn_client1)> surelink enable true
(config vpn openvpn client openvpn_client1)>
```

5. By default, the **Test DNS servers configured for this interface** test is automatically configured and enabled. This tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.

   To add additional tests:

   a. Add a test:

```
(config vpn openvpn client openvpn_client1)> add surelink tests end
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

   b. New tests are enabled by default. To disable:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> enable
false
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

   c. Create a label for the test:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> label
string
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

   d. if the test should apply to both IPv6 rather than IPv4, enable IPv6:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> ipv6
true
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

   e. Set the test type:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> test
value
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

   where *value* is one of:

   - **ping**: Uses ICMP to determine connectivity.

     If **ping** is selected, complete the following:

     - Set the **ping_method**:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)>
ping_method value
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

       where *value* is one of:

- **hostname**: The hostname or IP address of an external server.
  - Set **ping_host** to the hostname or IP address of the server:

```
(config vpn openvpn client openvpn_client1 surelink tests
1)> ping_host hostname/IP_address
(config vpn openvpn client openvpn_client1 surelink tests
1)>
```

- **interface_gateway**. If set, an initial traceroute is sent to the hostname or IP address configured in the SureLink advanced settings, and then the first hop in that route is used for the ping test.
- **interface_address**.
- **interface_dns**: The interface's DNS server.

- Set the number of bytes to send as part of the ping payload:

```
(config vpn openvpn client openvpn_client1 openvpn client
openvpn_client1 surelink tests 1)> ping_size int
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- **dns**: Performs a DNS query to the named DNS server.

  If **dns** is set, set the IPv4 or IPv6 address of the DNS server:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)>
dns_server IP_address
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- **http**: Uses HTTP(s) GET requests to determine connectivity to the configured web server.

  If **http** is set, set the URL of the web server.

```
(config vpn openvpn client openvpn_client1 surelink tests 1)>
http url
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- **dns_configured**: Tests communication with DNS servers that are either provided by DHCP, or statically configured for this interface.
- **interface_up**: Tests the current status of the interface. The test fails if the interface is down. Failing this test infers that all other tests fail.

  If **interface_up** is set, complete the following:

  - Set the amount of time that the interface is down before the test can be considered to have failed.

```
(config vpn openvpn client openvpn_client1 surelink tests 1)>
interface_down_time value
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

  where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **interface_down_time** to ten minutes, enter either **10m** or **600s**:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)>
interface_down_time 600s
(config)>
```

- Set the amount of time to wait for the interface to connect for the first time before the test is considered to have failed.

```
(config vpn openvpn client openvpn_client1 surelink tests 1)>
interface_timeout value
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **interface_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)>
interface_timeout 600s
(config)>
```

- **custom_test**: Tests the interface with custom commands.

  If **custom_test** is set, set the commands to run to perform the test:

```
(config vpn openvpn client openvpn_client1  surelink tests 1)>
custom_test_commands "string"
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- **tcp_connection**: Tests that the interface can reach a destination port on the configured host.

  If **tcp_connection** is selected, complete the following:

  - Set the hostname or IP address of the host to create a TCP connection to:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)>
tcp_host hostname/IP_address
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

  - Set the TCP port to create a TCP connection to.

```
(config vpn openvpn client openvpn_client1 surelink tests 1)>
tcp_port port
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

- **other**: Tests the status of another interface.

  If **other** is selected, complete the following:

- Set the interface to test.
  i. Use the **?** to determine available interfaces:
  ii. Set the interface. For example:

```
(config vpn openvpn client openvpn_client1 surelink tests
1)> other_interface /network/interface/eth1
(config vpn openvpn client openvpn_client1 surelink tests
1)>
```

- Set the type of IP connection:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)>
other_ip_version value
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

  where *value* is one of:
  - **any**: Either the IPv4 or IPv6 connection must be up.
  - **both**: Both the IPv4 or IPv6 connection must be up.
  - **ipv4** The IPv4 connection must be up.
  - **ipv6**: The IPv6 connection must be up.
- The status required for the test to past.

```
(config vpn openvpn client openvpn_client1 surelink tests 1)>
other_status value
(config vpn openvpn client openvpn_client1 surelink tests 1)>
```

  where *value* is one of:
  - **up**: The test will pass only if the referenced interface is up and passing its own SureLink tests (if applicable).
  - **down**: The test will pass only if the referenced interface is down or failing its own SureLink tests (if applicable).

f. Repeat for each additional test.

6. Add recovery actions:
   a. Type **...** to return to the root of the configuration:

```
(config vpn openvpn client openvpn_client1 surelink tests 1)> ...
(config)>
```

   b. Add a recovery action:

```
(config)> add vpn openvpn client openvpn_client1 surelink actions end
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

   c. New actions are enabled by default. To disable:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> enable
false
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

d. Create a label for the action:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> label
string
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

e. Set the type of recovery action to **reboot_device**:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> action
reboot_device
(config vpn openvpn client openvpn_client1 surelink actions 0)>
```

- Set the number of failures for this recovery action to perform, before moving to the next recovery action:

  ```
  (config vpn openvpn client openvpn_client1 surelink actions 0)>
  test_failures int
  (config vpn openvpn client openvpn_client1 surelink actions 0)>
  ```

  The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

  ```
  (config vpn openvpn client openvpn_client1 surelink actions 0)>
  override_interval int
  (config vpn openvpn client openvpn_client1 surelink actions 0)>
  ```

f. Set the type of recovery action. If multiple recovery actions are configured, they are performed in the order that they are listed. The command varies depending on whether the interface is a WAN or WWAN:

- WAN interfaces:

  ```
  (config vpn openvpn client openvpn_client1 surelink actions 0)>
  action value
  (config vpn openvpn client openvpn_client1 surelink actions 0)>
  ```

- WWAN interfaces:

  ```
  (config vpn openvpn client openvpn_client1 surelink actions 0)>
  modem_action value
  (config vpn openvpn client openvpn_client1 surelink actions 0)>
  ```

where *value* is one of:

- **update_routing_table**: Increases the interface's metric to change the default gateway.

  If **update_routing_table** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn openvpn client openvpn_client1 surelink actions
0)> test_failures int
(config vpn openvpn client openvpn_client1 surelink actions
0)>
```

The default is **3**.

- Set the amount that the interface's metric should be increased. This should be set to a number large enough to change the routing table to use another default gateway.

```
(config vpn openvpn client openvpn_client1 surelink actions
0)> metric_adjustment_modem int
(config vpn openvpn client openvpn_client1 surelink actions
0)>
```

The default is **100**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn openvpn client openvpn_client1 surelink actions
0)> override_interval int
(config vpn openvpn client openvpn_client1 surelink actions
0)>
```

- **restart_interface**.

  If **restart_interface** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn openvpn client openvpn_client1 surelink actions
0)> test_failures int
(config vpn openvpn client openvpn_client1 surelink actions
0)>
```

  The default is **3**.

  - Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn openvpn client openvpn_client1 surelink actions
0)> override_interval int
(config vpn openvpn client openvpn_client1 surelink actions
0)>
```

- **reset_modem**: This recovery action is available for WWAN interfaces only.

  If **reset_modem** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn openvpn client openvpn_client1 surelink actions
0)> test_failures int
(config vpn openvpn client openvpn_client1 surelink actions
0)>
```

The default is **3**.

- Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn openvpn client openvpn_client1 surelink actions
0)> override_interval int
(config vpn openvpn client openvpn_client1 surelink actions
0)>
```

- **switch_sim**: Switches to an alternate SIM. This recovery action is available for WWAN interfaces only.

  If **switch_sim** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn openvpn client openvpn_client1 surelink actions
0)> test_failures int
(config vpn openvpn client openvpn_client1 surelink actions
0)>
```

    The default is **3**.

  - Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn openvpn client openvpn_client1 surelink actions
0)> override_interval int
(config vpn openvpn client openvpn_client1 surelink actions
0)>
```

- **modem_power_cycle**: This recovery action is available for WWAN interfaces only.

  If **modem_power_cycle** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

```
(config vpn openvpn client openvpn_client1 surelink actions
0)> test_failures int
(config vpn openvpn client openvpn_client1 surelink actions
0)>
```

    The default is **3**.

  - Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

```
(config vpn openvpn client openvpn_client1 surelink actions
0)> override_interval int
(config vpn openvpn client openvpn_client1 surelink actions
0)>
```

- **reboot_device**.

  If **reboot_device** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

    ```
    (config vpn openvpn client openvpn_client1 surelink actions
    0)> test_failures int
    (config vpn openvpn client openvpn_client1 surelink actions
    0)>
    ```

    The default is **3**.

  - Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

    ```
    (config vpn openvpn client openvpn_client1 surelink actions
    0)> override_interval int
    (config vpn openvpn client openvpn_client1 surelink actions
    0)>
    ```

- **custom_action**: Execute custom recovery commands.

  If **custom_action** is selected, complete the following:

  - Set the number of failures for this recovery action to perform, before moving to the next recovery action:

    ```
    (config vpn openvpn client openvpn_client1 surelink actions
    0)> test_failures int
    (config vpn openvpn client openvpn_client1 surelink actions
    0)>
    ```

    The default is **3**.

  - Set the commands to run to attempt to recovery connectivity.

    ```
    (config network interface my_wan surelink actions 0)> custom_
    action_commands_modem "string"
    (config network interface my_wan surelink actions 0)>
    ```

  - Set the time to wait before the next test is run. If set to the default value of **0s**, the test interval is used.

    ```
    (config vpn openvpn client openvpn_client1 surelink actions
    0)> override_interval int
    (config vpn openvpn client openvpn_client1 surelink actions
    0)>
    ```

g. Repeat for each additional recovery action.

7. Optional SureLink configuration parameters:
   a. Type **...** to return to the root of the configuration:

```
(config vpn openvpn client openvpn_client1 surelink actions 0)> ...
(config)>
```

   b. Set the test interval between connectivity tests:

```
(config)> vpn openvpn client openvpn_client1 surelink interval value
(config)>
```

   where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

   For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn openvpn client openvpn_client1 surelink interval 600s
(config)>
```

   The default is **15m**.

   c. If more than one test target is configured, set the success condition:

```
(config)> vpn openvpn client openvpn_client1 surelink success_
condition value
(config)>
```

   where *value* is either:

   - **one**: Only one test needs to pass for Surelink to consider an interface to be up.
   - **all**: All tests need to pass for SureLink to consider the interface to be up.

   d. Set the number of times that the test must pass after failure, before the interface is determined to be working and is reinstated.

```
(config)> vpn openvpn client openvpn_client1 surelink pass_threshold
int
(config)>
```

   The default is **1**.

   e. Set the amount of time that the device should wait for a response to a test attempt before considering it to have failed:

```
(config)> vpn openvpn client openvpn_client1 surelink timeout value
(config)>
```

   where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

   For example, to set **timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn openvpn client openvpn_client1 surelink timeout 600s
(config)>
```

   The default is **15s**.

f. Set the amount of time to wait while the device is starting before SureLink testing begins. This setting is bypassed when the interface is determined to be up.

```
(config)> vpn openvpn client openvpn_client1 surelink advanced
delayed_start value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **delayed_start** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn openvpn client openvpn_client1 surelink advanced
delayed_start 600s
(config)>
```

The default is **300s**.

g. Set the time to add to the test interval when restarting the list of actions. This option is capped at 15 minutes.

```
(config)> vpn openvpn client openvpn_client1 surelink advanced
backoff_interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **backoff_interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> vpn openvpn client openvpn_client1 surelink advanced
backoff_interval 600s
(config)>
```

The default is 300 seconds.

h. The **interface_gateway** parameter is used by the Interface gateway Ping test as the endpoint for traceroute to use to determine the interface gateway. The default is **8.8.8.8**, and should only be changed if this IP address is not accessible due to networking issues. To set to an alternate host:

```
(config)> vpn openvpn client openvpn_client1 surelink advanced
interface_gateway hostname/IP_address
(config)>
```

8. Save the configuration and apply the change.

```
(config vpn openvpn client openvpn_client1 connection_monitor target 0)>
save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

See Show SureLink status and statistics for information about showing Surelink status for OpenVPN clients.

## Show OpenVPN server status and statistics

You can view status and statistics for OpenVPN servers from either the web interface or the command line:

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, select **Status** > **OpenVPN** > **Servers**.

   The **OpenVPN Servers** page appears.
2. To view configuration details about an OpenVPN server, click the (configuration) icon in the upper right of the OpenVPN server's status pane.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured OpenVPN servers, type the following at the prompt:

```
> show openvpn server all

 Server           Enable  Type  Zone      IP Address       Port
 ---------------  ------  ----  --------  ---------------  ----
 OpenVPN_server1  true    tun   internal  192.168.30.1/24  1194
 OpenVPN_server2  false   tun   internal  192.168.40.1/24  1194

>
```

3. To display details about a specific server:

```
> show openvpn server name OpenVPN_server1

 Server                  : OpenVPN_server1
 Enable                  : true
 Type                    : tun
 Zone                    : internal
 IP Address              : 192.168.30.1/24
 Port                    : 1194
 Use File                : true
 Metric                  : 0
 Protocol                : udp
 First IP                : 80
 Last IP                 : 99

>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show OpenVPN client status and statistics

You can view status and statistics for OpenVPN clients from either web interface or the command line:

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, select **Status** > **OpenVPN** > **Clients**.

   The **OpenVPN Clients** page appears.

2. To view configuration details about an OpenVPN client, click the (configuration) icon in the upper right of the OpenVPN client's status pane.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. To display details about all configured OpenVPN clients, type the following at the prompt:

```
> show openvpn client all

 Client           Enable  Status     Username  Use File  Zone
 ---------------  ------  -------    --------  --------  --------
 OpenVPN_Client1  true    connected            true      internal
 OpenVPN_Client2  true    pending              true      internal

>
```

3. To display details about a specific client:

```
> show openvpn client name OpenVPN_client1

 Client                  : OpenVPN_client1
 Enable                  : true
 Status                  : up
 Username                : user1
 IP address              : 123.122.121.120
 Remote                  : 120.121.122.123
 MTU                     : 1492
 Zone                    : internal
 IP Address              : 192.168.30.1/24
 Port                    : 1194
 Use File                : true
```

```
 Metric                    : 0
 Protocol                  : udp
 Port                      : 1194
 Type                      : tun

>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Generic Routing Encapsulation (GRE)

Generic Routing Encapsulation (GRE) is an IP packet encapsulation protocol that allow for networks and routes to be advertized from one network device to another. You can use GRE to encapsulate a wide variety of network layer protocols inside virtual point-to-point links over an IP network.

## Configuring a GRE tunnel

Configuring a GRE tunnel involves the following items:

**Required configuration items**

- A GRE loopback endpoint interface.
- GRE tunnel configuration:
  - Enable the GRE tunnel.

    The GRE tunnels are enabled by default.
  - The local endpoint interface.
  - The IP address of the remote device/peer.

**Additional configuration items**

- A GRE key.
- Enable the device to respond to keepalive packets.

### *Task One: Create a GRE loopback endpoint interface*

#### Web

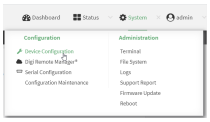
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Network** > **Interfaces**.
4. For **Add Interface**, type a name for the GRE loopback endpoint interface and click **+**.
5. **Enable** the interface.

   New interfaces are enabled by default. To disable, toggle off **Enable**.
6. For **Interface type**, select **Ethernet**.
7. For **Zone**, select **Internal**.
8. For **Device**, select **Ethernet: Loopback**.
9. Click to expand **IPv4**.
10. For **Address**, enter the IP address and subnet mask of the local GRE endpoint, for example **10.10.1.1/24**.
11. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the GRE endpoint interface. For example, to add an interface named **gre_endpoint**:

```
(config)> add network interface gre_interface
(config network interface gre_interface)>
```

4. Set the interface zone to **internal**:

```
(config network interface gre_interface)> zone internal
(config network interface gre_interface)>
```

5. Set the interface device to **loopback**:

```
(config network interface gre_interface)> device /network/device/loopback
(config network interface gre_interface)>
```

6. Set the IP address and subnet mask of the local GRE endpoint. For example, to set the local GRE endpoint's IP address and subnet mask to **10.10.1.1/24:**

```
(config network interface gre_interface)> ipv4 address 10.10.1.1/24
(config network interface gre_interface)>
```

7. Save the configuration and apply the change.

```
(config network interface gre_interface)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### *Task Two: Configure the GRE tunnel*

#### Web

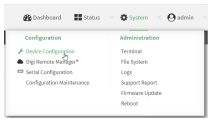
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **VPN** > **IP Tunnels**.
4. For **Add IP tunnel**, type a name for the GRE tunnel and click **+**.
5. **Enable** the tunnel.

   New tunnels are enabled by default. To disable, toggle off **Enable**.
6. For **Mode**, select one of the following options:
   - **GRE**: Standard GRE point-to-point protocol.
   - **mGRE**: multipoint GRE protocol.
   - **GRETAP**: Ethernet over GRE.
7. For **Local endpoint**, select the GRE endpoint interface created in Task One.

8. If **GRE** is selected for the **Mode**, for **Remote endpoint**, type the IP address of the GRE endpoint on the remote peer.
9. If **GRETAP** is selected for **Mode**, for **Local endpoint**, select the interface.
10. (Optional) For **Key**, enter a key that will be inserted in GRE packets created by this tunnel. It must match the key set by the remote endpoint. Allowed value is an integer between 0 and 4294967295, or an IP address.
11. (Optional) **Enable keepalive reply** to enable the device to reply to Cisco GRE keepalive packets.
12. (Optional) **Enable open routing** to enable packets destined for an address which is not explicitly in the routing table to exit the IP tunnel.
13. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the GRE endpoint tunnel. For example, to add a tunnel named **gre_example**:

```
(config)> add vpn iptunnel gre_example
(config vpn iptunnel gre_example)>
```

   GRE tunnels are enabled by default. To disable:

```
(config vpn iptunnel gre_example)> enable false
(config vpn iptunnel gre_example)>
```

4. Set the mode:

```
(config vpn iptunnel gre_example)> type value
(config vpn iptunnel gre_example)>
```

   where *value* is either:

   - **gre**: Standard GRE point-to-point protocol.
   - **mgre**: multipoint GRE protocol.
   - **GRETAP**: Ethernet over GRE
5. Set the local endpoint to the GRE endpoint interface created in Task One, for example:

```
(config vpn iptunnel gre_example)> local /network/interface/gre_endpoint
(config vpn iptunnel gre_example)>
```

6. If **type** is set to **gre**, set the IP address of the GRE endpoint on the remote peer:

```
(config vpn iptunnel gre_example)> remote ip_address
(config vpn iptunnel gre_example)>
```

7. (Optional) Set a key that will be inserted in GRE packets created by this tunnel.

   The key must match the key set by the remote endpoint.

```
(config vpn iptunnel gre_example)> key value
(config vpn iptunnel gre_example)>
```

   where value is an integer between 0 and 4294967295, or an IP address.

8. (Optional) Enable the device to reply to Cisco GRE keepalive packets:

```
(config vpn iptunnel gre_example)> keepalive true
(config vpn iptunnel gre_example)>
```

9. (Optional) Enable the device to allow packets destined for an address which is not explicitly in the routing table to exit the IP tunnel:

```
(config vpn iptunnel gre_example)> open_routing true
(config vpn iptunnel gre_example)>
```

10. Save the configuration and apply the change.

```
(config vpn iptunnel gre_example)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show GRE tunnels

To view information about currently configured GRE tunnels:

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, click **Status** > **IP tunnels**.

   The **IP Tunnels** page appears.

2. To view configuration details about a GRE tunnel, click the (configuration) icon in the upper right of the tunnel's status pane.

## Example: GRE tunnel over an IPSec tunnel

The Connect EZ 16/32 device can be configured as an advertised set of routes through an IPSec tunnel. This allows you to leverage the dynamic route advertisement of GRE tunnels through a secured IPSec tunnel.

The example configuration provides instructions for configuring the Connect EZ 16/32 device with a GRE tunnel through IPsec.

**Connect EZ 16/32-1 configuration tasks**

1. Create an IPsec tunnel named **ipsec_gre1** with:
   - A pre-shared key.
   - **Remote endpoint** set to the public IP address of the Connect EZ 16/32-2 device.
   - A policy with:
     - **Local network** set to the IP address and subnet of the local GRE tunnel, **172.30.0.1/32**.
     - **Remote network** set to the IP address and subnet of the remote GRE tunnel, **172.30.0.2/32**.
2. Create an IPsec endpoint interface named **ipsec_endpoint1**:
   a. **Zone** set to **Internal**.
   b. **Device** set to **Ethernet: Loopback**.
   c. IPv4 Address set to the IP address of the local GRE tunnel, **172.30.0.1/32**.
3. Create a GRE tunnel named **gre_tunnel1**:
   a. **Local endpoint** set to the IPsec endpoint interface, **Interface: ipsec_endpoint1**.
   b. Remote endpoint set to the IP address of the GRE tunnel on Connect EZ 16/32-2, **172.30.0.2**.
4. Create an interface named **gre_interface1** and add it to the GRE tunnel:
   a. **Zone** set to **Internal**.
   b. **Device** set to **IP tunnel: gre_tunnel1**.
   c. IPv4 Address set to a virtual IP address on the GRE tunnel, **172.31.0.1/30**.

**Connect EZ 16/32-2 configuration tasks**

1. Create an IPsec tunnel named **ipsec_gre2** with:
   - The same pre-shared key as the **ipsec_gre1** tunnel on Connect EZ 16/32-1.
   - **Remote endpoint** set to the public IP address of Connect EZ 16/32-1.
   - A policy with:
     - **Local network** set to the IP address and subnet of the local GRE tunnel, **172.30.0.2/32**.
     - **Remote network** set to the IP address of the remote GRE tunnel, **172.30.0.1/32**.
2. Create an IPsec endpoint interface named **ipsec_endpoint2**:
   a. **Zone** set to **Internal**.
   b. **Device** set to **Ethernet: Loopback**.
   c. IPv4 Address set to the IP address of the local GRE tunnel, **172.30.0.2/32**.

3. Create a GRE tunnel named **gre_tunnel2**:
   a. **Local endpoint** set to the IPsec endpoint interface, **Interface: ipsec_endpoint2**.
   b. Remote endpoint set to the IP address of the GRE tunnel on Connect EZ 16/32-1, **172.30.0.1**.
4. Create an interface named **gre_interface2** and add it to the GRE tunnel:
   a. **Zone** set to **Internal**.
   b. **Device** set to **IP tunnel: gre_tunnel2**.
   c. IPv4 Address set to a virtual IP address on the GRE tunnel, **172.31.0.2/30**.

## *Configuration procedures*

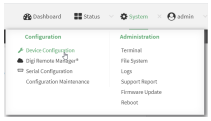
**Configure the Connect EZ 16/32-1 device**
**Task one: Create an IPsec tunnel**

### Web

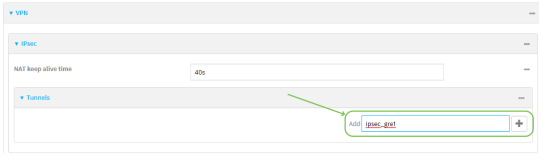
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

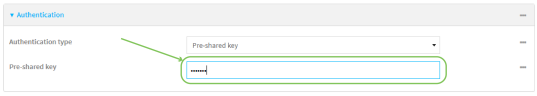
   Local Web UI:
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

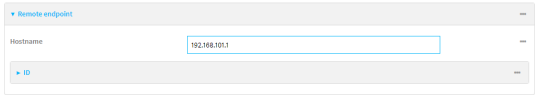
   The **Configuration** window is displayed.
3. Click **VPN** > **IPsec** > **Tunnels**.
4. For **Add IPsec Tunnel**, type **ipsec_gre1** and click **+**.

   
   
5. Click to expand **Authentication**.

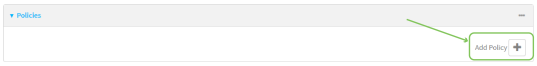
6. For **Pre-shared key**, type **testkey**.



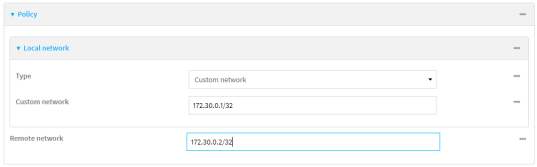

7. Click to expand **Remote endpoint**.
8. For **Hostname**, type public IP address of the Connect EZ 16/32-2 device.




9. Click to expand **Policies**.
10. For **Add Policy**, click ✚ to add a new policy.




11. Click to expand **Local network**.
12. For **Type**, select **Custom network**.
13. For **Address**, type the IP address and subnet of the local GRE tunnel, **172.30.0.1/32**.
14. For **Remote network**, type the IP address and subnet of the remote GRE tunnel, **172.30.0.2/32**.




15. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add an IPsec tunnel named **ipsec_gre1**:

```
(config)> add vpn ipsec tunnel ipsec_gre1
(config vpn ipsec tunnel ipsec_gre1)>
```

4. Set the pre-shared key to **testkey**:

```
(config vpn ipsec tunnel ipsec_gre1)> auth secret testkey
(config vpn ipsec tunnel ipsec_gre1)>
```

5. Set the remote endpoint to public IP address of the Connect EZ 16/32-2 device:

```
(config vpn ipsec tunnel ipsec_gre1)> remote hostname 192.168.101.1
(config vpn ipsec tunnel ipsec_gre1)>
```

6. Add a policy:

```
(config vpn ipsec tunnel ipsec_gre1)> add policy end
(config vpn ipsec tunnel ipsec_gre1 policy 0)>
```

7. Set the local network policy type to **custom**:

```
(config vpn ipsec tunnel ipsec_gre1 policy 0)> local type custom
(config vpn ipsec tunnel ipsec_gre1 policy 0)>
```

8. Set the local network address to the IP address and subnet of the local GRE tunnel, **172.30.0.1/32**:

```
(config vpn ipsec tunnel ipsec_gre1 policy 0)> local custom 172.30.0.1/32
(config vpn ipsec tunnel ipsec_gre1 policy 0)>
```

9. Set the remote network address to the IP address and subnet of the remote GRE tunnel, **172.30.0.2/32**:

```
(config vpn ipsec tunnel ipsec_gre1 policy 0)> remote network
172.30.0.2/32
(config vpn ipsec tunnel ipsec_gre1 policy 0)>
```

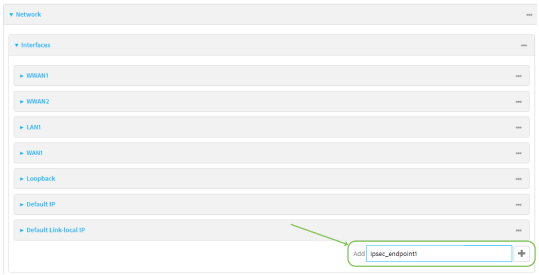
10. Save the configuration and apply the change.

```
(config ipsec tunnel ipsec_gre1 policy 0)> save
Configuration saved.
>
```

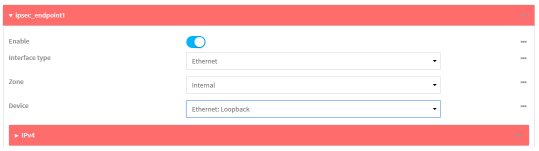
### Task two: Create an IPsec endpoint interface

**Web**

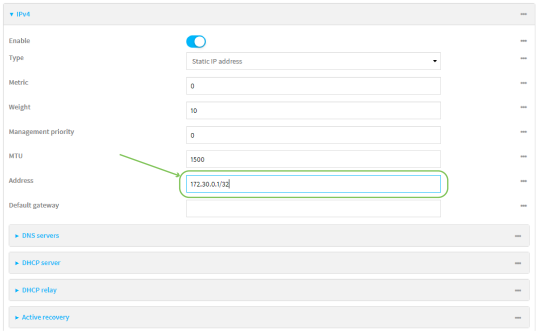
1. Click **Network** > **Interface**.
2. For **Add Interface**, type **ipsec_endpoint1** and click **+**.




3. For **Zone**, select **Internal**.
4. For **Device**, select **Ethernet: loopback**.




5. Click to expand **IPv4**.
6. For **Address**, type the IP address of the local GRE tunnel, **172.30.0.1/32**.




7. Click **Apply** to save the configuration and apply the change.

### Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add an interface named **ipsec_endpoint1**:

```
(config)> add network interface ipsec_endpoint1
(config network interface ipsec_endpoint1)>
```

3. Set the zone to **internal**:

```
(config network interface ipsec_endpoint1)> zone internal
(config network interface ipsec_endpoint1)>
```

4. Set the device to **/network/device/loopback**:

```
(config network interface ipsec_endpoint1)> device
/network/device/loopback
(config network interface ipsec_endpoint1)>
```

5. Set the IPv4 address to the IP address of the local GRE tunnel, **172.30.0.1/32**:

```
(config network interface ipsec_endpoint1)> ipv4 address 172.30.0.1/32
(config network interface ipsec_endpoint1)>
```

6. Save the configuration and apply the change.

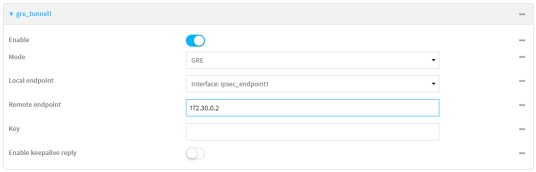
```
(config vpn ipsec tunnel ipsec_endpoint1 policy 0)> save
Configuration saved.
>
```

**Task three: Create a GRE tunnel**

### Web

1. Click **VPN** > **IP Tunnels**.
2. For **Add IP Tunnel**, type **gre_tunnel1** and click **+**.

3. For **Local endpoint**, select the IPsec endpoint interface created in Task two (**Interface: ipsec_endpoint1**).
4. For **Remote endpoint**, type the IP address of the GRE tunnel on Connect EZ 16/32-2, **172.30.0.2**.




5. Click **Apply** to save the configuration and apply the change.

## Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add a GRE tunnel named **gre_tunnel1**:

```
(config)> add vpn iptunnel gre_tunnel1
(config vpn iptunnel gre_tunnel1)>
```

3. Set the local endpoint to the IPsec endpoint interface created in Task two (**/network/interface/ipsec_endpoint1**):

```
(config vpn iptunnel gre_tunnel1)> local /network/interface/ipsec_
endpoint1
(config vpn iptunnel gre_tunnel1)>
```

4. Set the remote endpoint to the IP address of the GRE tunnel on Connect EZ 16/32-2, **172.30.0.2**:

```
(config vpn iptunnel gre_tunnel1)> remote 172.30.0.2
(config vpn iptunnel gre_tunnel1)>
```

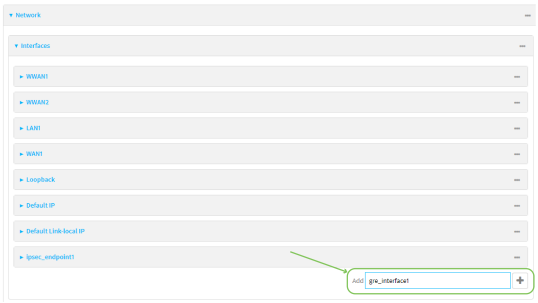
5. Save the configuration and apply the change.

```
(config vpn iptunnel gre_tunnel1)> save
Configuration saved.
>
```

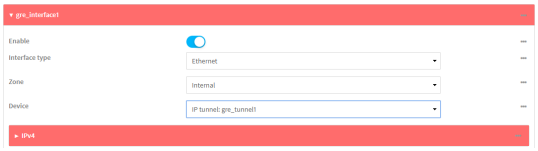
### Task four: Create an interface for the GRE tunnel device

#### Web

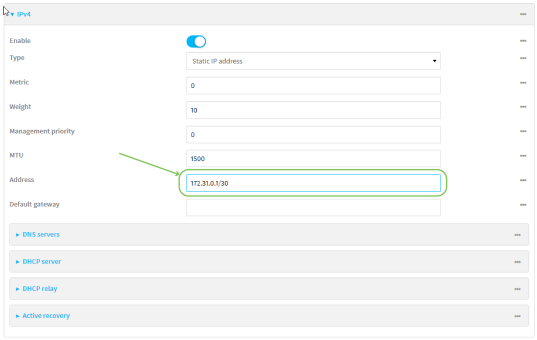
1. Click **Network** > **Interfaces**.
2. For **Add Interface**, type **gre_interface1** and click **+**.




3. For **Zone**, select **Internal**.
4. For **Device**, select the GRE tunnel created in Task three (**IP tunnel: gre_tunnel1**).




5. Click to expand **IPv4**.
6. For **Address**, type **172.31.0.1/30** for a virtual IP address on the GRE tunnel.




7. Click **Apply** to save the configuration and apply the change.

### Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add an interface named **gre_interface1**:

```
(config)> add network interface gre_interface1
(config network interface gre_interface1)>
```

3. Set the zone to **internal**:

```
(config network interface gre_interface1)> zone internal
(config network interface gre_interface1)>
```

4. Set the device to the GRE tunnel created in Task three (**/vpn/iptunnel/gre_tunnel1**):

```
(config network interface gre_interface1)> device /vpn/iptunnel/gre_
tunnel1
(config network interface gre_interface1)>
```

5. Set **172.31.0.1/30** as the virtual IP address on the GRE tunnel:

```
(config network interface gre_interface1)> ipv4 address 172.31.0.1/30
(config network interface gre_interface1)>
```

6. Save the configuration and apply the change.

```
(config network interface gre_interface1)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

**Configure the Connect EZ 16/32-2 device**
**Task one: Create an IPsec tunnel**

### Web

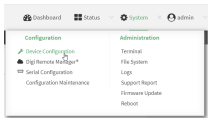
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

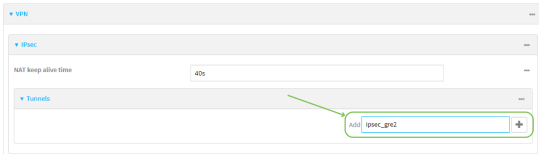
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

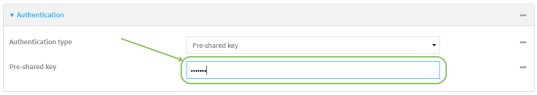


The **Configuration** window is displayed.

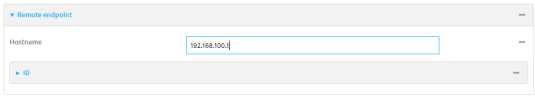
3. Click **VPN** > **IPsec** > **Tunnels**.
4. For **Add IPsec Tunnel**, type **ipsec_gre2** and click **+**.



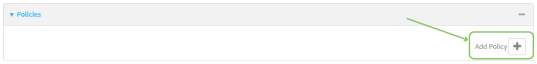
5. Click to expand **Authentication**.
6. For **Pre-shared key**, type the same pre-shared key that was configured for the Connect EZ 16/32-1 (**testkey**).



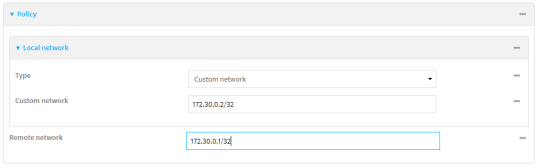
7. Click to expand **Remote endpoint**.
8. For **Hostname**, type public IP address of the Connect EZ 16/32-1 device.



9. Click to expand **Policies**.
10. For **Add Policy**, click **+** to add a new policy.



11. Click to expand **Local network**.
12. For **Type**, select **Custom network**.
13. For **Address**, type the IP address and subnet of the local GRE tunnel, **172.30.0.2/32**.
14. For **Remote network**, type the IP address and subnet of the remote GRE tunnel, **172.30.0.1/32**.



15. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add an IPsec tunnel named **ipsec_gre2**:

```
(config)> add vpn ipsec tunnel ipsec_gre2
(config vpn ipsec tunnel ipsec_gre2)>
```

4. Set the pre-shared key to the same pre-shared key that was configured for the Connect EZ 16/32-1 (**testkey**):

```
(config vpn ipsec tunnel ipsec_gre2)> auth secret testkey
(config vpn ipsec tunnel ipsec_gre2)>
```

5. Set the remote endpoint to public IP address of the Connect EZ 16/32-1 device:

```
(config vpn ipsec tunnel ipsec_gre2)> remote hostname 192.168.100.1
(config vpn ipsec tunnel ipsec_gre2)>
```

6. Add a policy:

```
(config vpn ipsec tunnel ipsec_gre2)> add policy end
(config vpn ipsec tunnel ipsec_gre2 policy 0)>
```

7. Set the local network policy type to **custom**:

```
(config vpn ipsec tunnel ipsec_gre2 policy 0)> local type custom
(config vpn ipsec tunnel ipsec_gre2 policy 0)>
```

8. Set the local network address to the IP address and subnet of the local GRE tunnel, **172.30.0.2/32**:

```
(config vpn ipsec tunnel ipsec_gre2 policy 0)> local custom 172.30.0.2/32
(config vpn ipsec tunnel ipsec_gre2 policy 0)>
```

9. Set the remote network address to the IP address and subnet of the remote GRE tunnel, **172.30.0.1/32**:

```
(config vpn ipsec tunnel ipsec_gre2 policy 0)> remote network
172.30.0.1/32
(config vpn ipsec tunnel ipsec_gre2 policy 0)>
```

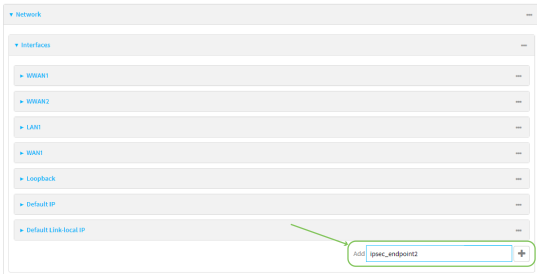
10. Save the configuration and apply the change.

```
(config vpn ipsec tunnel ipsec_gre2 policy 0)> save
Configuration saved.
>
```

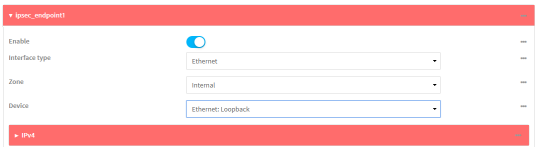
**Task two: Create an IPsec endpoint interface**

### Web

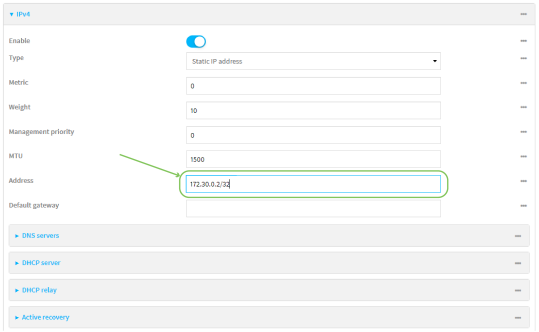
1. Click **Network** > **Interfaces**.
2. For **Add Interface**, type **ipsec_endpoint2** and click **+**.




3. For **Zone**, select **Internal**.
4. For **Device**, select **Ethernet: loopback**.




5. Click to expand **IPv4**.
6. For **Address**, type the IP address of the local GRE tunnel, **172.30.0.2/32**.




7. Click **Apply** to save the configuration and apply the change.

### Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add an interface named **ipsec_endpoint2**:

```
(config)> add network interface ipsec_endpoint2
(config network interface ipsec_endpoint2)>
```

3. Set the zone to **internal**:

```
(config network interface ipsec_endpoint2)> zone internal
(config network interface ipsec_endpoint2)>
```

4. Set the device to **/network/device/loopback**:

```
(config network interface ipsec_endpoint2)> device
/network/device/loopback
(config network interface ipsec_endpoint2)>
```

5. Set the IPv4 address to the IP address of the local GRE tunnel, **172.30.0.2/32**:

```
(config network interface ipsec_endpoint2)> ipv4 address 172.30.0.2/32
(config network interface ipsec_endpoint2)>
```

6. Save the configuration and apply the change.

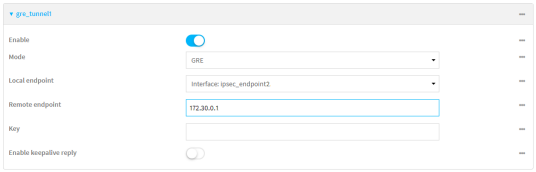
```
(config vpn ipsec tunnel ipsec_endpoint2)> save
Configuration saved.
>
```

**Task three: Create a GRE tunnel**

**Web**

1. Click **VPN** > **IP Tunnels**.
2. For **Add IP Tunnel**, type **gre_tunnel2** and click **+**.

3. For **Local endpoint**, select the IPsec endpoint interface created in Task two (**Interface: ipsec_endpoint2**).
4. For **Remote endpoint**, type the IP address of the GRE tunnel on Connect EZ 16/32-1, **172.30.0.1**.




5. Click **Apply** to save the configuration and apply the change.

## Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add a GRE tunnel named **gre_tunnel2**:

```
(config)> add vpn iptunnel gre_tunnel2
(config vpn iptunnel gre_tunnel2)>
```

3. Set the local endpoint to the IPsec endpoint interface created in Task two (**/network/interface/ipsec_endpoint2**):

```
(config vpn iptunnel gre_tunnel2)> local /network/interface/ipsec_
endpoint2
(config vpn iptunnel gre_tunnel2)>
```

4. Set the remote endpoint to the IP address of the GRE tunnel on Connect EZ 16/32-1, **172.30.0.1**:

```
(config vpn iptunnel gre_tunnel2)> remote 172.30.0.1
(config vpn iptunnel gre_tunnel2)>
```

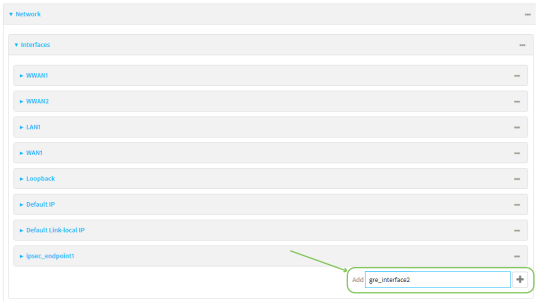
5. Save the configuration and apply the change.

```
(config vpn iptunnel gre_tunnel2)> save
Configuration saved.
>
```

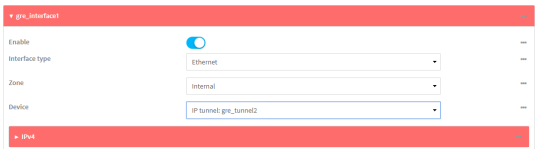
**Task four: Create an interface for the GRE tunnel device**

## Web

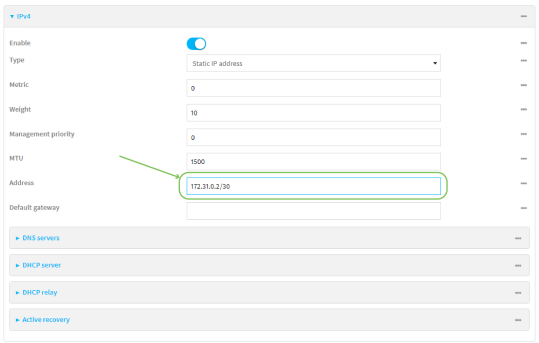
1. Click **Network** > **Interfaces**.
2. For **Add Interface**, type **gre_interface2** and click **+**.




3. For **Zone**, select **Internal**.
4. For **Device**, select the GRE tunnel created in Task three (**IP tunnel: gre_tunnel2**).




5. Click to expand **IPv4**.
6. For **Address**, type **172.31.0.2/30** for a virtual IP address on the GRE tunnel.




7. Click **Apply** to save the configuration and apply the change.

## Command line

1. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

2. Add an interface named **gre_interface2**:

```
(config)> add network interface gre_interface2
(config network interface gre_interface2)>
```

3. Set the zone to **internal**:

```
(config network interface gre_interface2)> zone internal
(config network interface gre_interface2)>
```

4. Set the device to the GRE tunnel created in Task three (**/vpn/iptunnel/gre_tunnel2**):

```
(config network interface gre_interface2)> device /vpn/iptunnel/gre_
tunnel2
(config network interface gre_interface2)>
```

5. Set **172.31.0.2/30** as the virtual IP address on the GRE tunnel:

```
(config network interface gre_interface2)> ipv4 address 172.31.0.2/30
(config network interface gre_interface2)>
```

6. Save the configuration and apply the change.

```
(config network interface gre_interface2)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Dynamic Multipoint VPN (DMVPN)

Dynamic Multipoint Virtual Private Network (DMVPN) is a dynamic tunneling form of a virtual private network (VPN), using a multi spoke-to-hub network in which the network addresses of the spoke routers do not need to be known, and therefore do not need to be configured in the hub router.

One advantage to this form of VPN is a scalable network in which the size of the hub configuration is minimized. When one spoke of the network needs to send traffic to another spoke, a direct transfer is possible without having to add any load onto the hub. This is achieved by the creation of a dynamic GRE tunnel directly to the other spoke. The network address of the target spoke is resolved with the use of Next Hop Resolution Protocol (NHRP).

This section contains the following topics:

Configure a DMVPN spoke ..... 496

## Configure a DMVPN spoke

To configure a DMVPN spoke:

### Web

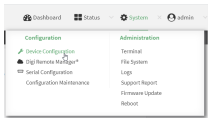
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

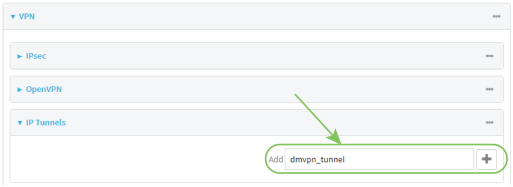
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

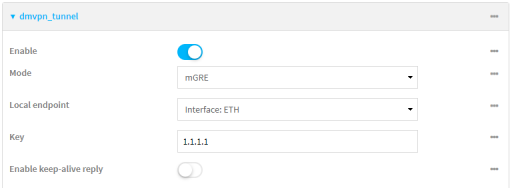
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Create an IP tunnel.
   a. Click **VPN** > **IP Tunnels**.
   b. In **Add IP tunnel**, type the name of the tunnel and click ✚.

   c. For **Mode**, select **mGRE**.
   d. For **Local endpoint**, select the interface that will serve as the local endpoint of the tunnel.
   e. For **Key**, type a four-octet value that matches the key on the remote endpoint.

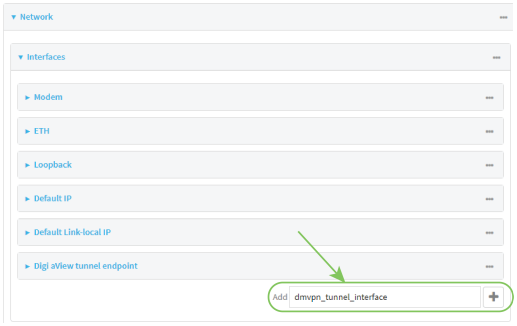
f. (Optional) **Enable keep-alive reply** to enable the device to reply to Cisco GRE keep-alive packets.

g. (Optional) **Enable open routing** to enable packets destined for an address which is not explicitly in the routing table to exit the IP tunnel.

4. Assign an IP address to the IP tunnel:

a. Click **Network** > **Interfaces**.

b. For **Add Interface**, type a name for the interface and click ✚.

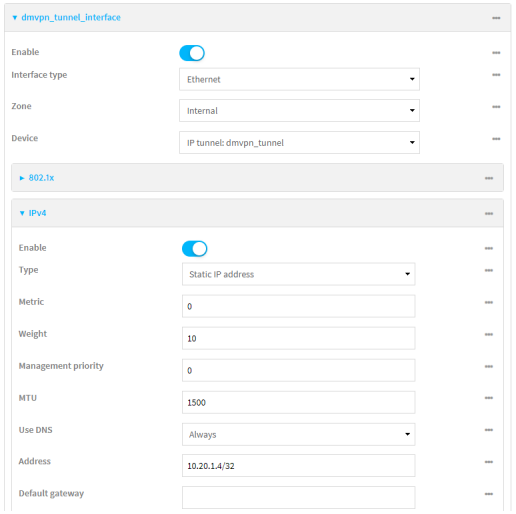



c. For **Zone**, select **Internal**.

d. For **Device**, select the IP tunnel created above.

e. Click to expand **IPv4**.

f. For **Address**, type the IP address and netmask of the tunnel. The netmask must be set to **/32**.




5. Configure **NHRP**:

a. Click **Network** > **Routing Services**.

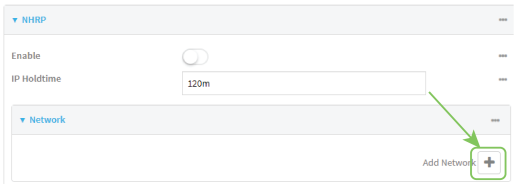
b. **Enable** routing services.

c. Click to expand **NHRP**.

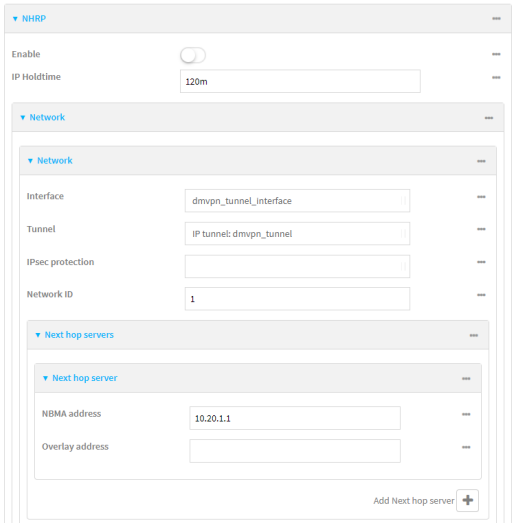
d. **Enable** NHRP.

e. Click to expand Network.

f. Click ✚ to add a network.



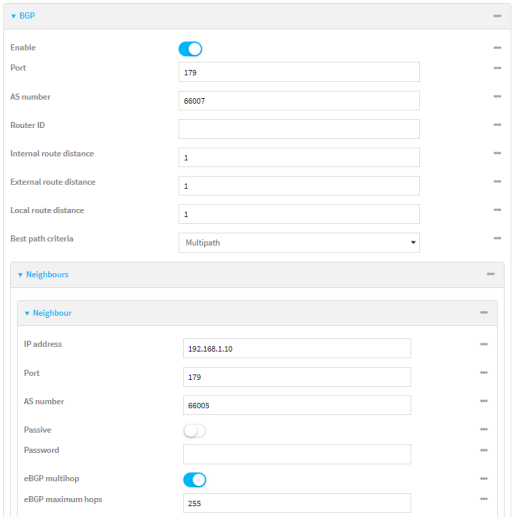

g. For **Interface**, select the interface created above.
h. For **Tunnel**, select the IP tunnel created above.
i. Click to expand **Next hop servers**.
j. Click ✚ to add a server.
k. For **NBMA address**, type the hostname or IP address of the node that will be the next hop server.




6. To enable redirection of packets between spokes, configure OSPF routing:
   a. Click **Network** > **Routes** > **Routing services** > **OSPF**.
   b. **Enable** OSPF.
   c. For **ABR behavior**, choose the Area Border Router for the network.
   d. For **Reference bandwidth**, type the link bandwidth.
   e. **Enable** the Opaque-LSA standard.
   f. **Enable** the RFC1583 standard.
7. Configure the overlay connection:
   a. Click **Network** > **Routing services** > **BGP**.
   b. **Enable** BGP.
   c. For **AS number**, type the autonomous system number for this device.
   d. For **Best path criteria**, select **Multipath**.
   e. Click to expand **Neighbours**.
   f. Click ✚ to add a neighbour.

g. For **IP address**, type the IP address of the hub.

h. Click to toggle on **eBGP multihop**.




8. Repeat to add additional spokes.
9. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create an IP tunnel.

   a. Add an IP tunnel. For example, to add a tunnel named **dmvpn_tunnel**:

```
(config)> add vpn iptunnel dmvpn_tunnel
(config vpn iptunnel dmvpn_tunnel)>
```

   b. Set the type to multipoint:

```
(config vpn iptunnel dmvpn_tunnel)> type multipoint
(config vpn iptunnel dmvpn_tunnel)>
```

   c. Set the local interface:

      i. Use the **?** to determine available interfaces:

      ii. Set the interface. For example:

```
(config vpn iptunnel dmvpn_tunnel)> local /network/interface/eth1
(config vpn iptunnel dmvpn_tunnel)>
```

d. Set the key to a four-octet value that matches the key on the remote endpoint. For example:

```
(config vpn iptunnel dmvpn_tunnel)> key 1.1.1.1
(config vpn iptunnel dmvpn_tunnel)>
```

e. (Optional) Enable the device to reply to Cisco GRE keepalive packets:

```
(config vpn iptunnel dmvpn_tunnel)> keepalive true
(config vpn iptunnel dmvpn_tunnel)>
```

f. (Optional) Enable the device to allow packets destined for an address which is not explicitly in the routing table to exit the IP tunnel:

```
(config vpn iptunnel dmvpn_tunnel)> open_routing true
(config vpn iptunnel dmvpn_tunnel)>
```

4. Assign an IP address to the IP tunnel:
   a. Type **...** to return to the top level of the configuration schema:

```
(config vpn iptunnel dmvpn_tunnel)> ...
(config)>
```

   b. And a network interface. For example, to add an interface named dmvpn_tunnel_ interface:

```
(config)> add network interface dmvpn_tunnel_interface
(config network interface dmvpn_tunnel_interface)>
```

   c. Set the zone to **internal**:

```
(config network interface dmvpn_tunnel_interface)> zone internal
(config network interface dmvpn_tunnel_interface)>
```

   d. Set the device to the IP tunnel created above:

```
(config network interface dmvpn_tunnel_interface)> device
/vpn/iptunnel/dmvpn_tunnel
(config network interface dmvpn_tunnel_interface)>
```

   e. Set the IP address and netmask of the tunnel. The netmask must be set to **/32**. For example, to set the IP address to **10.20.1.4/32**:

```
(config network interface dmvpn_tunnel_interface)> ipv4 address
10.20.1.4/32
(config network interface dmvpn_tunnel_interface)>
```

5. Configure NHRP:
   a. Type **...** to return to the top level of the configuration schema:

```
(config network interface dmvpn_tunnel_interface)> ...
(config)>
```

b. Enable routing services:

```
(config)> network route service enable true
(config)>
```

c. Enable NHRP:

```
(config)> network route service nhrp enable true
(config)>
```

d. Add an NHRP network:

```
(config)> add network route service nhrp network end
(config network route service nhrp network 0)>
```

e. Set the interface to the interface that was created above:

```
(config network route service nhrp network 0)> interface dmvpn_tunnel_
interface
(config network route service nhrp network 0)>
```

f. Set the tunnel to the IP tunnel created above:

```
(config network route service nhrp network 0)> tunnel
/vpn/iptunnel/dmvpn_tunnel
(config network route service nhrp network 0)>
```

g. Add a net hop server:

```
(config network route service nhrp network 0)> add nhs end
(config network route service nhrp network 0 nhs 0)>-
```

6. Set the hostname or IP address of the node that will be the next hop server:

```
(config network route service nhrp network 0 nhs 0)> nbma hostname/IP_
address
(config network route service nhrp network 0 nhs 0)>
```

7. Configure OSPF routing:

```
(config network route service ospf)
(config)>
```

8. Configure the overlay connection using BGP:
   a. Type **...** to return to the top level of the configuration schema:

```
(config network interface dmvpn_tunnel_interface)> ...
(config)>
```

   b. Enable BGP:

```
(config)> network route service bgp enable true
(config)>
```

c. Set the autonomous system number for this device. For example, to set the autonomous system number to 66007:

```
(config)> network route service bgp asn 66007
(config)>
```

d. Set the best path criteria to multipath:

```
(config)> network route service bgp as_path multipath-relax
(config)>
```

e. Add a neighbour:

```
(config)> add network route service bgp neighbour end
(config network route service bgp neighbour 0)>
```

f. Set **ip** to the IP address of the hub. For example:

```
(config network route service bgp neighbour 0)> ip 10.20.1.1
(config network route service bgp neighbour 0)>
```

g. Enable eBGP multihop:

```
(config network route service bgp neighbour 0)> ebgp_multihop true
(config network route service bgp neighbour 0)>
```

9. Repeat to add additional spokes.
10. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# L2TP

Your Connect EZ 16/32 device supports PPP-over-L2TP (Layer 2 Tunneling Protocol).

## Configure a PPP-over-L2TP tunnel

Your Connect EZ 16/32 device supports PPP-over-L2TP (Layer 2 Tunneling Protocol). The tunnel endpoints are known as L2TP Access Concentrators (LAC) and L2TP Network Servers (LNS). Each endpoint terminates the PPP session.

**Required configuration items**

- For L2TP access concentrators:
  - The hostname or IP address of the L2TP network server.
  - The firewall zone for the tunnel.

- For L2TP network servers:
  - The IP address of the L2TP access concentrator.
  - The local IP address assigned to the L2TP virtual network interface.
  - The IP address assigned to the remote peer.
  - The firewall zone for the tunnel.

**Additional configuration items**

- The UDP port that L2TP servers will listen on, if other than the deafult of **1701**.
- Access control for the L2TP tunnel.
- For L2TP access concentrators:
  - L2TP network server port.
  - The username and password of the L2TP server.
  - The metric for the tunnel.
  - Enable custom PPP configuration options for the tunnel.
    - Whether to override the default configuration and only use the custom options.
    - Optional configuration data in the format of a pppd options file.
- For L2TP network servers:
  - The Authentication method.
  - The metric for the tunnel.
  - Enable custom PPP configuration options for the tunnel.
    - Whether to override the default configuration and only use the custom options.
    - Optional configuration data in the format of a pppd options file.

## Web

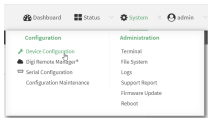
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **VPN** > **L2TP**.
4. (Optional) Type the **UDP listening port** that L2TP servers will listen on, if other than the default of **1701**.
5. Set the access control for L2TP tunnels:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's service-type. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the service-type.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's service-type. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the service-type.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.
   - To limit access based on firewall zones:
     a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
     b. For **Add Zone**, click ✚.
     c. For **Zone**, select the appropriate firewall zone from the dropdown.
        See Firewall configuration for information about firewall zones.
     d. Click ✚ again to allow access through additional firewall zones.
6. To add an L2TP access concentrator:
   a. Click to expand **L2TP access concentrators**.
   b. For **Add L2TP access concentrator**, type a name for the LAC and click ✚.
   c. LACs are enabled by default. To disable, toggle off **Enable**.
   d. For **L2TP network server**, type the hostname or IP address of the L2TP network server.

e. (Optional) Type the **L2TP network server port** to use to connect to the server, if other than the default of **1701**.

f. (Optional) Type the **Username** to use to log into the server.

g. (Optional) Type the **Password** to use to log into the server.

h. (Optional) Type the **Metric** for the tunnel, if other than the default of **1**.

i. Select a firewall **Zone** for the tunnel. This is used by packet filtering rules and access control lists to restrict network traffic on the tunnel.

j. (Optional): Custom PPP configuration:

   i. **Enable** custom PPP configuration.

   ii. Enable **Override** if the custom configuration should override the default configuration and only use the custom options.

   iii. For **Configuration file**, paste or type the configuration data in the format of a pppd options file.

7. To add an L2TP network server:

   a. Click to expand **L2TP network servers**.

   b. For **Add L2TP network server**, type a name for the LNS and click **+**.

   c. LNSs are enabled by default. To disable, toggle off **Enable**.

   d. For **L2TP access concentrator**, type the IP addressof the L2TP access concentrator that this server will allow connections from. This can also be:

      - A range of IP addresses, using the format x.x.x.x-y.y.y.y, for example **192.168.188.1-192.168.188.254**.
      - The keyword **any**, which means that the server will accept connections from any IP address.

   e. For **Local IP address**, type the IP address of the L2TP virtual network interface.

   f. For **Remote IP address**, type the IP address to assign to the remote peer.

   g. (Optional) For **Authentication method**, select one of the following:

      - **None**: No authentication is required.
      - **Automatic**: The device will attempt to connect using CHAP first, and then PAP.
      - **CHAP**: Uses the Challenge Handshake Authentication Profile (CHAP) to authenticate.
      - **PAP**: Uses the Password Authentication Profile (PAP) to authenticate.

      If **Automatic**, **CHAP**, or **PAP** is selected, enter the **Username** and **Password** required to authenticate.

      The default is **None**.

   h. (Optional) For **Authentication method**, select the authentication method, one of:

      - **None**: No authentication is required.
      - **Automatic**: The device will attempt to connect using CHAP first, and then PAP.
      - **CHAP**: Uses the Challenge Handshake Authentication Profile (CHAP) to authenticate.
      - **PAP**: Uses the Password Authentication Profile (PAP) to authenticate.

- **MS-CHAPv2**: Uses the Microsoft version of the Challenge Handshake Authentication Profile (CHAP) to authenticate.
- If **Automatic**, **CHAP**, **PAP**, or **MS-CHAPv2** is selected, enter the **Username** and **Password** required to authenticate.
- The default is **None**.

i. (Optional) Type the **Metric** for the tunnel, if other than the default of **1**.

j. Select a firewall **Zone** for the tunnel. This is used by packet filtering rules and access control lists to restrict network traffic on the tunnel.

k. (Optional): Custom PPP configuration:

i. **Enable** custom PPP configuration.

ii. Enable **Override** if the custom configuration should override the default configuration and only use the custom options.

iii. For **Configuration file**, paste or type the configuration data in the format of a pppd options file.

8. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Set the UDP listening port that L2TP servers will listen on:

```
(config)> vpn l2tp port value
(config)>
```

   where *value* is an integer between **1** and **65535**. The default is **1701**.

4. Set the access control for L2TP tunnels:

   - To limit access to specified IPv4 addresses and networks:

```
(config)> add vpn l2tp acl address end value
(config)>
```

     Where *value* can be:

     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the service-type.

     Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add vpn l2tp acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the service-type.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config)> add vpn l2tp acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add vpn l2tp acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------------------
------------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

5. To add an L2TP access concentrator:
   a. Add an LAC:

```
(config)> add vpn l2tp lac name
(config add vpn l2tp lac name)>
```

   where *name* is the name of the LAC. For example, to add an LAC named lac_tunnel:

```
(config)> add vpn l2tp lac lac_tunnel
(config vpn l2tp lac lac_tunnel)>
```

   LACs are enabled by default. To disable:

```
(config vpn l2tp lac lac_tunnel)> enable false
(config vpn l2tp lac lac_tunnel)>
```

   b. Set the hostname or IP address of the L2TP network server:

```
(config vpn l2tp lac lac_tunnel)> lns hostname
(config vpn l2tp lac lac_tunnel)>
```

   c. (Optional) Set the UDP port to use to connect to the L2TP network server:

```
(config vpn l2tp lac lac_tunnel)> port int
(config vpn l2tp lac lac_tunnel)>
```

   where *int* is an integer between **1** and **65535**. The default is **1701**.

   d. (Optional) Set the username to use to log into the server:

```
(config vpn l2tp lac lac_tunnel)> username username
(config vpn l2tp lac lac_tunnel)>
```

   e. (Optional) Set the password to use to log into the server:

```
(config vpn l2tp lac lac_tunnel)> password password
(config vpn l2tp lac lac_tunnel)>
```

   f. (Optional) Set the metric for the tunnel:

```
(config vpn l2tp lac lac_tunnel)> metric int
(config vpn l2tp lac lac_tunnel)>
```

   where *int* is an integer between **0** and **65535**. The default is **1**.

   g. Set the firewall zone for the tunnel. This is used by packet filtering rules and access control lists to restrict network traffic on the tunnel.

i. Use the **?** to determine available zones:

```
(config vpn l2tp lac lac_tunnel)> zone ?

Zone: The firewall zone assigned to this tunnel. This can be used
by packet
filtering rules and access control lists to restrict network
traffic on this
tunnel.
Format:
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
Current value:

(config vpn l2tp lac lac_tunnel)>
```

ii. Set the zone:

```
(config vpn l2tp lac lac_tunnel)> zone zone
(config vpn l2tp lac lac_tunnel)>
```

h. (Optional): Custom PPP configuration:

i. Enable custom PPP configuration:

```
(config vpn l2tp lac lac_tunnel)> custom enable true
(config vpn l2tp lac lac_tunnel)>
```

ii. Enable overriding, if the custom configuration should override the default configuration and only use the custom options:

```
(config vpn l2tp lac lac_tunnel)> custom override true
(config vpn l2tp lac lac_tunnel)>
```

iii. Paste or type the configuration data in the format of a pppd options file:

```
(config vpn l2tp lac lac_tunnel)> custom config_file data
(config vpn l2tp lac lac_tunnel)>
```

6. To add an L2TP network server:

a. Add an LNS:

```
(config)> add vpn l2tp lns name
(config add vpn l2tp lac name)>
```

where *name* is the name of the LNS. For example, to add an LNS named lns_server:

```
(config)> add vpn l2tp lns lns_server
(config vpn l2tp lns lns_server)>
```

LACs are enabled by default. To disable:

```
(config vpn l2tp lns lns_server)> enable false
(config vpn l2tp lns lns_server)>
```

b. Set the IP address of the L2TP access concentrator that this server will allow connections from:

```
(config vpn l2tp lns lns_server)> lac IP_address
(config vpn l2tp lns lns_server)>
```

This can also be:

- A range of IP addresses, using the format x.x.x.x-y.y.y.y, for example **192.168.188.1-192.168.188.254**.
- The keyword **any**, which means that the server will accept connections from any IP address.

c. Set the IP address of the L2TP virtual network interface:

```
(config vpn l2tp lns lns_server)> local_address IP_address
(config vpn l2tp lns lns_server)>
```

d. Set the IP address to assign to the remote peer:

```
(config vpn l2tp lns lns_server)> remote_address IP_address
(config vpn l2tp lns lns_server)>
```

e. (Optional) Set the authentication method:

```
(config vpn l2tp lns lns_server)> auth method
(config)>
```

where *method* is one of the following:

- **none**: No authentication is required.
- **auto**: The device will attempt to connect using CHAP first, and then PAP.
- **chap**: Uses the Challenge Handshake Authentication Profile (CHAP) to authenticate.
- **pap**: Uses the Password Authentication Profile (PAP) to authenticate.
- **mschapv2**: Uses the Microsoft version of the Challenge Handshake Authentication Profile (CHAP) to authenticate.

If **auto**, **chap**, **pap** or **mschapv2** is selected, enter the **Username** and **Password** required to authenticate:

```
(config vpn l2tp lns lns_server)> username username
(config vpn l2tp lns lns_server)> password password
(config vpn l2tp lns lns_server)>
```

The default is **none**.

f. (Optional) Set the metric for the tunnel:

```
(config vpn l2tp lns lns_server)> metric int
(config vpn l2tp lns lns_server)>
```

where *int* is an integer between **0** and **65535**. The default is **1**.

g. Set the firewall zone for the tunnel. This is used by packet filtering rules and access control lists to restrict network traffic on the tunnel.

i. Use the **?** to determine available zones:

```
(config vpn l2tp lns lns_server)> zone ?

Zone: The firewall zone assigned to this tunnel. This can be used
by packet
filtering rules and access control lists to restrict network
traffic on this
tunnel.
Format:
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
Current value:

(config vpn l2tp lns lns_server)>
```

ii. Set the zone:

```
(config vpn l2tp lns lns_server)> zone zone
(config vpn l2tp lns lns_server)>
```

h. (Optional): Custom PPP configuration:

i. Enable custom PPP configuration:

```
(config vpn l2tp lac lns lns_server)> custom enable true
(config vpn l2tp lns lns_server)>
```

ii. Enable overriding, if the custom configuration should override the default configuration and only use the custom options:

```
(config vpn l2tp lns lns_server)> custom override true
(config vpn l2tp lns lns_server)>
```

iii. Paste or type the configuration data in the format of a pppd options file:

```
(config vpn l2tp lns lns_server)> custom config_file data
(config vpn l2tp lns lns_server)>
```

7. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## L2TP with IPsec

L2TP is commonly used in conjunction with IPsec in transport mode (to provide security).

Your Connect EZ 16/32 supoorts L2TP with IPsec by configuring a transport-mode IPsec tunnel between the two endpoints, and then an L2TP tunnel with its LNS and LAC configured the same as the IPsec tunnel's endpoints. See Configure an IPsec tunnel for information about configuring an IPsec tunnel.

**Note** The Connect EZ 16/32 does not currently support the configuration of IPsec protocol/port traffic selectors. This means that you cannot restrict traffic on the IPsec tunnel to L2TP traffic (typically UDP port 1701).

While multiple L2TP clients are supported on the Connect EZ 16/32 by configuring a separate LNS for each client, multiple clients behind a Network Address Translation (NAT) device are not supported, because they will all appear to have the same IP address.

## Show L2TP tunnel status

### Web

#### *Show the status of L2TP access connectors from the WebUI*

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, select **Status**. Under VPN, select **L2TP** > **Access Connectors**.

   The **L2TP Access Connectors** page appears.

2. To view configuration details about an L2TP access connector, click the (configuration) icon in the upper right of the tunnel's status pane.

#### *Show the status of L2TP network servers from the WebUI*

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, select **Status**. Under VPN, select **L2TP** > **Network Servers**.

   The **L2TP Network Servers** page appears.

2. To view configuration details about an L2TP network server, click the (configuration) icon in the upper right of the tunnel's status pane.

### Command line

### Show the status of L2TP access connectors from the Admin CLI

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured L2TP access connectors, type the following at the prompt:

```
> show l2tp lac

 Name       Enabled  Status  Device
 ---------  -------  ------  -----------
 lac_test1  true     up      test_device0
 lac_test2  true     pending
>
```

3. To display details about a specific tunnel:

```
> show l2tp lac name lac_test2

 lac_test2 L2TP Access Concentrator Status
 -------------------------------------
 Enabled         : true
 Status          : pending

>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### Show the status of L2TP network servers from the Admin CLI

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured L2TP access connectors, type the following at the prompt:

```
> show l2tp lns

 Name       Enabled  Status  Device
 ---------  -------  ------  -----------
 lns_test1  true     up      test_device0
 lns_test2  true     pending

>
```

3. To display details about a specific tunnel:

```
> show l2tp lns name lns_test2

 lns_test2 L2TP Access Concentrator Status
 -------------------------------------
 Enabled         : true
 Status          : pending

>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# L2TPv3 Ethernet

Your Connect EZ 16/32 device supports Layer 2 Tunneling Protocol Version 3 (L2TPv3) static unmanaged Ethernet tunnels.

## Configure an L2TPv3 tunnel

Your Connect EZ 16/32 device supports Layer 2 Tunneling Protocol Version 3 (L2TPv3) static unmanaged Ethernet tunnels.

**Required configuration items**

- A name for the L2TPv3 tunnel.
- Enable the tunnel.
- The remote endpoint IP address.
- The local endpoint IP address.
- The session ID.
- The peer session ID.

**Additional configuration items**

- Encapsulation type. If UDP is selected:
  - The ID for the tunnel.
  - The ID of the peer's tunnel.
  - Determine whether to enable UDP checksum.
- The session cookie.
- The peer session cookie.
- The Layer2SpecificHeader type.
- The Sequence numbering control.

### Web

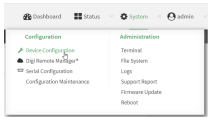
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **VPN** > **L2TPv3 ethernet**.
4. For **Add L2TPv3 ethernet tunnel**, type a name for the tunnel and click **+**.
5. For **Remote endpoint**, type the IPv4 address of the remote endpoint.
6. For **Local endpoint**, select the interface that will be the local endpoint.
7. For **Tunnel ID**, type the tunnel identifier for this tunnel. This must match the value for **Peer tunnel ID** on the remote peer. Allowed value is any integer between 1 and 4294967295.
8. For **Peer tunnel ID**, type the **Tunnel ID** of the remote peer.
9. (Optional) For **Encapsulation type**, select either **UDP** or **IP**. If **UDP** is selected:
   a. For **UDP source port**, type the number of the source UDP port to be used for the tunnel.
   b. For **UDP destination port**, type the number of the destination UDP port to be used for the tunnel.
   c. (Optional) Click to enable **UDP checksum** to calculate and check the UDP checksum.
10. Click to expand **Sessions**.
    a. For **Add Sesssion**, type a name for a session carried by the parent tunnel and click **+**.
    b. For **Session ID**, type the session identifier for this session. This must match the value for **Peer session ID** on the remote peer. Allowed value is any integer between 1 and 4294967295.
    c. For **Peer session ID**, type the **Session ID** of the remote peer.
    d. (Optional) For **Cookie**, type the cookie value to be assigned to the session. Allowed value is 8 or 16 hex digits.
    e. (Optional) For **Peer cookie**, type the **Cookie** value of the remote peer.
    f. For **Layer2SpecificHeader type**, select the Layer2Specific header type. This must match what is configured on the remote peer.

g. For **Sequence numbering control**, determine the sequence number control to prevent or detect out of order packets. Allowed values are:
   - **None**: No sequence numbering.
   - **Send**: Add a sequence number to each outgoing packet.
   - **Receive**: Reorder packets if they are received out of order.
   - **Both**: Add a sequence number to each outgoing packet, and reorder packets if they are received out of order.

   The default is **None**.

h. Repeat for additional sessions.

11. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a L2TPv3 Ethernet tunnel. For example, to add a tunnel named **L2TPv3_example**:

```
(config)> add vpn l2tpv3 L2TPv3_example
(config vpn l2tpeth L2TPv3_example)>
```

   The tunnel is enabled by default. To disable:

```
(config vpn l2tpeth L2TPv3_example)> enable false
(config vpn l2tpeth L2TPv3_example)>
```

4. Set the IPv4 address of the remote endpoint:

```
(config vpn l2tpeth L2TPv3_example)> remote IP_address
(config vpn l2tpeth L2TPv3_example)>
```

5. Set the interface of the local endpoint:
   i. Use the **?** to determine available interfaces:
   ii. Set the interface. For example:

```
(config vpn l2tpeth L2TPv3_example)> local /network/interface/eth1
(config vpn l2tpeth L2TPv3_example)>
```

6. Set the tunnel identifier for this tunnel. This must match the value for peer tunnel ID on the remote peer.

```
(config vpn l2tpeth L2TPv3_example)> tunnel_id value
(config vpn l2tpeth L2TPv3_example)>
```

where *value* is any integer between 1 and 4294967295.

7. Set the tunnel ID of the remote peer:

```
(config vpn l2tpeth L2TPv3_example)> peer_tunnel_id value
(config vpn l2tpeth L2TPv3_example)>
```

where *value* is any integer between 1 and 4294967295.

8. (Optional) Set the encapsulation type:

```
(config vpn l2tpeth L2TPv3_example)> encapsulation  value
(config vpn l2tpeth L2TPv3_example)>
```

where *value* is either **udp** or **ip**. The default is **upd**.

If **udp** is set:

a. Set the source UDP port to be used for the tunnel:

```
(config vpn l2tpeth L2TPv3_example)> udp_source_port port
(config vpn l2tpeth L2TPv3_example)>
```

b. Set the destination UDP port to be used for the tunnel.

```
(config vpn l2tpeth L2TPv3_example)> udp_destination_port port
(config vpn l2tpeth L2TPv3_example)>
```

c. (Optional) To calculate and check the UDP checksum:

```
(config vpn l2tpeth L2TPv3_example)> udp_checksum true
(config vpn l2tpeth L2TPv3_example)>
```

9. Add a session carried by the parent tunnel:

```
(config vpn l2tpeth L2TPv3_example)> add session session_example
(config vpn l2tpeth L2TPv3_example session_example)>
```

10. Set the session identifier for this session. This must match the value for peer session ID on the remote peer.

```
(config vpn l2tpeth L2TPv3_example session_example)> session_id value
(config vpn l2tpeth L2TPv3_example session_example)>
```

where *value* is any integer between 1 and 4294967295.

11. Set the session ID of the remote peer:

```
(config vpn l2tpeth L2TPv3_example session_example)> peer_session_id
value
(config vpn l2tpeth L2TPv3_example session_example)>
```

where *value* is any integer between 1 and 4294967295.

12. (Optional) Set the cookie value to be assigned to the session.

```
(config vpn l2tpeth L2TPv3_example session_example)> cookie value
(config vpn l2tpeth L2TPv3_example session_example)>
```

Allowed *value* is 8 or 16 hex digits.

13. (Optional) Set the cookie value of the remote peer:

```
(config vpn l2tpeth L2TPv3_example session_example)> peer cookie value
(config vpn l2tpeth L2TPv3_example session_example)>
```

Allowed *value* is 8 or 16 hex digits.

14. Set the Layer2Specific header type. This must match what is configured on the remote peer.

```
(config vpn l2tpeth L2TPv3_example session_example)> l2spec_type value
(config vpn l2tpeth L2TPv3_example session_example)>
```

where *value* is either **none** or **default**. The default is **default**.

15. Set the sequence number control to prevent or detect out of order packets.

```
(config vpn l2tpeth L2TPv3_example session_example)> seq value
(config vpn l2tpeth L2TPv3_example session_example)>
```

where *value* is one of:

- **none**: No sequence numbering.
- **send**: Add a sequence number to each outgoing packet.
- **recv**: Reorder packets if they are received out of order.
- **both**: Add a sequence number to each outgoing packet, and reorder packets if they are received out of order.

  The default is **none**.

16. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

17. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show L2TPV3 tunnel status

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, select **Status**. Under VPN, select **L2TPv3 Ethernet**.

The **L2TPv3 Ethernet** page appears.

2. To view configuration details about an L2TPV3 tunnel, click the (configuration) icon in the upper right of the tunnel's status pane.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To display details about all configured L2TPv3 Ethernet tunnels, type the following at the prompt:

```
> show l2tpeth

 Tunnel Session     Enabled  Device        Status
 -----------------  -------  ------------  ------
 test/session/test  true     le_test_test  up

>
```

3. To display details about a specific tunnel:

```
> show l2tpeth name /vpn/l2tpeth/test/session/test

 test/session/test Tunnel Session Status
 ---------------------------------------
 Enabled                  : true
 Status                   : up


 Local IP                 : 4.3.2.1
 Remote IP                : 10.10.10.1
 Tunnel ID                : modem
 Peer Tunnel ID           : 10.10.10.1 === 4.3.2.1
 Session ID               : 255
 Peer Session ID          : 1476
 Lifetime (Actual)        : 600

 Device                   : le_test_test
 RX Packets               : 2,102
 RX Bytes                 : 462
 TX Packets               : 2,787
 TX Byptes                : 3,120

>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# MACsec

MACsec (Media Access Control Security) is a 802.1ae (Layer2) VPN protocol that can be used to create a secure MACsec tunnel over a wired Ethernet LAN. The MACsec uses keys to provide multiple authentications between hosts in a network.

A MACsec tunnel must be tied to a physical interface. You cannot create a MACsec tunnel for a bridge.

### *Security modes*

Two security modes are available for a MACsec tunnel.

- **Automatic**: Uses a pre-shared key to generate association key information, which is periodically rotated through using 802.1x.
- **Manual**: Uses connectivity association key information that is manually entered in the **CAK** and **CKN** fields.

## Configure a MACsec tunnel

Your Connect EZ 16/32 device supports MACsec (Layer 2 Tunneling Protocol).

#### Required configuration items

- The local network device to connect to the peer device.
- When using **Manual** mode, the connectivity association key and key name.

### Web

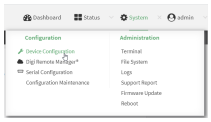
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **VPN** > **MACsec**.

4. For **Add MACsec tunnel**, click ✚.
5. Click **Enable**.
6. For **Local endpoint**, select the local network device you want to use to connect to the peer device.
7. For **Security mode**, select your desired mode.
   - **Automatic**: Uses a pre-shared key to generate association key information, which is periodically rotated through using 802.1x.
   - **Manual**: Uses connectivity association key information that is manually entered in the **CAK** and **CKN** fields.
8. If you selected **Manual**, additional required fields display.
   a. For **CAK**, enter the connectivity associated key. The key format is 16 hex digits.
   b. For **CKN**, enter the connectivity associated key name. The key format is 32 hex digits.
9. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Name the tunnel. At the config prompt, type:

```
(config)> add vpn macsec name
(config)>
```

   where *name* is a string.
4. Enable the tunnel:

```
(config vpn macsec tunnel1) enable true
(config vpn macsec tunnel1)>
```

5. Specify the local endpoint:

```
(config vpn macsec tunnel1) local value
(config vpn macsec tunnel1)>
```

   where *value* is one of the available options.
6. Specify the security mode:

```
(config vpn macsec tunnel1) type value
(config vpn macsec tunnel1)>
```

   where *value* is one of the following:

- **automatic**: Uses a pre-shared key to generate association key information, which is periodically rotated through using 802.1x.
- **manual**: Uses connectivity association key information that is manually entered.

7. If you specified the **manual** security mode, enter the connectivity association key and key name.
   a. Specify the connectivity association key:

   ```
   (config vpn macsec tunnel1) association cak value
   (config  vpn macsec tunnel1)>
   ```

   where *value* is the association key. The key format is 16 hex digits.
   b. Specify the connectivity association key name:

   ```
   (config vpn macsec tunnel1) association ckn value
   (config  vpn macsec tunnel1)>
   ```

   where *value* is the association key name. The key format is 32 hex digits.
8. Save the configuration and apply the change.

   ```
   (config)> save
   Configuration saved.
   >
   ```

9. Type **exit** to exit the Admin CLI.
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# NEMO

Network Mobility (NEMO) is a mobile networking technology that provides access to one or more Local Area Networks (LANs) on your device. NEMO creates a tunnel between the home agent on the mobile private network and the Connect EZ 16/32 device, isolating the connection from internet traffic and advertising the IP subnets of the LANs for remote access and device management.

Dynamic Mobile Network Routing (DMNR) is the implementation of NEMO for Verizon Wireless Private Networks. DMNR support requires the use of Verizon SIM cards that have DMNR enabled.

## Configure a NEMO tunnel

Configuring an NEMO tunnel with a remote device involves configuring the following items:

**Required configuration items**

- Enable the NEMO tunnel.
  The NEMO tunnel is enabled by default.
- The IP address of the NEMO virtual network interface.
- The firewall zone of the NEMO tunnel.
- The IP address of the NEMO home agent server. This is provided by your cellular carrier.
- The home agent's authentication key. This is provided by your cellular carrier.

- Home agent registration lifetime. This is provided by your cellular carrier.
- The local network interfaces that will be advertised on NEMO.

**Additional configuration items**

- The home agent Software Parameter Index (SPI).
- Path MTU discovery.

  Path MTU discovery is enabled by default. If it is disabled, identify the MTU.
- Care of address: the local network interface that is used to communicate with the peer.
  - If set to **Interface**, identify the local interface to be used. Generally, this will be the Wirelesss WAN (**Modem**).
  - If set to **IP address**, enter the IP address.
- The local network of the GRE endpoint negotiated by NEMO.
  - If the local network is set to Interface, identify the local interface to be used.

## Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

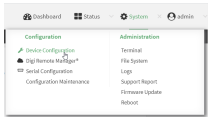
   b. Click the **Device ID**.

   c. Click **Settings**.

   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **VPN** > **NEMO**.

   The NEMO tunnel is enabled by default. To disable, toggle off **Enable**.
4. For **Home IP address**, type the IPv4 address of the NEMO virtual network interface.
5. For **Zone**, select **Internal**.

   The Internal firewall zone configures the Connect EZ 16/32 device to trust traffic going to the tunnel and allows it through the network.
6. For **Home agent server IP** address, type the IPv4 address of the NEMO home agent. This is provided by your cellular carrier.

7. For **Key**, type the key used to authenticate to the home agent. This is provided by your cellular carrier.
8. For **Home agent SPI**, type the Security Parameter Index (SPI) value, which is used in the authentication extension when registering. This should be normally left at the default setting of **256** unless your service provider indicates a different value.
9. For **Home agent registration lifetime, in seconds**, type the number of seconds number of seconds until the authorization key expires. This is provided by your cellular carrier.
10. For **MTU discovery**, leave enabled to determine the maximum transmission unit (MTU) size.

    If disabled, for **MTU**, type the MTU size. The default MTU size for LANs on the Connect EZ 16/32 device is 1500. The MTU size of the NEMO tunnel will be smaller, to take into account the required headers.
11. Click to expand **Care of address** to configure the local WAN interface of the internet facing network.
    a. For **Type**, select the method to determine the local network interface that is used to communicate with the peer.
        - If **Default route** is selected, the network interface that is used will be the same as the default route.
        - If **Interface** is selected, specify the local network interface.
        - If **IP address** is selected, type the IP address.

    The default is **Default route**.
12. Click to expand **GRE tunnel local endpoint**.
    a. For **Type**, select the local endpoint of the GRE endpoint negotiated by NEMO.
        - If **Default route** is selected, the network interface that is used will be the same as the default route.
        - If **Interface** is selected, specify the local network interface.

    The default is **Default route**.
13. Click to expand **Local networks**.
    a. For **Add Interface**, click ✚ to add a local network to use as a virtual NEMO network interface.

    b. For **Interface**, select the local interface to use as a virtual NEMO network interface. Generally, this will be the a Local Area Network (LAN).
    c. (Optional) Repeat for additional interfaces.
14. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a NEMO tunnel. For example, to add a NEMO tunnel named **nemo_example**:

```
(config)> add vpn nemo nemo_example
(config vpn nemo nemo_example)>
```

The NEMO tunnel is enabled by default. To disable:

```
(config vpn nemo nemo_example)> enable false
(config vpn nemo nemo_example)>
```

4. Set the IPv4 address of the NEMO virtual network interface:

```
(config vpn nemo nemo_example)> home_address IPv4_address
(config vpn nemo nemo_example)>
```

5. Set the IPv4 address of the NEMO home agent. This is provided by your cellular carrier.

```
(config vpn nemo nemo_example)> home_agent IPv4_address
(config vpn nemo nemo_example)>
```

6. Set the key used to authenticate to the home agent. This is provided by your cellular carrier.

```
(config vpn nemo nemo_example)> key value
(config vpn nemo nemo_example)>
```

7. Set the the number of seconds number of seconds until the authorization key expires. This is provided by your cellular carrier.

```
(config vpn nemo nemo_example)> lifetime integer
(config vpn nemo nemo_example)>
```

Allowed values are any integer between 1 and 65535.

8. MTU discovery is enabled by default, which allows the device to determine the maximum transmission unit (MTU) size. To disable:

```
(config vpn nemo nemo_example)> mtu_discovery false
(config vpn nemo nemo_example)>
```

If disabled, set the MTU size. The default MTU size for LANs on the Connect EZ 16/32 device is 1500. The MTU size of the NEMO tunnel will be smaller, to take into account the required headers.

```
(config vpn nemo nemo_example)> mtu integer
(config vpn nemo nemo_example)>
```

Allowed values are any integer between 68 and 1476.

9. Set the Security Parameter Index (SPI) value, which is used in the authentication extension when registering. This should be normally left at the default setting of **256** unless your service

provider indicates a different value.

```
(config vpn nemo nemo_example)> spi integer
(config vpn nemo nemo_example)>
```

Allowed values are any integer between 256 and 4294967295.

10. Set the firewall zone for the NEMO tunnel to internal:

```
(config vpn nemo nemo_example)> zone internal
(config vpn nemo nemo_example)>
```

The Internal firewall zone configures the Connect EZ 16/32 device to trust traffic going to the tunnel and allows it through the network.

11. Configure the Care-of-Address, the local WAN interface of the internet facing network.
    a. Set the method to determine the Care-of-Address:

```
(config vpn nemo nemo_example)> coaddress type value
(config vpn nemo nemo_example)>
```

where *value* is one of:

- **defaultroute**: Uses the same network interface as the default route.
- **interface**

  If **interface** is used, set the interface:

  i. Use the **?** to determine available interfaces:

  ii. Set the interface. For example:

```
(config vpn nemo nemo_example)> coaddress interface eth1
(config vpn nemo nemo_example)>
```

- **ip**

  If **ip** is used, set the IP address:

```
(config vpn nemo nemo_example)> coaddress address IP_address
(config vpn nemo nemo_example)>
```

The default is **defaultroute**.

12. Set the GRE tunnel local endpoint:
    a. Set the method to determine the GRE tunnel local endpoint:

```
(config vpn nemo nemo_example)> tun_local type value
(config vpn nemo nemo_example)>
```

where *value* is one of:

- **defaultroute**: Uses the same network interface as the default route.
- **interface**

  If **interface** is used, set the interface.

i. Use the **?** to determine available interfaces:

ii. Set the interface. For example:

```
(config vpn nemo nemo_example)> tun_local interface eth1
(config vpn nemo nemo_example)>
```

The default is **defaultroute**.

13. Configure one or more local networks to use as a virtual NEMO network interface. Generally, this will be a Local Area Network (LAN):

    a. Add a local network to use as a virtual NEMO network interface:

    ```
    (config vpn nemo nemo_example)> add network end eth2
    (config vpn nemo nemo_example)>
    ```

    b. (Optional) Repeat for additional interfaces.

14. Save the configuration and apply the change.

    ```
    (config)> save
    Configuration saved.
    >
    ```

15. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show NEMO status

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, select **Status** > **NEMO**.

   The **NEMO** page appears.

2. To view configuration details about an NEMO tunnel, click the (configuration) icon in the upper right of the tunnel's status pane.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. To display details about all configured NEMO tunnels, type the following at the prompt:

```
> show nemo

 NEMO  Enable  Status  Address  Agent    CoAddress
 ----  ------  ------  -------  -------  ----------
 demo  false
```

```
test  true    up      1.2.3.4  4.3.2.1  10.10.10.1

>
```

3. To display details about a specific tunnel:

```
> show nemo name test

 test NEMO Status
 ----------------
 Enabled                  : true
 Status                   : up
 Home Agent               : 4.3.2.1
 Care of Address          : 10.10.10.1
 Interface                : modem
 GRE Tunnel               : 10.10.10.1 === 4.3.2.1
 Metric                   : 255
 MTU                      : 1476
 Lifetime (Actual)        : 600

 Local Network  Subnet          Status
 -------------  --------------  ----------
 lan1           192.168.2.1/24  Advertized
 LAN2           192.168.3.1/24  Advertized


>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# WireGuard VPN

WireGuard is a VPN[1] is a protocol that operates at the network layer to provide communication between devices over a public network. It encrypts and encapsulates traffic to protect information. WireGuard supports full networking capabilities including standard, policy-based, and static routes, as well as firewalls. In addition to having IPs inside the tunnel, like IPSec and OpenVPN, you can use this WireGuard tunnel for policy-based routing: send only certain traffic through the tunnel or use it for static routes to send routing and networking through regardless of the source IP. You can also have multiple tunnels.

There are two modes available when configuring a WireGuard VPN:

- **Client mode**: Configure the Connect EZ 16/32 device to act as a client, so it establishes an outbound WireGuard VPN tunnel to a remote server.
- **Server mode**: Configure the Connect EZ 16/32 device to act as a server, so one or more remote devices can establish an inbound WireGuard VPN tunnel to the device.

1virtual private network

## Configure the WireGuard VPN

Your Connect EZ 16/32 device supports using WireGuard VPN. You can configure the device for either client or server mode. For client mode, your Connect EZ 16/32 is establishing an outbound WireGuard VPN connection to the WireGuard server. For server mode, your Connect EZ 16/32 is acting as a WireGuard server and accepts incoming WireGuard VPN connections from one or more client devices. Regardless of how you configure the device, you will need to to create a Wireguard tunnel and corresponding interface.

### *Before you begin*

Decide whether you want your device to establish an outbound WireGuard VPN connection or if you want it to act as a WireGuard server. Each mode requires different information.

| **For client mode**<br>You need the following information from the WireGuard server:<br>■ Private key<br>■ Remote endpoint address or hostname<br>■ Remote endpoint port<br>■ Remote endpoint public key<br>■ Preshared key (optional)<br>■ Local and remote IP addresses | **For server mode**<br>You need the following information:<br>■ Client public key<br>**Note** This key can come from the client device or you can generate it from the Digi device's Admin CLI console using the `wireguard generate [tunnel_name] [client_name]` command after configuring the Wireguard server settings on the Digi device.<br>■ Pre-shared key (optional)<br>■ Local and remote IP addresses |
|---|---|

### Web

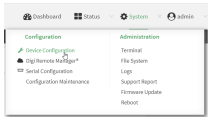
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
b. Click the **Device ID**.
c. Click **Settings**.
d. Click to expand **Config**.

Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

1. To create a WireGuard tunnel, navigate to **VPN** > **WireGuard** > **WireGuard tunnel**.
2. Click ✚ to add a new WireGuard tunnel.
3. Type a name for the tunnel.
4. Click **OK**.

   The settings for your new tunnel appear.

| Tunnel setting | UI configuration |
|---|---|
| **Enable** | The new tunnel is enabled by default. It can be disabled if the tunnel is being set up for future use or if you want to stop the tunnel while testing other configuration changes. |

| Tunnel setting | UI configuration |
|---|---|
| **Peers** | a. Click ✚ to add a new peer.<br>▪ If this Connect EZ 16/32 is the WireGuard client, then only add one peer. The peer is the remote Wireguard server to which it connects.<br>▪ If this Connect EZ 16/32 is the WireGuard server, add one or more peers. The peer(s) are the remote WireGuard clients that will connect to this device.<br>b. Configure the settings for the new peer (s).<br>If the new peer is to act as the WireGuard server, make sure to configure the following settings:<br>▪ [Remote] Public key<br>▪ [Remote] Pre-shared key (optional)<br>▪ [Remote] Allowed addresses: Only traffic destined for an IP address added here is sent to this peer.<br>▪ [Remote] Endpoint address<br>▪ [Remote] Endpoint port<br>If the new peer is to act as a remote WireGuard client, make sure to configure the following settings:<br>▪ [Client] Public key<br>▪ [Client] Pre-shared key (optional)<br>▪ [Local and Remote] Allowed addresses |
| **Device managed private key** | Enable to allow the Connect EZ 16/32 to generate its own public and private keys. If this setting is enabled, it triggers the Connect EZ 16/32 to automatically generate a private key and corresponding public key. This private and public key is used to establish the encrypted communication between the client and peer via the Wireguard tunnel. To see the public key, navigate to **Status** > **VPN** > **WireGuard**. |

| Tunnel setting | UI configuration |
|---|---|
| **Private key** | Type the private key for the Wireguard tunnel, if the **Device managed private key** setting is disabled. |
| **Endpoint port** | The WireGuard connection value of **51820** is populated by default. |

5. Modify the settings.
6. To create the WireGuard interface, navigate to **Network** > **Interfaces** > **Interface**.
7. Click ✚ to add a new interface.
8. Type a name for the interface.
9. Click **OK**.
10. The settings for your new interface appear.

| Tunnel setting | UI configuration |
|---|---|
| **Enable** | The new interface is enabled by default. It can be disabled if it is being set up for future use or if you want to stop using the interface while testing other configuration changes. |
| **Zone** | Select **External**. |
| **Device** | Select the device the interface will use, which is the new WireGuard tunnel you created. |
| **IPv4** | a. Click **IPv4** to expand the settings menu.<br>b. For **Address**, type the IP address and netmask assigned to this interface (SYNTAX: IPv4_address/netmask). For example, `10.200.200.1/24`.<br>c. Click to expand **DNS servers**.<br>d. Click ✚ to add a new DNS server.<br>e. For DNS Server, type the IP address of the DNS server (SYNTAX: IPv4_address). For example, `10.200.200.1`. |

11. Click **Apply** to save the new configuration settings.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Save the configuration and apply the change.

```
(config vpn iptunnel gre_example)> save
Configuration saved.
>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

5. At the command line, type **VPN** to enter configuration mode for VPN:

```
 > config vpn
(config vpn)>
```

6. Type **wireguard** to enter configuration mode for WireGuard.

```
 > config vpn wireguard
(config vpn wireguard)>
```

7. The table below lists the required settings for creating and configuring a client WireGuard tunnel.

| Configuration | Description |
|---|---|
| **add** | Add a new WireGuard tunnel.<br>`> config vpn wireguard add name`<br>`(config)>`<br>Where *name* is the name of the new WireGuard tunnel.<br>For example, *newtunnel1*. |
| **enable** | The WireGuard tunnel is enabled by default.<br>You may want to temporarily disable the tunnel while it is being set up, for future use, or if you want to stop the tunnel while testing other configuration changes.<br>To disable:<br>`(config)> vpn wireguard name enable false`<br>`(config)>`<br>To enable:<br>`(config)> vpn wireguard name enable true`<br>`(config)>` |
| **peer** | a. Determine if the Connect EZ 16/32 will act as a client or server. |

- If this Connect EZ 16/32 is the WireGuard client, then only add one peer. The peer is the remote Wireguard server to which it connects.
- If this Connect EZ 16/32 is the WireGuard server, add one or more peers. The peer(s) are the remote WireGuard clients that will connect to this device.

b. Create the peer(s).

```
(config)> vpn wireguard name add peer
(config)>
```

For a peer that acts as the remote Wireguard server, configure the following settings:

- [Remote] Device managed public key

```
(config vpn wireguard [name])>  generate
```

```
Parameters
----------------------------------------
tunnel          Tunnel Name (Required)
peer            Peer (Required)
```

- [Remote] Public key

```
(config)> vpn wireguard name peer public_key
(config)>
```

- [Remote] Pre-shared key (optional)

```
(config)> vpn wireguard name peer psk
(config)>
```

- [Remote] Allowed addresses: Only traffic destined for an IP address added here will be sent to this peer.

```
(config)> vpn wireguard name peer overlay
(config)>
```

- [Remote] Endpoint address

```
(config)> vpn wireguard name peer endpoint
(config)>
```

- [Remote] Endpoint port

```
(config)> vpn wireguard name peer port
(config)>
```

For a peer(s) that acts as the remote WireGuard client, configure the following settings:

- [Client] Public key

| | |
|---|---|
| | ```(config)> vpn wireguard name peer public_key<br>(config)>```<br>▪ [Client] Pre-shared key (optional)<br>```(config)> vpn wireguard name peer psk<br>(config)>```<br>▪ [Local and Remote] Allowed addresses |
| **autogenerate** | Enable to allow the Connect EZ 16/32 to generate its own public and private keys. If this setting is enabled, it triggers the Connect EZ 16/32 to automatically generate a private key and corresponding public key.<br>To enable:<br>```> config vpn wireguard add name autogenerate true<br>(config)>```<br>To disable:<br>```> config vpn wireguard add name autogenerate false<br>(config)>``` |
| **port** | The WireGuard connection value of **51820** is populated by default.<br>```(config)> vpn wireguard name port<br>(config)>``` |
| **private-key** | Type the private key for the Wireguard tunnel, if the **Device managed private key** setting is disabled.<br>```> config vpn wireguard add name private key value<br>(config)>```<br>With *value* being a 32-byte string encoded in base 64. |

8. The table below lists the required settings for creating and configuring a new interface.

| Configuration | Description |
|---|---|
| **add** | Add a new interface.<br>```> (config network interface) > add name<br>(config)>```<br>Where *name* is the name of the new interface.<br>For example, `add newWGtunnel1`. |
| **enable** | The interface is enabled by default.<br>You may want to temporarily disable the tunnel while it is being set up, for future use, or if you want to stop the tunnel while testing other configuration |

| | |
|---|---|
| | changes.<br>To disable:<br>`(config network interface ) > name enable false`<br>`(config)>`<br>To enable:<br>`(config network interface) > name enable true`<br>`(config)>`<br>Where *name* is the name of the new interface. |
| **zone** | Set the zone to external.<br>`(config network interface [name]) > zone external`<br>`(config)>` |
| **device** | Add the network device used by this interface.<br>`(config network interface [name]) > device /vpn/wireguard/[name]`<br>For example, `device /vpn/wireguard/newWGtunnel1`. |
| **IPv4** | a. Add the address and netmask assigned to this interface.<br>`config network interface [name] ipv4) > address IPv4_[IPaddress]/[netmask]`<br>For example, `ipv4_10.200.200.1/24`.<br>b. Add the IP address of the DNS server.<br>`(config network interface [name] ipv4) > dns`<br>`(config network interface [name] ipv4 dns) > ipv4_[address].`<br>Address is the IP address of the DNS server.<br>For example, `ipv4_10.200.200.1`. |

# Services

This chapter contains the following topics: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# Allow remote access for web administration and SSH

By default, only devices connected to the Connect EZ 16/32's LAN have access to the device via web administration and SSH. To enable these services for access from remote devices:

- The Connect EZ 16/32 device must have a publicly reachable IP address.
- The **External** firewall zone must be added to the web administration or SSH service. See Firewall configuration for information on zones.
- See Set the idle timeout for Connect EZ 16/32 users for information about setting the inactivity timeout for the web administration and SSH services.

To allow web administration or SSH for the External firewall zone:

## Add the External firewall zone to the web administration service

### Web

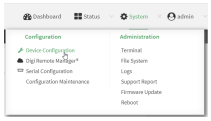
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

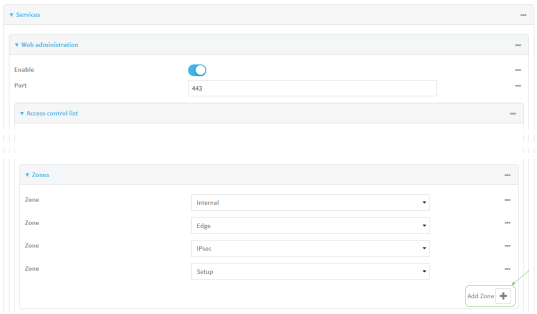
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

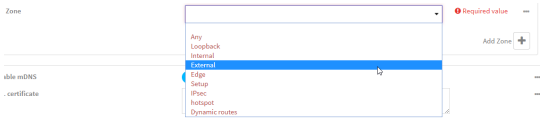
   

   The **Configuration** window is displayed.
3. Click **Services** > **Web administration** > **Access Control List** > **Zones**.

4. For **Add Zone**, click ✚.




5. Select **External**.




6. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the external zone to the web administration service:

```
(config)> add service web_admin acl zone end external
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Add the External firewall zone to the SSH service

## Web

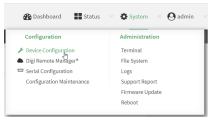
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

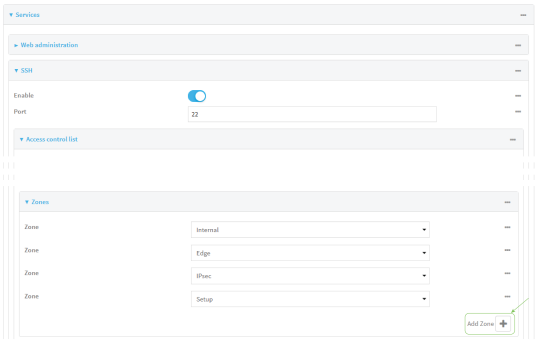
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

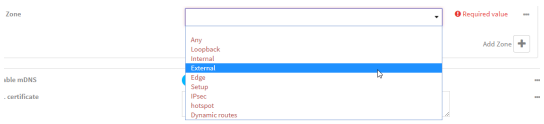
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Configuration** > **Services** > **SSH** > **Access Control List** > **Zones**.
4. For **Add Zone**, click ✚.

5. Select **External**.

6. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the **External** zone to the SSH service:

```
(config)> add service ssh acl zone end external
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure the web administration service

The web administration service allows you to monitor and configure the Connect EZ 16/32 device by using the WebUI, a browser-based interface.

By default, the web administration service is enabled and uses the standard HTTPS port, 443. The default access control for the service uses the **Internal** firewall zone, which means that only devices connected to the Connect EZ 16/32's LAN can access the WebUI. If this configuration is sufficient for your needs, no further configuration is required. See Allow remote access for web administration and SSH for information about configuring the web administration service to allow access from remote devices.

### *Required configuration items*

- The web administration service is enabled by default.
- Configure access control for the service.

### *Additional configuration items*

- Port to use for web administration service communication.
- Multicast DNS (mDNS) support.
- An SSL certificate to use for communications with the service.
- Support for legacy encryption protocols.

See Set the idle timeout for Connect EZ 16/32 users for information about setting the inactivity timeout for the web administration services.

## Enable or disable the web administration service

The web administration service is enabled by default. To disable the service, or enable it if it has been disabled:

### Web

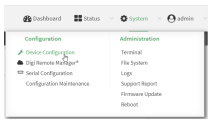
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **Web administration**.
4. Click **Enable**.
5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable or disable the web administration service:
   - To enable the service:

```
(config)> service web_admin enable true
(config)>
```

- To disable the sevice:

```
(config)> service web_admin enable false
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure the service

### Web

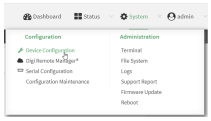
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **Web administration**.
4. (Optional) For **Port**, enter the port number for the service. Normally this should not be changed.
5. Click **Access control list** to configure access control:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's web administration service. Allowed values are:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the web administration service.

d. Click ✚ again to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:
  a. Click **IPv6 Addresses**.
  b. For **Add Address**, click ✚.
  c. For **Address**, enter the IPv6 address or network that can access the device's web administration service. Allowed values are:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the web administration service.
  d. Click ✚ again to list additional IP addresses or networks.
- To limit access to hosts connected through a specified interface on the device:
  a. Click **Interfaces**.
  b. For **Add Interface**, click ✚.
  c. For **Interface**, select the appropriate interface from the dropdown.
  d. Click ✚ again to allow access through additional interfaces.
- To limit access based on firewall zones:
  a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
  b. For **Add Zone**, click ✚.
  c. For **Zone**, select the appropriate firewall zone from the dropdown.
     See Firewall configuration for information about firewall zones.
  d. Click ✚ again to allow access through additional firewall zones.

6. Multicast DNS (mDNS) is enabled by default. mDNS is a protocol that resolves host names in small networks that do not have a DNS server. To disable mDNS, or enable it if it has been disabled, click **Enable mDNS**.
7. For **SSL certificate**, if you have your own signed SSL certificate, paste the certificate and private key. If **SSL certificate** is blank, the device will use an automatically-generated, self-signed certificate.
   - The SSL certificate and private key must be in PEM format.
   - The private key can use one of the following algorithms:
     - RSA
     - DSA
     - ECDSA
     - ECDH

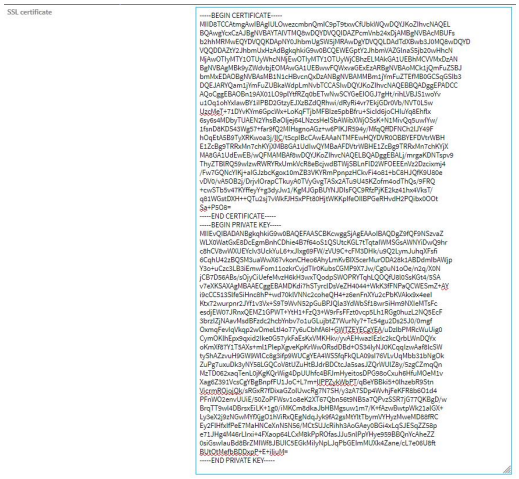
     **Note** Password-protected certificate keys are not supported.

Example:

a. Generate the SSL certificate and private key, for example:

```
# openssl req -newkey rsa:2048 -nodes -keyout key.pem -x509 -days 365
-out certificate.pem
```

b. Paste the contents of **certificate.pem** and **key.pem** into the **SSL certificate** field. The contents of the **certificate.pem** must be first. For example:




8. **View** is set to **Auto** by default and normally should not be changed.
9. **Legacy port redirection** is used to redirect client HTTP requests to the HTTPS service. Legacy port redirection is enabled by default, and normally these settings should not be changed. To disable legacy port redirection, click to expand **Legacy port redirection** and deselect **Enable**.
10. For **Minimum TLS version**, select the minimum TLS version that can be used by client to negotiate the HTTPS session.
11. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Configure access control:
   - To limit access to specified IPv4 addresses and networks:

```
(config)> add service web_admin acl address end value
(config)>
```

   Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the web administratrion service.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service web_admin acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the web administratrion service.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config)> add service web_admin acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service web_admin acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------------------
------------------------
  any
  dynamic_routes
  edge
```

```
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to include additional firewall zones.

4. (Optional) If you have your own signed SSL certificate, if you have your own signed SSL certificate, set the certificate and private key by pasting their contents into the **service web_admin cert** command. Enclose the certificate and private key contents in quotes (").

```
(config)> service web_admin cert "ssl-cert-and-private-key"
(config)>
```

- If **SSL certificate** is blank, the device will use an automatically-generated, self-signed certificate.
- The SSL certificate and private key must be in PEM format.
- The private key can use one of the following algorithms:
  - RSA
  - DSA
  - ECDSA
  - ECDH

  **Note** Password-protected certificate keys are not supported.

**Example**

a. Generate the SSL certificate and private key, for example:

```
# openssl req -newkey rsa:2048 -nodes -keyout key.pem -x509 -days 365
-out certificate.pem
```

b. Paste the contents of **certificate.pem** and **key.pem** into the **service web_admin cert** command. Enclose the contents of **certificate.pem** and **key.pem** in quotes. For example:

```
(config)> service web_admin cert "-----BEGIN CERTIFICATE-----
MIID8TCCAtmgAwIBAgIULOwezcmbnQmIC9pT9txwCfUbkWQwDQYJKoZIhvcNAQEL
BQAwgYcxCzAJBgNVBAYTAlVTMQ8wDQYDVQQIDAZPcmVnb24xDjAMBgNVBAcMBUFs
b2hhMRMwEQYDVQQKDApNY0JhbmUgSW5jMRAwDgYDVQQLDAdTdXBwb3J0MQ8wDQYD
VQQDDAZtY2JhbmUxHzAdBgkqhkiG9w0BCQEWEGptY2JhbmVAZGlnaS5jb20wHhcN
MjAwOTIyMTY1OTUyWhcNMjEwOTIyMTY1OTUyWjCBhzELMAkGA1UEBhMCVVMxDzAN
BgNVBAgMBk9yZWdvbjEOMAwGA1UEBwwFQWxvaGExEzARBgNVBAoMCk1jQmFuZSBJ
bmMxEDAOBgNVBAsMB1N1cHBvcnQxDzANBgNVBAMMBm1jYmFuZTEfMB0GCSqGSIb3
DQEJARYQam1jYmFuZUBkaWdpLmNvbTCCASIwDQYJKoZIhvcNAQEBBQADggEPADCC
AQoCggEBAOBn19AX01LO9plYtfRZq0bETwNwSCYGeEIOGJ7gHt/rihLVBJS1woYv
u1Oq1ohYxIawBY1iIPBD2GtzyEJXzBZdQRhwi/dRyRi4vr7EkjGDr0Vb/NVT0L5w
UzcMeT+71DYvKYm6GpcWx+LoKqFTjbMFBIze5pbBfru+SicId6joCHIuYq8Ehflx
6sy6s4MDbyTUAEN2YhsBaOljej64LNzcsHeISbAWibXWjOSsK+N1MivQq5uwIYw/
```

```
1fsnD8KDS43Wg57+far9fQ2MIHsgnoAGz+w6PIKJR594y/MfqQffDFNCh2lJY49F
hOqEtA5B9TyXRKwoa3j/lIC/t5cpIBcCAwEAAaNTMFEwHQYDVR0OBBYEFDVtrWBH
E1ZcBg9TRRxMn7chKYjXMB8GA1UdIwQYMBaAFDVtrWBHE1ZcBg9TRRxMn7chKYjX
MA8GA1UdEwEB/wQFMAMBAf8wDQYJKoZIhvcNAQELBQADggEBALj/mrgaKDNTspv9
ThyZTBlRQ59wIzwRWRYRxUmkVcR8eBcjwdBTWjSBLnFlD2WFOEEEnVz2Dzcixmj4
/Fw7GQNcYIKj+aIGJzbcKgox10mZB3VKYRmPpnpzHCkvFi4o81+bC8HJQfK9U80e
vDV0/vA5OB2j/DrjvlOrapCTkuyA0TVyGvgTASx2ATu9U45KZofm4odThQs/9FRQ
+cwSTb5v47KYffeyY+g3dyJw1/KgMJGpBUYNJDIsFQC9RfzPjKE2kz41hx4VksT/
q81WGstDXH++QTu2sj7vWkFJH5xPFt80HjtWKKpIfeOIlBPGeRHvdH2PQibx0OOt
Sa+P5O8=
-----END CERTIFICATE-----
-----BEGIN PRIVATE KEY-----
MIIEvQIBADANBgkqhkiG9w0BAQEFAASCBKcwggSjAgEAAoIBAQDgZ9fQF9NSzvaZ
WLX0WatGxE8DcEgmBnhCDhie4B7f64oS1QSUtcKGL7tTqtaIWMSGsAWNYiDwQ9hr
c8hCV8wWXUEYcIv3UckYuL6+xJIxg69FW/zVU9C+cFM3DHk/u9Q2LymJuhqXFsfi
6CqhU42zBQSM3uaWwX67vkonCHeo6AhyLmKvBIX5cerMurODA28k1ABDdmIbAWjp
Y3o+uCzc3LB3iEmwFom11ozkrCvjdTIr0KubsCGMP9X7Jw/Cg0uN1oOe/n2q/X0N
jCB7D56ABs/sOjyCiUefeMvzH6kH3wxTQodpSWOPRYTqhLQOQfU8l0SsKGt4/5SA
v7eXKSAXAgMBAAECggEBAMDKdi7hSTyrclDsVeZH4044+WkK3fFNPaQCWESmZ+AY
i9cCC513SlfeSiHnc8hP+wd70klVNNc2coheQH4+z6enFnXYu2cPbKVAkx9x4eeI
Ktx72wurpnr2JYf1v3Vx+S9T9WvN52pGuBPJQla3YdWbSf18wr5iHm9NXIeMTsFc
esdjEW07JRnxQEMZ1GPWT+YtH1+FzQ3+W9rFsFFzt0vcp5Lh1RGg0huzL2NQ5EcF
3brzIZjNAavMsdBFzdc2hcbYnbv7o1uGLujbtZ7WurNy7+Tc54gu2Ds25J0/0mgf
OxmqFevIqVkqp2wOmeLtI4o77y6uCbhfA6I+GWTZEYECgYEA/uDzlbPMRcWuUig0
CymOKlhEpx9qxid2Ike0G57ykFaEsKxVMKHkv/yvAEHwazIEzlc2kcQrbLWnDQYx
oKmXf87Y1T5AXs+ml1PlepXgveKpKrWwORsdDBd+OS34lyNJ0KCqqIzwAaf8lcSW
tyShAZzvuH9GW9WlCc8g3ifp9WUCgYEA4WSSfqFkQLA09sI76VLvUqMbb31bNgOk
ZuPg7uxuDk3yNY58LGQCoV8tUZuHtBJdrBDCtcJa5sasJZQrWUlZ8y/5zgCZmqQn
MzTD062xaqTenL0jKgKQrWig4DpUUhfc4BFJmHyeitosDPG98oCxuh6HfuMOeM1v
Xag6Z391VcsCgYBgBnpfFU1JoC+L7m+lIPPZykWbPT/qBeYBBki5+0lhzebR9Stn
VicrmROjojQk/sRGxR7fDixaGZolUwcRg7N7SH/y3zA7SDp4WvhjFeKFR8b6O1d4
PFnWO2envUUiE/50ZoPFWsv1o8eK2XT67Qbn56t9NB5a7QPvzSSR7jG77QKBgD/w
BrqTT9wl4DBrsxEiLK+1g0/iMKCm8dkaJbHBMgsuw1m7/K+fAzwBwtpWk21alGX+
Ly3eX2j9zNGwMYfXjgO1hViRxQEgNdqJyk9fA2gsMtYltTbymVYHyzMweMD88fRC
Ey2FlHfxIfPeE7MaHNCeXnN5N56/MCtSUJcRihh3AoGAey0BGi4xLqSJESqZZ58p
e71JHg4M46rLlrxi+4FXaop64LCxM8kPpROfasJJu5nlPpYHye959BBQnYcAheZZ
0siGswIauBd8BrZMIWf8JBUIC5EGkMiIyNpLJqPbGEImMUXk4Zane/cL7e06U8ft
BUtOtMefbBDDxpP+E+iIiuM=
-----END PRIVATE KEY-----"
(config)>
```

5. (Optional) Configure Multicast DNS (mDNS):

   mDNS is a protocol that resolves host names in small networks that do not have a DNS server. mDNS is enabled by default. To disable mDNS, or enable it if it has been disabled:

   - To enable the mDNS protocol:

     ```
     (config)> service web_admin mdns enable true
     (config>
     ```

- To disable the mDNS protocl:

```
(config)> service web_admin mdns enable false
(config)>
```

6. (Optional) Set the port number for this service.

   The default setting of 443 normally should not be changed.

```
(config)> service web_admin port 444
(config)>
```

7. (Optional) Set the minimum TLS version that can be used by client to negotiate the HTTPS session:

```
(config)> service web_admin legacy_encryption value
(config)>
```

   where *value* is one of:

   - **TLS-1_1**
   - **TLS-1_2**
   - **TLS-1_3**

   The default is **TLS-1_2**.

8. (Optional) Disable legacy port redirection.

   Legacy port redirection is used to redirect client HTTP requests to the HTTPS service. Legacy port redirection is enabled by default, and normally these settings should not be changed.

   To disable legacy port redirection:

```
(config)> service web_admin legacy enable false
(config)>
```

9. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Configure SSH access

The Connect EZ 16/32's default configuration has SSH access enabled, and allows SSH access to the device from authorized users within the **Internal** firewall zone. If this configuration is sufficient for your needs, no further configuration is required. See Allow remote access for web administration and SSH for information about configuring the SSH service to allow access from remote devices.

## *Required configuration items*

- Enable SSH access.
- Configure access control for the SSH service.

## *Additional configuration items*

- Port to use for communications with the SSH service.
- Multicast DNS (mDNS) support.
- A private key to use for communications with the SSH service.
- Create custom SSH configuration settings.

See Set the idle timeout for Connect EZ 16/32 users for information about setting the inactivity timeout for the SSH service.

## Enable or disable the SSH service

The SSH service is enabled by default. To disable the service, or enable it if it has been disabled:

### Web

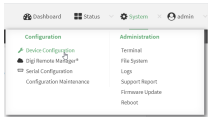
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.

3. Click **Services** > **SSH**.
4. Click **Enable**.
5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable or disable the SSH service:
   - To enable the service:

```
(config)> service ssh enable true
(config)>
```

   - To disable the sevice:

```
(config)> service ssh enable false
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure the service

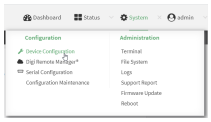
### Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services** > **SSH**.
4. (Optional) For **Port**, enter the port number for the service. Normally this should not be changed.
5. Click **Access control list** to configure access control:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's SSH service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the SSH service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's SSH service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the SSH service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.
   - To limit access based on firewall zones:
     a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
     b. For **Add Zone**, click ✚.
     c. For **Zone**, select the appropriate firewall zone from the dropdown.
     See Firewall configuration for information about firewall zones.

d. Click ✚ again to allow access through additional firewall zones.

6. Multicast DNS (mDNS) is enabled by default. mDNS is a protocol that resolves host names in small networks that do not have a DNS server. To disable mDNS, or enable it if it has been disabled, click **Enable mDNS**.
7. For **Private key**, type the private key in PEM format. If **Private key** is blank, the device will use an automatically-generated key.
8. To create custom SSH configuration settings:
   a. Click to expand **Custom configuration**.
   b. Click **Enable**.
   c. For **Override**:
      - If **Override** is enabled, entries in **Configuration file** will be used in place of the standard SSH configuration.
      - If **Override** is not enabled, entries in **Configuration file** will be added to the standard SSH configuration.
   d. For **Configuration file**, type configuration settings in the form of an OpenSSH sshd_config file.

      For example, to enable the diffie-helman-group-sha-14 key exchange algorithm:
      i. Click **Enable** to enable SSH custom configuration.
      ii. Leave **Override** disabled.
      iii. For **Configuration file**, type the following:

```
KexAlgorithms +diffie-hellman-group14-sha1
```

9. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Configure access control:
   - To limit access to specified IPv4 addresses and networks:

```
(config)> add service ssh acl address end value
(config)>
```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the SSH service.

     Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service ssh acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the SSH service.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config)> add service ssh acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service ssh acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------------------
-----------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

4. (Optional) Set the private key in PEM format. If not set, the device will use an automatically-generated key.

```
(config)> service ssh key key.pem
(config)>
```

5. (Optional) Configure Multicast DNS (mDNS)

   mDNS is a protocol that resolves host names in small networks that do not have a DNS server. mDNS is enabled by default. To disable mDNS, or enable it if it has been disabled:

   - To enable the mDNS protocol:

```
(config)> service ssh mdns enable true
(config>
```

   - To disable the mDNS protocl:

```
(config)> service ssh mdns enable false
(config)>
```

6. (Optional) Set the port number for this service.

   The default setting of 22 normally should not be changed.

```
(config)> service ssh port 24
(config)>
```

7. To create custom SSH configuration settings:

   a. Enable custom configurations:

```
(config)> service ssh custom enable true
(config)>
```

   b. To override the standard SSH configuration and only use the **config_file** parameter:

```
(config)> service ssh custom override true
(config)>
```

      - If **override** is set to **true**, entries in **Configuration file** will be used in place of the standard SSH configuration.
      - If **override** is set to **false**, entries in **Configuration file** will be added to the standard SSH configuration.

        The default is **false**.

   c. Set the configuration settings:

```
(config)> service ssh custom config_file value
(config)>
```

where *value* is one or more entires in the form of an OpenSSH sshd_config file. For example, to enable the diffie-helman-group-sha-14 key exchange algorithm:

```
(config)> service ssh custom config_file "KexAlgorithms +diffie-
hellman-group14-sha1"
(config)>
```

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Use SSH with key authentication

Rather than using passwords, you can use SSH keys to authenticate users connecting via SSH, SFTP, or SCP. SSH keys provide security and scalability:

- **Security**: Using SSH keys for authentication is more secure than using passwords. Unlike a password that can be guessed by an unauthorized user, SSH key pairs provide more sophisticated security. A public key configured on the Connect EZ device is paired with a private key on the user's PC. The private key, once generated, remains on the user's PC.
- **Scalability**: SSH keys can be used on more than one Connect EZ device.

## Generating SSH key pairs

On a Microsoft Windows PC, you can generate SSH key pairs using a terminal emulator application, such as **PuTTY** or **Tera Term**.

On a Linux host, an SSH key pair is usually created automatically in the user's **.ssh** directory. The private and public keys are named **id_rsa** and **id_rsa.pub**. If you need to generate an SSH key pair, you can use the **ssh-keygen** application.

For example, the following entry generates an RSA key pair in the user's **.ssh** directory:

```
ssh-keygen -t rsa -f ~/.ssh/id_rsa
```

The private key file is named **id_rsa** and the public key file is named **id_rsa.pub**. (The **.pub** extension is automatically appended to the name specified for the private key output file.)

### *Required configuration items*

- Name for the user
- SSH public key for the user

### *Additional configuration items*

- If you want to access the Connect EZ device using SSH over a WAN interface, configure the access control list for the SSH service to allow SSH access for the **External** firewall zone.

### Web

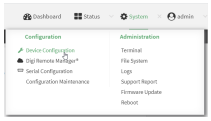
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication** > **Users**.
4. Select an existing user or create a new user. See User authentication for information about creating a new user.
5. Click **SSH keys**.
6. In **Add SSH key**, enter a name for the SSH key and click ✚.
7. Enter the public SSH key by pasting or typing a public encryption key that this user can use for passwordless SSH login.
8. Click **Apply** to save the configuration and apply the change.

## Command line

You can add configure passwordless SSH login for an existing user or include the support when creating a new user. See User authentication for information about creating a new user. These instructions assume an existing user named **temp_user**.

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add an SSH key for the user by using the ssh_key command and pasting or typing a public encryption key:

```
(config)> add auth user maria ssh_key key_name key
(config)>
```

   where:

   - *key_name* is a name for the key.
   - *key* is a public SSH key, which you can enter by pasting or typing a public encryption key that this user can use for passwordless SSH login
4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Configure telnet access

By default, the telnet service is disabled.

**Note** Telnet is an insecure protocol and should only be used for backward-compatibility reasons, and only if the network connection is otherwise secured.

### *Required configuration items*

- Enable telnet access.
- Configure access control for the telnet service.

### *Additional configuration items*

- Port to use for communications with the telnet service.
- Multicast DNS (mDNS) support.

See Set the idle timeout for Connect EZ 16/32 users for information about setting the inactivity timeout for the telnet service.

## Enable the telnet service

The telnet service is disabled by default. To enable the service:

### Web

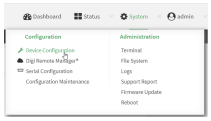
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **telnet**.

4. Click **Enable**.
5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the telnet service:

```
(config)> service telnet enable true
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure the service

### Web

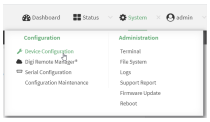
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services** > **telnet**.
4. (Optional) For **Port**, enter the port number for the service. Normally this should not be changed.
5. Click **Access control list** to configure access control:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's telnet service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the telnet service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's telnet service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the telnet service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.
   - To limit access based on firewall zones:
     a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
     b. For **Add Zone**, click ✚.
     c. For **Zone**, select the appropriate firewall zone from the dropdown.
     See Firewall configuration for information about firewall zones.
     d. Click ✚ again to allow access through additional firewall zones.

6. Multicast DNS (mDNS) is disabled by default. mDNS is a protocol that resolves host names in small networks that do not have a DNS server. To enable mDNS, click **Enable mDNS**.
7. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Configure access control:
   - To limit access to specified IPv4 addresses and networks:

```
(config)> add service telnet acl address end value
(config)>
```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the telnet service.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:

```
(config)> add service telnet acl address6 end value
(config)>
```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the telnet service.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config)> add service telnet acl interface end value
(config)>
```

     Where *value* is an interface defined on your device.

     Display a list of available interfaces:

     Use **... network interface ?** to display interface information:

     Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service telnet acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------------------
-----------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to include additional firewall zones.

4. (Optional) Configure Multicast DNS (mDNS)

   mDNS is a protocol that resolves host names in small networks that do not have a DNS server. mDNS is disabled by default. To enable:

```
(config)> service telnet mdns enable true
(config>
```

5. (Optional) Set the port number for this service.

   The default setting of 23 normally should not be changed.

```
(config)> service telnet port 25
(config)>
```

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Configure DNS

The Connect EZ 16/32 device includes a caching DNS server which forwards queries to the DNS servers that are associated with the network interfaces, and caches the results. This server is used within the device, and cannot be disabled. Use the access control list to restrict external access to this server.

### *Required configuration items*

- Configure access control for the DNS service.

### *Additional configuration items*

- Whether the device should cache negative responses.
- Whether the device should always perform DNS queries to all available DNS servers.
- Whether to prevent upstream DNS servers from returning private IP addresses.
- Additional DNS servers, in addition to the ones associated with the device's network interfaces.
- Specific host names and their IP addresses.

  The device is configured by default with the hostname **digi.device**, which corresponds to the **192.168.210.1** IP address.

To configure the DNS server:

## Web

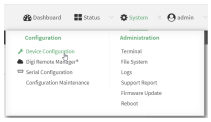
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services** > **DNS**.
4. Click **Access control list** to configure access control:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's DNS service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the DNS service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's DNS service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the DNS service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.
   - To limit access based on firewall zones:
     a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
     b. For **Add Zone**, click ✚.
     c. For **Zone**, select the appropriate firewall zone from the dropdown.

        See Firewall configuration for information about firewall zones.
     d. Click ✚ again to allow access through additional firewall zones.
5. (Optional) **Cache negative responses** is enabled by default. Disabling this option may improve performance on networks with transient DNS results, when one or more DNS servers may have positive results. To disable, click to toggle off **Cache negative responses**.

6. (Optional) **Query all servers** is enabled by default. This option is useful when only some DNS servers will be able to resolve hostnames. To disable, click to toggle off **Query all servers**.
7. (Optional) **Rebind protection**, if enabled, prevents upstream DNS servers from returning private IP addresses. To enable, click **Rebind protection**.
8. (Optional) **Allow localhost rebinding** is enabled by default if **Rebind protection** is enabled. This is useful for Real-time Black List (RBL) servers.
9. (Optional) Type the IP address of the **Fallback server**. This is a DNS server to be used in the absence of any other server. The default is **8.8.8.8**.
10. (Optional) To add additional DNS servers:
    a. Click **DNS servers**.
    b. For **Add Server**, click ✚.
    c. (Optional) Enter a label for the DNS server.
    d. For **DNS server**, enter the IP address of the DNS server.
    e. **Domain** restricts the device's use of this DNS server based on the domain. If no domain are listed, then all queries may be sent to this server.
11. (Optional) To add host names and their IP addresses that the device's DNS server will resolve:
    a. Click **Additional DNS hostnames**.
    b. For **Add Host**, click ✚.
    c. Type the **IP address** of the host.
    d. For **Name**, type the hostname.
12. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Configure access control:
   - To limit access to specified IPv4 addresses and networks:

```
(config)> add service dns acl address end value
(config)>
```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the DNS service.

     Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service dns acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the DNS service.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config)> add service dns acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service dns acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------------------
-----------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
```

```
(config)>
```

Repeat this step to include additional firewall zones.

4. (Optional) Cache negative responses

   By default, the device's DNS server caches negative responses. Disabling this option may improve performance on networks with transient DNS results, when one or more DNS servers may have positive results. To disable:

```
(config)> service dns cache_negative_responses false
(config>
```

5. (Optional) Query all servers

   By default, the device's DNS server queries all available DNS servers. Disabling this option may improve performance on networks with transient DNS results, when one or more DNS servers may have positive results. To disable:

```
(config)> service dns query_all_servers false
(config>
```

6. (Optional) Rebind protection

   By default, rebind protection is disabled. If enabled, this prevents upstream DNS servers from returning private IP addresses. To enable:

```
(config)> service dns stop_dns_rebind false
(config)>
```

7. (Optional) Allow localhost rebinding

   By default, localhost rebinding is enabled by default if rebind protection is enabled. This is useful for Real-time Black List (RBL) servers. To disable:

```
(config)> service dns rebind_localhost_ok false
(config)>
```

8. (Optional) Fallback server

   Configure the IP address of the DNS server to be used in the absence of any other server. The default is **8.8.8.8**.

```
(config)> service dns fallback_server value
(config)>
```

9. (Optional) Add additional DNS servers

   a. Add a DNS server:

```
(config)> add service dns server end
(config service dns server 0)>
```

b. Set the IP address of the DNS server:

```
(config service dns server 0)> address ip-addr
(config service dns server 0)>
```

c. To restrict the device's use of this DNS server based on the domain, use the **domain** command. If no domain are listed, then all queries may be sent to this server.

```
(config service dns server 0)> domain domain
(config service dns server 0)>
```

d. (Optional) Set a label for this DNS server:

```
(config service dns server 0)> label label
(config service dns server 0)>
```

10. (Optional) Add host names and their IP addresses that the device's DNS server will resolve
    a. Add a host:

```
(config)> add service dns host end
(config service dns host 0)>
```

    b. Set the IP address of the host:

```
(config service dns host 0)> address ip-addr
(config service dns host 0)>
```

    c. Set the host name:

```
(config service dns host 0)> name host-name
(config service dns host 0)>
```

11. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show DNS server

You can display status for DNS servers. This command is available only at the Admin CLI.

### Command line

#### *Show DNS information*

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the show dns command at the system prompt:

```
> show dns

 Interface  Label  Server                    Domain
 ---------  -----  ------------------------  ------
 eth1              192.168.3.1
 eth1              fd00:2704::1
 eth1              fe80::227:4ff:fe2b:ae12
 eth1              fe80::227:4ff:fe44:105b
 eth1              fe80::240:ffff:fe80:23b0

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Simple Network Management Protocol (SNMP)

Simple Network Management Protocol (SNMP) is a protocol for remotely managing and monitoring network devices. Network administrators can use the SNMP architecture to manage nodes, including servers, workstations, routers, switches, hubs, and other equipment on an IP network, manage network performance, find and solve network problems, and plan for network growth.

The Connect EZ 16/32 device supports both SNMPv3 and SNMPv2c in read-only mode. Both are disabled by default. SNMPv1 is not supported.

## SNMP Security

By default, the Connect EZ 16/32 device automatically blocks SNMP packets from being received over WAN and LAN interfaces. As a result, if you want a Connect EZ 16/32 device to receive SNMP packets, you must configure the SNMP access control list to allow the device to receive the packets. See Configure Simple Network Management Protocol (SNMP).

### *Standard and custom Management Information Bases (MIB)*

The standard MIB defines the properties and access permissions for various managed objects so that you can query standard information about a device, like *system contact* or *system location* via SNMP monitoring. The custom MIB defines the unique properties and access permissions not found in the standard MIB. To view the MIB list, see Download MIBs.

### *Dynamic SNMP*

To expose a specific device property for SNMP monitoring that is not included in the standard MIB - properties like *serial number*, *system firmware version*, *hardware model name*, and *dynamic properties* - you can query the runtime database for the property value and then add a Dynamic SNMP. The device property is added to the custom MIB.

## Configure Simple Network Management Protocol (SNMP)

**Required configuration items**

- Enable SNMP.
- Firewall configuration using access control to allow remote connections to the SNMP agent.
- The user name and password used to connect to the SNMP agent.

**Additional configuration items**

- The port used by the SNMP agent.
- Authentication type (either MD5 or SHA1).
- Privacy protocol (either DES or AES128).
- Privacy passphrase, if different that the SNMP user password.
- Enable Multicast DNS (mDNS) support.

To configure the SNMP agent on your Connect EZ 16/32 device:

Web

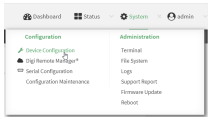
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **SNMP**.
4. Click **Enable**.
5. Click **Access control list** to configure access control:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's SNMP agent. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the SNMP agent.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's SNMP agent. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the SNMP agent.
     d. Click ✚ again to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the device:
  a. Click **Interfaces**.
  b. For **Add Interface**, click ✚.
  c. For **Interface**, select the appropriate interface from the dropdown.
  d. Click ✚ again to allow access through additional interfaces.
- To limit access based on firewall zones:
  a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
  b. For **Add Zone**, click ✚.
  c. For **Zone**, select the appropriate firewall zone from the dropdown.
  See Firewall configuration for information about firewall zones.
  d. Click ✚ again to allow access through additional firewall zones.

6. Type the **Username** used to connect to the SNMP agent.
7. Type the **Password** used to connect to the SNMP agent.
8. (Optional) For **Port**, type the port number. The default is **161**.
9. (Optional) Multicast DNS (mDNS) is disabled by default. mDNS is a protocol that resolves host names in small networks that do not have a DNS server. To enable mDNS, click **Enable mDNS**.
10. (Optional) Select the **Authentication type**, either **MD5** or **SHA1**. The default is **MD5**.
11. (Optional) Type the **Privacy passphrase**. If not set, the password, entered above, is used.
12. (Optional) Select the **Privacy protocol**, either **DES** or **AES128**. The default is **DES**.
13. (Optional) Add **Dynamic SNMP Properties** to expose specific details about your device for SNMP monitoring that are not included in the standard MIB. To query the runtime database to find the device property you want to expose to SNMP, see Use digidevice runtime to access the runtime database.
    a. Click ✚.
    b. For **Property**, type the device property (e.g., "system.cpu_temp" or "system.name").
    c. Click ✚ again to add another dynamic SNMP property.
14. (Optional) Enable read-only access to SNMP versions 1 and 2c.
    a. Click **Enable version 1 and 2c access** to enable read-only access to SNMP versions 1 and 2c.
    b. The **Read-only community name** field displays. The default name is **public**. You can change the name if needed.
15. (Optional) Enable read and write access to SNMP versions 1 and 2c.
    a. Click **Enable version 1 and 2c write access** to enable read and write access to SNMP versions 1 and 2c.
    b. The **Read/write community name** field displays and is blank by default. You are required to enter a name.
16. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the SNMP agent:

```
(config)> service snmp enable true
(config)>
```

4. Configure access control:
   - To limit access to specified IPv4 addresses and networks:

```
(config)> add service snmp acl address end value
(config)>
```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the SNMP service.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:

```
(config)> add service snmp acl address6 end value
(config)>
```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the SNMP service.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config)> add service snmp acl interface end value
(config)>
```

     Where *value* is an interface defined on your device.

     Display a list of available interfaces:

     Use **... network interface ?** to display interface information:

     Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service snmp acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------------------
-----------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to include additional firewall zones.

5. Set the name of the user that will be used to connect to the SNMP agent.

```
(config)> service snmp username name
(config)>
```

6. Set the password for the user that will be used to connect to the SNMP agent:

```
(config)> service snmp password pwd
(config)>
```

7. (Optional) Set the port number for the SNMP agent. The default is **161**.

```
(config)> service snmp port port
(config)>
```

8. (Optional) Configure Multicast DNS (mDNS)

mDNS is a protocol that resolves host names in small networks that do not have a DNS server. For the SNMP agent, mDNS is disabled by default. To enable:

```
(config)> service snmp mdns enable true
(config>
```

9. (Optional) Set the authentication type. Allowed values are **MD5** or **SHA1**. The default is **MD5**.

```
(config)> service snmp auth_type SHA1
(config)>
```

10. (Optional) Set the privacy passphrase. If not set, the password, entered above, is used.

```
(config)> service snmp privacy pwd
(config)>
```

11. (Optional) Set the privacy protocol, either **DES** or **AES128**. The default is **DES**.

```
(config)> service snmp privacy_protocol AES128
(config)>
```

12. (Optional) Add **Dynamic SNMP Properties** to expose specific details about your device for SNMP monitoring that are not included in the standard MIB.

```
(config) service snmp runt> add end value
(config)>
```

Where *value* can be any element in the runtime table you want to expose to SNMP monitoring (for example, "system.cpu_temp" or "system.name").

13. (Optional) Enable read-only access to to SNMP versions 1 and 2c.

```
(config)> service snmp enable 2c true
(config)>
```

The community name is set to **public** by default. You can change it if desired.

```
(config)> service snmp community_name <name>
(config)>
```

Where *name* is the read-only community name.

14. (Optional) Enable read/write access to to SNMP versions 1 and 2c.

```
(config)> service snmp enable_write true
(config)>
```

The read/write community name is blank by default. You are required to enter a name when read/write access to to SNMP versions 1 and 2c is enabled.

```
(config)> service snmp rw_community_name <name>
(config)>
```

Where *name* is the read/write community name.

15. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

16. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Download MIBs

This procedure is available from the WebUI only.

### Required configuration items

- Enable SNMP.

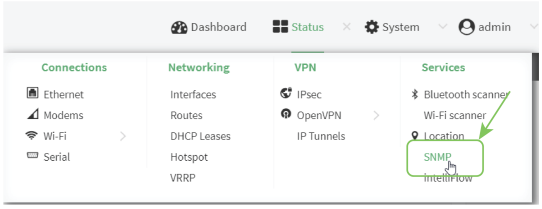
To download a .zip archive of the SNMP MIBs supported by this device:

### Web

1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. Enable SNMP.

   See Configure Simple Network Management Protocol (SNMP) for information about enabling and configuring SNMP support on the Connect EZ 16/32 device.
3. On the main menu, click **Status**. Under **Services**, click **SNMP**.

   **Note** If you have recently enabled SNMP and the SNMP option is not visible, refresh your browser.




   The **SNMP** page is displayed.

4. Click **Download**.

# Location information

Your Connect EZ 16/32 device can be configured to use the following location sources:

- User-defined static location.
- Location messages forwarded to the device from other location-enabled devices.

You can also configure your Connect EZ 16/32 device to forward location messages, either from the Connect EZ 16/32 device or from external sources, to a remote host. Additionally, the device can be configured to use a geofence, to allow you to determine actions that will be taken based on the physical location of the device.

This section contains the following topics:

Configure the device to use a user-defined static location ..... 580
Configure the device to accept location messages from external sources ..... 582
Forward location information to a remote host ..... 586
Configure geofencing ..... 593
Show location information ..... 605

## Configure the device to use a user-defined static location

You can configured your Connect EZ 16/32 device to use a user-defined static location.

### Web

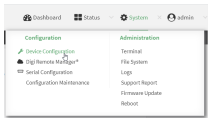
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **Location** > **Location sources**.
4. Click **+** to add a location source.
5. (Optional) Type a **Label** for this location source.
6. For **Type of location source**, select **User-defined location**.
7. The location source is enabled by default. Click **Enable the location source** to disable the location source, or to enable it if it has been disabled.
8. For **Latitude**, type the latitude of the device. Allowed values are **-90** and **90**, with up to six decimal places.
9. For **Longitude**, type the longitude of the device. Allowed values are **-180** and **180**, with up to six decimal places.
10. For **Altitude**, type the altitude of the device. Allowed values are an integer followed by **m** or **km**, for example, **100m** or **1km**.
11. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a location source:

```
(config)> add service location source end
(config service location source 0)>
```

The location source is enabled by default. To disable:

```
(config service location source 0)> enable false
(config service location source 0)>
```

4. (Optional) Set a label for this location source:

```
(config service location source 0)> label "label"
(config)>
```

5. Set the **type** of location source to **user_defined**:

```
(config service location source 0)> type user_defined
(config service location source 0)>
```

6. Set the latitude of the device:

```
(config service location source 0 coordinates latitude int
(config service location source 0)>
```

where *int* is any integer between **-90** and **90**, with up to six decimal places.

7. Set the longitude of the device:

```
(config service location source 0 coordinates longitude int
(config service location source 0)>
```

where *int* is any integer between **-180** and **180**, with up to six decimal places.

8. Set the altitude of the device:

```
(config service location source 0 coordinates altitude alt
(config service location source 0)>
```

Where *alt* is an integer followed by **m** or **km**, for example, **100m** or **1km**.

9. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure the device to accept location messages from external sources

You can configure the Connect EZ 16/32 device to accept NMEA and TAIP messages from external sources. For example, location-enabled devices connected to the Connect EZ 16/32 device can forward their location information to the device, and then the Connect EZ 16/32 device can serve as a central repository for this location information and forward it to a remote host. See Forward location information to a remote host for information about configuring the Connect EZ 16/32 device to forward location messages.

This procedure configures a UDP port on the Connect EZ 16/32 device that will be used to listen for incoming messages.

**Required configuration items**

- The location server must be enabled.
- UDP port that the Connect EZ device will listen to for incoming location messages.
- Access control list configuration to provide access to the port through the firewall.

To configure the device to accept location messages from external sources:

### Web

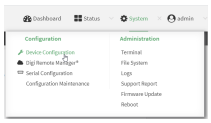
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **Location** > **Location sources**.
4. Click **+** to add a location source.
5. (Optional) Type a **Label** for this location source.
6. For **Type of location source**, select **Server**.

7. For **Location server port**, type the number of the UDP port that will receive incoming location messages.
8. Click **Access control list** to configure access control:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's location server UDP port. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the location server UDP port.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's location server UDP port. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the location server UDP port.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.
   - To limit access based on firewall zones:
     a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
     b. For **Add Zone**, click ✚.
     c. For **Zone**, select the appropriate firewall zone from the dropdown.
        See Firewall configuration for information about firewall zones.
     d. Click ✚ again to allow access through additional firewall zones.
9. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a location source:

```
(config)> add service location source end
(config service location source 0)>
```

4. (Optional) Set a label for this location source:

```
(config service location source 0)> label "label"
(config service location source 0)>
```

5. Set the **type** of location source to **server**:

```
(config service location source 0)> type server
(config service location source 0)>
```

6. Set the UDP port that will receive incoming location messages.

```
(config service location source 0)> server port port
(config service location source 0)>
```

7. Click **Access control list** to configure access control:
   - To limit access to specified IPv4 addresses and networks:

     ```
     (config)> add service location source 1 acl address end value
     (config)>
     ```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the location server UDP port.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:

     ```
     (config)> add service location source 1 acl address6 end value
     (config)>
     ```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the location server UDP port.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config)> add service location source 1 acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service location source 1 acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------------------
------------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to include additional firewall zones.

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

2. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Forward location information to a remote host

You can configure location clients on the Connect EZ 16/32 device that forward location messages in either NMEA or TAIP format to a remote host.

### Required configuration items

- Enable the location service.
- The hostname or IP address of the remote host to which the location messages will be forwarded.
- The communication protocol, either TCP or UDP.
- The destination port on the remote host to which the messages will be forwarded.
- Message protocol type of the messages being forwarded, either NMEA or TAIP.

### Additional configuration items

- Additional remote hosts to which the location messages will be forwarded.
- Location update interval, which determines how often the device will forward location information to the remote hosts.
- A description of the remote hosts.
- Specific types of NMEA or TAIP messages that should be forwarded.
- If the message protocol is NMEA, configure a talker ID to be used for all messages.
- Text that will be prepended to the forwarded message.
- A vehicle ID that is used in the TAIP ID message and can also be prepended to the forwarded message.

Configure the Connect EZ device to forward location information:

### Web

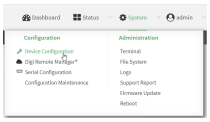
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services** > **Location** > **Destination servers**.
4. For **Add destination server**, click ✚.
5. (Optional) For **Label**, type a description of the location destination server.
6. For **Destination server**, enter the hostname or IP address of the remote host to which location messages will be sent.
7. For **Destination server port**, enter the UDP or TCP port on the remote host to which location messages will be sent.
8. For **Communication protocol**, select either **UDP** or **TCP**.
9. For **Forward interval multiplier**, select the number of **Location update intervals** to wait before forwarding location data to this server.
10. For **NMEA filters**, select the filters that represent the types of messages that will be forwarded. By default, all message types are forwarded.
    - To remove a filter:
      a. Click the down arrow (▾) next to the appropriate message type.
      b. Click **Delete**.
    - To add a message type:
      a. For **Add NMEA filter** or **Add TAIP filter**, click ✚.
      b. Select the filter type. Allowed values are:
         - **GGA**: Reports time, position, and fix related data.
         - **GLL**: Reports position data: position fix, time of position fix, and status.
         - **GSA**: Reports GPS DOP and active satellites.
         - **GSV**: Reports the number of SVs in view, PRN, elevation, azimuth, and SNR.
         - **RMC**: Reports position, velocity, and time.
         - **VTG**: Reports direction and speed over ground.
11. For **TAIP filters**, select the filters that represent the types of messages that will be forwarded. By default, all message types are forwarded.
    - To remove a filter:
      a. Click the down arrow (▾) next to the appropriate message type.
      b. Click **Delete**.
    - To add a message type:
      a. For **Add NMEA filter** or **Add TAIP filter**, click ✚.
      b. Select the filter type. Allowed values are:
         - **AL**: Reports altitude and vertical velocity.
         - **CP**: Compact position: reports time, latitude, and longitude.
         - **ID**: Reports the vehicle ID.

- **LN**: Long navigation: reports the latitude, longitude, and altitude, the horizontal and vertical speed, and heading.
- **PV**: Position/velocity: reports the latitude, longitude, and heading.

12. For **Outgoing message type**, select either **NMEA** or **TAIP** for the type of message that the device will forward to a remote host.

    (Optional) If **NMEA** is selected:

    a. Select a **Talker ID**.

    The talker ID is a two-character prefix in the NMEA message that identifies the source type. The talker ID set here will override the talker ID from all sources, and all forwarded sentences will use the configured ID. The default setting is **Default**, which means that the talker ID provided by the source will be used.

    b. Determine the **Behavior when fix is invalid**:

    - **None**: No messages are sent.
    - **Empty**: Send messages with empty fields.
    - **Last fix**: Send messages with information from the last valid fix.

13. (Optional) For **Prepend text**, enter text to prepend to the forwarded message. Two variables can be included in the prepended text:

    - **%s**: Includes the Connect EZ device's serial number in the prepended text.
    - **%v**: Includes the vehicle ID in the prepended text.

    For example, to include both the device's serial number and vehicle ID in the prepend message, you can enter the following in the **Prepend** field:

```
__|%s|__|%v|__
```

14. Type a four-digit alphanumeric **Vehicle ID** that will be included with to location messages. If no vehicle ID is configured, this setting defaults to 0000.
15. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a remote host to which location messages will be sent:

```
(config)> add service location forward end
(config service location forward 0)>
```

4. Set the hostname or IP address of the remote host to which location messages will be sent:

```
(config service location forward 0)> server host
(config service location forward 0)>
```

5. Set the communication protocol to either **upd** or **tcp**:

```
(config service location forward 0)> protocol protocol
(config service location forward 0)>
```

6. Set the TCP or UDP port on the remote host to which location messages will be sent:

```
(config service location forward 0)> server_port 8000
(config service location forward 0)>
```

7. Set the number of **Location update intervals** to wait before forwarding location data to this server.

```
(config service location forward 0)> interval_multiplier int
(config service location forward 0)>
```

8. Set the protocol type for the messages. Allowed values are **taip** or **nmea**; the default is **taip**:

```
(config service location forward 0)> type nmea
(config service location forward 0)>
```

(Optional) If the protocol type is set to **nmea**:

a. Configure a **Talker ID**.

The talker ID is a two-character prefix in the NMEA message that identifies the source type. The talker ID set here will override the talker ID from all sources, and all forwarded sentences will use the configured ID.

i. Use the **?** to determine available talker IDs:

```
(config service location forward 0)> talker_id ?

Talker ID: Setting a talker ID will override the talker ID from
all remote
sources, and all forwarded sentences from remote sources will use
the configured
ID.
Format:
  Default
  GA
  GB
  GI
  GL
  GN
  GP
  GQ
Default value: Default
Current value: Default
```

```
(config service location forward 0)>
```

ii. Set the talker ID:

```
(config service location forward 0)> talker_id value
(config service location forward 0)>
```

The default setting is **Default**, which means that the talker ID provided by the source will be used.

b. Determine the behavior when fix is invalid:

```
(config service location forward 0)> no_fix value
(config service location forward 0)>
```

where *value* is one of:

- **none**: No messages are sent.
- **empty**: Send messages with empty fields.
- **last_fix**: Send messages with information from the last valid fix.

The default is **empty**.

9. (Optional) Set the text to prepend to the forwarded message. Two variables can be included in the prepended text:
   - **%s**: Includes the Connect EZ device's serial number in the prepended text.
   - **%v**: Includes the vehicle ID in the prepended text.

```
(config service location forward 0)> prepend __|%s|__|%v|__
(config service location forward 0)>
```

10. (Optional) Set the vehicle ID.

    Allowed value is a four digit alphanumerical string (for example, 01A3 or 1234). If no vehicle ID is configured, this setting defaults to 0000.

```
(config service location forward 0)> vehicle-id 1234
(config service location forward 0)>
```

11. (Optional) Provide a description of the remote host:

```
(config service location forward 0)> label "Remote host 1"
(config service location forward 0)>
```

12. (Optional) Specify types of messages that will be forwarded. Allowed values vary depending on the message protocol type. By default, all message types are forwarded.
    - If the message protocol type is NMEA:

      Allowed values are:

      - **gga**: Reports time, position, and fix related data.
      - **gll**: Reports position data: position fix, time of position fix, and status.
      - **gsa**: Reports GPS DOP and active satellites.
      - **gsv**: Reports the number of SVs in view, PRN, elevation, azimuth, and SNR.

- **rmc**: Reports position, velocity, and time.
- **vtg**: Reports direction and speed over ground.

To remove a message type:

a. Use the **show** command to determine the index number of the message type to be deleted:

```
(config service location forward 0)> show filter_nmea
0 gga
1 gll
2 gsa
3 gsv
4 rmc
5 vtg
(config service location forward 0)>
```

b. Use the index number to delete the message type. For example, to delete the **gsa** (index number 2) message type:

```
(config service location forward 0)> del filter_nmea 2
(config service location forward 0)>
```

To add a message type:

a. Change to the **filter_nmea** node:

```
(config service location forward 0)> filter_nmea
(config service location forward 0 filter_nmea)>
```

b. Use the **add** command to add the message type. For example, to add the **gsa** message type:

```
(config service location forward 0 filter_nmea)> add gsa end
(config service location forward 0 filter_nmea)>
```

- If the message protocol type is TAIP:

  Allowed values are:

  - **al**: Reports altitude and vertical velocity.
  - **cp**: Compact position: reports time, latitude, and longitude.
  - **id**: Reports the vehicle ID.
  - **ln**: Long navigation: reports the latitude, longitude, and altitude, the horizontal and vertical speed, and heading.
  - **pv**: Position/velocity: reports the latitude, longitude, and heading.

  To remove a message type:

  a. Use the **show** command to determine the index number of the message type to be deleted:

```
(config service location forward 0)> show filter_taip
0 al
1 cp
```

```
2 id
3 ln
4 pv
(config service location forward 0)>
```

b. Use the index number to delete the message type. For example, to delete the **id** (index number 2) message type:

```
(config service location forward 0)> del filter_taip 2
(config service location forward 0)>
```

To add a message type:

a. Change to the **filter_taip** node:

```
(config service location forward 0)> filter_taip
(config service location forward 0 filter_taip)>
```

b. Use the **add** command to add the message type. For example, to add the **id** message type:

```
(config service location forward 0 filter_taip)> add id end
(config service location forward 0 filter_taip)>
```

13. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

14. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure geofencing

Geofencing is a mechanism to create a virtual perimeter that allows you configure your Connect EZ 16/32 device to perform actions when entering or exiting the perimeter. For example, you can configure a device to factory default if its location service indicates that it has been moved outside of the geofence.

Multiple geofences can be defined for one device, allowing for a complex configuration in which different actions are taken depending on the physical location of the device.

**Required configuration items**

- Location services must be enabled.
- The geofence must be enabled.
- The boundary type of the geofence, either circular or polygonal.
  - If boundary type is circular, the latitude and longitude of the center point of the circle, and the radius.
  - If boundary type is polygonal, the latitude and longitude of the polygon's vertices (a vertex is the point at which two sides of a polygon meet). Three vertices will create a triangular polygon; four will create a square, etc. Complex polygons can be defined.
- Actions that will be taken when the device's location triggers a geofence event. You can define actions for two types of events:
  - Actions taken when the device enters the boundary of the geofence, or is inside the boundary when the device boots.
  - Actions taken when the device exits the boundary of the geofence, or is outside the boundary when the device boots.

  For each event type:
  - Determine if the action(s) associated with the event type should be performed when the device boots inside or outside of the geofence boundary.
  - The number of update intervals that should take place before the action(s) are taken.

  Multiple actions can be configured for each type of event. For each action:
  - The type of action, either a factory erase or executing a custom script.
  - If a custom script is used:
    - The script that will be executed.
    - Whether to log output and errors from the script.
    - The maximum memory that the script will have available.
    - Whether the script should be executed within a sandbox that will prevent the script from affecting the system itself.

**Additional configuration items**

- Update interval, which determines the amount of time that the geofence should wait between polling for updated location data.

Web

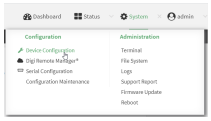
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

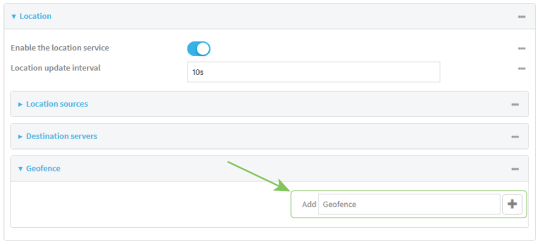
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **Location** > **Geofence**.
4. For **Add Geofence**, type a name for the geofence and click **+**.

   The geofence is enabled by default. To disable, toggle off **Enable**.
5. For **Update interval**, type the amount of time that the geofence should wait between polling for updated location data. The default is one minute.

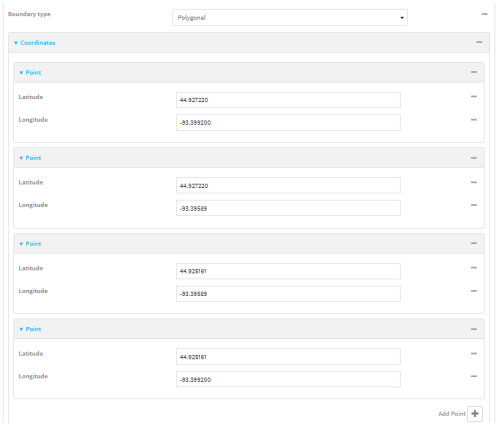
   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

   For example, to set **Update interval** to ten minutes, enter **10m** or **600s**.
6. For **Boundary type**, select the type of boundary that the geofence will have.
   - If **Circular** is selected:
     a. Click to expand **Center**.
     b. Type the **Latitude** and **Longitude** of the center point of the circle. Allowed values are:
        - For **Latitude**, any integer between **-90** and **90**, with up to six decimal places.
        - For **Longitude**, any integer between **-180** and **180**, with up to six decimal places.

c. For **Radius**, type the radius of the circle. Allowed values are an integer followed by **m** or **km**, for example, **100m** or **1km**.

- If **Polygonal** is selected:
  a. Click to expand **Coordinates**.
  b. Click **+** to add a point that represents a vertex of the polygon. A vertex is the point at which two sides of a polygon meet.
  c. Type the **Latitude** and **Longitude** of one of the vertices of the polygon. Allowed values are:
     - For **Latitude**, any integer between **-90** and **90**, with up to six decimal places.
     - For **Longitude**, any integer between **-180** and **180**, with up to six decimal places.
  d. Click **+** again to add an additional point, and continue adding points to create the desired polygon.

  For example, to configure a square polygon around the Digi headquarters, configure a polygon with four points:




This defines a square-shaped polygon equivalent to the following:

7. Define actions to be taken when the device's location triggers a geofence event:
   - To define actions that will be taken when the device enters the geofence, or is inside the geofence when it boots:

a. Click to expand **On entry**.

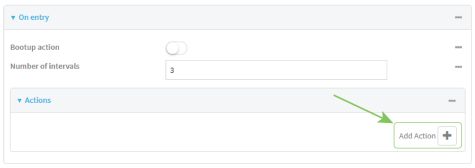
b. (Optional) Enable **Bootup action** to configure the device to perform the **On entry** actions if the device is inside the geofence when it boots.

c. For **Number of intervals**, type or select the number of **Update Intervals** that must take place prior to performing the **On entry** actions.

For example, if the **Update interval** is **1m** (one minute) and the **Number of intervals** is **3**, the **On entry** actions will not be performed until the device has been inside the geofence for three minutes.

d. Click to expand **Actions**.

e. Click **+** to create a new action.




f. For Action type, select either:

- **Factory erase** to erase the device configuration when the action is triggered.
- **Custom script** to execute a custom script when the action is triggered.

If **Custom script** is selected:

i. Click to expand **Custom script**.

ii. For **Commands**, type the script that will be executed when the action is triggered. If the script begins with **#!**, then the proceeding file path will be used to invoke the script interpreter. If not, then the default shell will be used.

iii. Enable **Log script output** to log the output of the script to the system log.

iv. Enable **Log script errors** to log errors from the script to the system log.

v. (Optional) For **Maximum memory**, type the maximum amount of system memory that will be available for the script and it spawned processes.

Allowed values are any integer followed by one of the following: **b|bytes|KB|k|MB|M|GB|G|TB|T**.

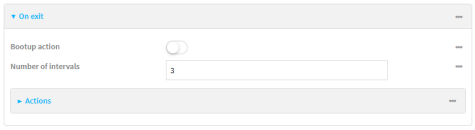
For example. the allocate one megabyte of memory to the script and its spawned processes, type **1MB** or **1M**.

vi. **Sandbox** is enabled by default. This prevents the script from adversely affecting the system. If you disable **Sandbox**, the script may render the system unusable.

vii. Repeat for any additional actions.

- To define actions that will be taken when the device exits the geofence, or is outside the geofence when it boots:

a. Click to expand **On exit**.



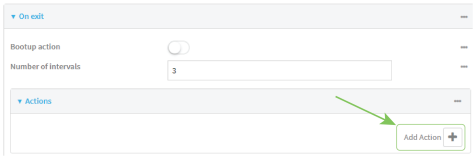

b. (Optional) Enable **Bootup action** to configure the device to perform the **On exit** actions if the device is inside the geofence when it boots.

c. For **Number of intervals**, type or select the number of **Update Intervals** that must take place prior to performing the **On exit** actions.

For example, if the **Update interval** is **1m** (one minute) and the **Number of intervals** is **3**, the **On entry** actions will not be performed until the device has been inside the geofence for three minutes.

d. Click to expand **Actions**.

e. Click **+** to create a new action.




f. For Action type, select either:

- **Factory erase** to erase the device configuration when the action is triggered.
- **Custom script** to execute a custom script when the action is triggered.

If **Custom script** is selected:

i. Click to expand **Custom script**.

ii. For **Commands**, type the script that will be executed when the action is triggered. If the script begins with **#!**, then the proceeding file path will be used to invoke the script interpreter. If not, then the default shell will be used.

iii. Enable **Log script output** to log the output of the script to the system log.

iv. Enable **Log script errors** to log errors from the script to the system log.

v. (Optional) For **Maximum memory**, type the maximum amount of system memory that will be available for the script and it spawned processes.

Allowed values are any integer followed by one of the following: **b|bytes|KB|k|MB|M|GB|G|TB|T**.

For example. the allocate one megabyte of memory to the script and its spawned processes, type **1MB** or **1M**.

vi. **Sandbox** is enabled by default. This prevents the script from adversely affecting the system. If you disable **Sandbox**, the script may render the system unusable.

vii. Repeat for any additional actions.

8. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a geofence:

```
(config)> add service location geofence name
(config service location geofence name)>
```

   where *name* is a name for the geofence. For example:

```
(config)> add service location geofence test_geofence
(config service location geofence test_geofence)>
```

   The geofence is enabled by default. To disable:

```
(config service location geofence test_geofence)> enable false
(config service location geofence test_geofence)>
```

4. Set the amount of time that the geofence should wait between polling for updated location data:

```
(config service location geofence test_geofence)> update_interval value
(config service location geofence test_geofence)>
```

   where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

   For example, to set **update_interval** to ten minutes, enter either **10m** or **600s**:

```
(config service location geofence test_geofence)> update_interval 600s
(config service location geofence test_geofence)>
```

   The default is **1m** (one minute).
5. Set the boundary type for the geofence:

```
(config service location geofence test_geofence)> boundary value
(config service location geofence test_geofence)>
```

   where *value* is either **circular** or **polygonal**.

   - If **boundary** is set to **circular** :
     a. Set the latitude and longitude of the center point of the circle:

```
(config service location geofence test_geofence)> center
latitude int
(config service location geofence test_geofence)> center
```

```
longitude int
(config service location geofence test_geofence)>
```

where *int* is:

- For **latitude**, any integer between **-90** and **90**, with up to six decimal places.
- For **longitude**, any integer between **-180** and **180**, with up to six decimal places.

b. Set the radius of the circle:

```
(config service location geofence test_geofence)> radius radius
(config service location geofence test_geofence)>
```

where *radius* is an integer followed by **m** or **km**, for example, **100m** or **1km**.

- If **boundary** is set to **polygonal**:

a. Set the coordinates of one vertex of the polygon. A vertex is the point at which two sides of a polygon meet.

i. Add a vertex:

```
(config service location geofence test_geofence)> add
coordinates end
(config service location geofence test_geofence coordinates
0)>
```

ii. Set the latitude and longitude of the vertex:

```
(config service location geofence test_geofence coordinates
0)> latitude int
(config service location geofence test_geofence coordinates
0)> longitude int
(config service location geofence test_geofence coordinates
0)>
```

where *int* is:

- For **latitude**, any integer between **-90** and **90**, with up to six decimal places.
- For **longitude**, any integer between **-180** and **180**, with up to six decimal places.

iii. Configure additional vortices:

```
(config service location geofence test_geofence coordinates
0)> ..
(config service location geofence test_geofence coordinates)>
add end
(config service location geofence test_geofence coordinates
1)> latitude int
(config service location geofence test_geofence coordinates
1)> longitude int
```

```
(config service location geofence test_geofence coordinates
1)>
```

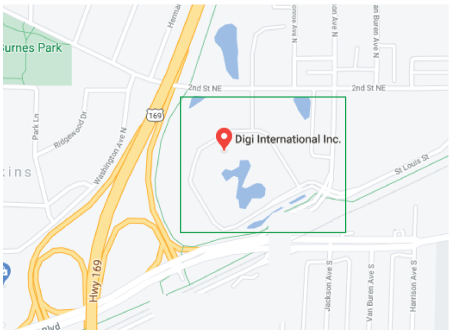
where *int* is:

- For **latitude**, any integer between **-90** and **90**, with up to six decimal places.
- For **longitude**, any integer between **-180** and **180**, with up to six decimal places.

Repeat for each vortex of the polygon.
For example, to configure a square polygon around the Digi headquarters, configure a polygon with four points:

```
(config service location geofence test_geofence)> add
coordinates end
(config service location geofence test_geofence coordinates
0)> latitude 44.927220
(config service location geofence test_geofence coordinates
0)> longitude -93.399200
(config service location geofence test_geofence coordinates
0)> ..
(config service location geofence test_geofence coordinates)>
add end
(config service location geofence test_geofence coordinates
1)> latitude 44.927220
(config service location geofence test_geofence coordinates
1)> longitude -93.39589
(config service location geofence test_geofence coordinates
1)> ..
(config service location geofence test_geofence coordinates)>
add end
(config service location geofence test_geofence coordinates
2)> latitude 44.925161
(config service location geofence test_geofence coordinates
2)> longitude -93.39589
(config service location geofence test_geofence coordinates
2)> ..
(config service location geofence test_geofence coordinates)>
add end
(config service location geofence test_geofence coordinates
3)> latitude 44.925161
(config service location geofence test_geofence coordinates
3)> longitude -93.399200
(config service location geofence test_geofence coordinates
3)>
```

This defines a square-shaped polygon equivalent to the following:




6. Define actions to be taken when the device's location triggers a geofence event:
   - To define actions that will be taken when the device enters the geofence, or is inside the geofence when it boots:
     a. (Optional) Configure the device to preform the actions if the device is inside the geofence when it boots:

```
(config)> service location geofence test_geofence on_entry
bootup true
(config)>
```

     b. Set the number of update_intervals that must take place prior to performing the actions:

```
(config)> service location geofence test_geofence on_entry num_
intervals int
(config)>
```

        For example, if the update interval is **1m** (one minute) and the **num_intervals** is set to **3**, the actions will not be performed until the device has been inside the geofence for three minutes.

     c. Add an action:
        i. Type **...** to return to the root of the configuration:

```
(config service location geofence test_geofence coordinates
3)> ...
(config)>
```

        ii. Add the action:

```
(config)> add service location geofence test_geofence on_
entry action end
(config service location geofence test_geofence on_entry
action 0)>
```

     d. Set the type of action:

```
(config service location geofence test_geofence on_entry action
0)> type value
```

```
(config service location geofence test_geofence on_entry action
0)>
```

where *value* is either:

- **factory_erase**—Erases the device configuration when the action is triggered.
- **script**—Executes a custom script when the action is triggered.

**factory_erase** or **script**.

If **type** is set to **script**:

i. Type or paste the script, closed in quote marks:

```
(config service location geofence test_geofence on_entry
action 0)> commands "script"
(config service location geofence test_geofence on_entry
action 0)>
```

If the script begins with **#!**, then the proceeding file path will be used to invoke the script interpreter. If not, then the default shell will be used.

ii. To log the output of the script to the system log:

```
(config service location geofence test_geofence on_entry
action 0)> syslog_stdout true
(config service location geofence test_geofence on_entry
action 0)>
```

iii. To log the errors from the script to the system log:

```
(config service location geofence test_geofence on_entry
action 0)> syslog_stderr true
(config service location geofence test_geofence on_entry
action 0)>
```

iv. (Optional) Set the maximum amount of system memory that will be available for the script and it spawned processes:

```
(config service location geofence test_geofence on_entry
action 0)> max_memory value
(config service location geofence test_geofence on_entry
action 0)>
```

where *value* is any integer followed by one of the following: **b|bytes|KB|k|MB|M|GB|G|TB|T**.

For example. the allocate one megabyte of memory to the script and its spawned processes:

```
(config service location geofence test_geofence on_entry
action 0)> max_memory 1MB
(config service location geofence test_geofence on_entry
action 0)>
```

v. A sandbox is enabled by default to prevent the script from adversely affecting the system. To disable the sandbox:

```
(config service location geofence test_geofence on_entry
action 0)> sandbox false
(config service location geofence test_geofence on_entry
action 0)>
```

If you disable the sandbox, the script may render the system unusable.

vi. Repeat for any additional actions.

- To define actions that will be taken when the device exits the geofence, or is outside the geofence when it boots:

a. (Optional) Configure the device to preform the actions if the device is outside the geofence when it boots:

```
(config)> service location geofence test_geofence on_exit bootup
true
(config)>
```

b. Set the number of update_intervals that must take place prior to performing the actions:

```
(config)> service location geofence test_geofence on_exit num_
intervals int
(config)>
```

For example, if the update interval is **1m** (one minute) and the **num_intervals** is set to **3**, the actions will not be performed until the device has been outside the geofence for three minutes.

c. Add an action:

i. Type **...** to return to the root of the configuration:

```
(config service location geofence test_geofence coordinates
3)> ...
(config)>
```

ii. Add the action:

```
(config)> add service location geofence test_geofence on_exit
action end
(config service location geofence test_geofence on_exit
action 0)>
```

d. Set the type of action:

```
(config service location geofence test_geofence on_exit action
0)> type value
(config service location geofence test_geofence on_exit action
0)>
```

where *value* is either:

- **factory_erase**—Erases the device configuration when the action is triggered.
- **script**—Executes a custom script when the action is triggered.

**factory_erase** or **script**.

If **type** is set to **script**:

i. Type or paste the script, closed in quote marks:

```
(config service location geofence test_geofence on_exit
action 0)> commands "script"
(config service location geofence test_geofence on_exit
action 0)>
```

If the script begins with **#!**, then the proceeding file path will be used to invoke the script interpreter. If not, then the default shell will be used.

ii. To log the output of the script to the system log:

```
(config service location geofence test_geofence on_exit
action 0)> syslog_stdout true
(config service location geofence test_geofence on_exit
action 0)>
```

iii. To log the errors from the script to the system log:

```
(config service location geofence test_geofence on_exit
action 0)> syslog_stderr true
(config service location geofence test_geofence on_exit
action 0)>
```

iv. (Optional) Set the maximum amount of system memory that will be available for the script and it spawned processes:

```
(config service location geofence test_geofence on_exit
action 0)> max_memory value
(config service location geofence test_geofence on_exit
action 0)>
```

where *value* is any integer followed by one of the following: **b|bytes|KB|k|MB|M|GB|G|TB|T**.

For example. the allocate one megabyte of memory to the script and its spawned processes:

```
(config service location geofence test_geofence on_exit
action 0)> max_memory 1MB
(config service location geofence test_geofence on_exit
action 0)>
```

v. A sandbox is enabled by default to prevent the script from adversely affecting the system. To disable the sandbox:

```
(config service location geofence test_geofence on_exit
action 0)> sandbox false
(config service location geofence test_geofence on_exit
action 0)>
```

If you disable the sandbox, the script may render the system unusable.

vi. Repeat for any additional actions.

7. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show location information

You can view status and statistics about location information from either the WebUI or the command line.

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the main menu, click **Status**.
2. Under **Services**, click **Location**.

   The device's current location is displayed, along with the status of any configured geofences.

### Command line

#### *Show location information*

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the show location command at the system prompt:

```
> show location

 Location Status
 ---------------
 State              : enabled
 Source             : 192.168.2.3
 Latitude           : 44* 55' 14.809" N (44.92078)
 Longitude          : 93* 24' 47.262" w (-93.413128)
 Altitude           : 279 meters
```

```
Velocity          : 0 meters per second
Direction         : None
Quality           : Standard GNSS (2D/3D)
UTC Date and Time : Fri, Jan 12, 2024 12:10:00 03
No. of Satellites : 7

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### *Show geofence information*

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the show location geofence command at the system prompt:

```
> show location geofence

Geofence       Status  State   Transitions  Last Transition
-------------  ------  ------  -----------  ---------------
test_geofence  Up      Inside  0

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Modbus gateway

The Connect EZ 16/32 supports the ability to function as a Modbus gateway, to provide serial-to-Ethernet connectivity to Programmable Logic Controllers (PLCs), Remote Terminal Units (RTUs), and other industrial devices. MODBUS provides client/server communication between devices connected on different types of buses and networks, and the Modbus gateway allows for communication between buses and networks that use the Modbus protocol.

This section contains the following topics:

Configure the Modbus gateway ..... 607
Modbus hardening ..... 620
Show Modbus gateway status and statistics ..... 622

## Configure the Modbus gateway

**Required configuration items**

- Server configuration:
  - Enable the server.
  - Connection type, either socket or serial.
    - If the connection type is socket, the IP protocol to be used.
    - If the connection type is serial, the serial port to be used.
- Client configuration:
  - Enable the client.
  - Connection type, either socket or serial.
    - If the connection type is socket:
      - The IP protocol to be used.
      - The hostname or IPv4 address of the remote host on which the Modbus server is running.
    - If the connection type is serial:
      - The serial port to be used.
  - Modbus address or addresses to determine if messages should be forwarded to a destination device.

**Additional configuration items**

- Server configuration:
  - The packet mode.
  - The maximum time between bytes in a packet.
  - If the connection type is set to socket:
    - The port to use.
    - The inactivity timeout.
    - Access control list.
  - If the connection type is set to serial:
    - Whether to use half duplex (two wire) mode.
- Client configuration:
  - The packet mode.
  - The maximum time between bytes in a packets.
  - Whether to send broadcast messages.
  - Response timeout
  - If connection type is set to socket:
    - The port to use.
    - The inactivity timeout.
  - If connection type is set to serial:
    - Whether to use half duplex (two wire) mode.

- Whether packets should be delivered to a fixed Modbus address.
- Whether packets should have their Modbus address adjusted downward before to delivery.

## Web

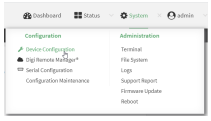
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

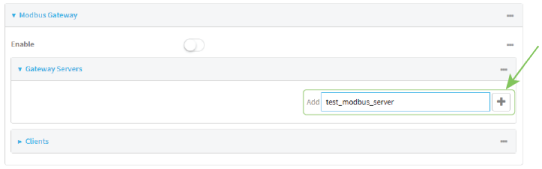
   

   The **Configuration** window is displayed.
3. Click **Services** > **Modbus Gateway**.

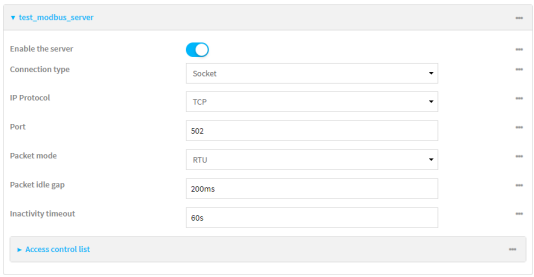
   
4. Click **Enable** to enable the gateway.
5. Click **Debug** to allow verbose logging in the system log.

### *Configure gateway servers*

1. Click to expand **Gateway Servers**.
2. For **Add Modbus server**, type a name for the server and click ✚.

   The new Modbus gateway server configuration is displayed.




3. The new Modbus gateway server is enabled by default. Toggle off **Enable the server** to disable.
4. For **Connection type**, select **Socket** or **Serial**. Available options in the gateway server configuration vary depending on this setting.
   - If **Socket** is selected for **Connection type**:
     a. For **IP Protocol**, select **TCP** or **UDP**. The default is **TCP**.
     b. For **Port**, enter or select an appropriate port. The default is port **502**.
   - If **Serial** is selected for **Connection type**:
     a. For **Serial port**, select the appropriate serial port on the Connect EZ 16/32 device.
5. For **Packet mode**, select **RTU** or **RAW** (if **Connection type** is set to **Socket**) or **ASCII** (if **Connection type**is set to **Serial**) for the type of packet that will be used by this connection. The default is **RTU**.
6. For **Packet idle gap**, type the maximum allowable time between bytes in a packet.

   Allowed values are between 10 milliseconds and one second, and take the format ***number*** {**ms|s**}.

   For example, to set **Packet idle gap** to 20 milliseconds, enter **20ms**.
7. If **Connection type** is set to **Socket**, for **Inactivity timeout**, type the amount of time to wait before disconnecting the socket when it has become inactive.

   Allowed values are any number of minutes or seconds up to a maximum of 15 minutes, and take the format ***number***{**m|s**}.

   For example, to set **Inactivity timeout** to ten minutes, enter **10m** or **600s**.
8. (Optional) If **Connection type** is set to **Serial**, click **Half duplex** to enable half duplex (two wire) mode.
9. (Optional) If **Connection type** is set to **Socket**, click to expand **Access control list**:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's web administration service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the web administration service.
     d. Click ✚ again to list additional IP addresses or networks.

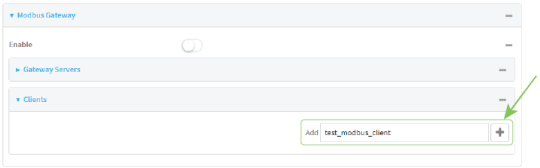
- To limit access to specified IPv6 addresses and networks:
  a. Click **IPv6 Addresses**.
  b. For **Add Address**, click ✚.
  c. For **Address**, enter the IPv6 address or network that can access the device's web administration service. Allowed values are:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the web administration service.
  d. Click ✚ again to list additional IP addresses or networks.
- To limit access to hosts connected through a specified interface on the device:
  a. Click **Interfaces**.
  b. For **Add Interface**, click ✚.
  c. For **Interface**, select the appropriate interface from the dropdown.
  d. Click ✚ again to allow access through additional interfaces.
- To limit access based on firewall zones:
  a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
  b. For **Add Zone**, click ✚.
  c. For **Zone**, select the appropriate firewall zone from the dropdown.

     See Firewall configuration for information about firewall zones.
  d. Click ✚ again to allow access through additional firewall zones.

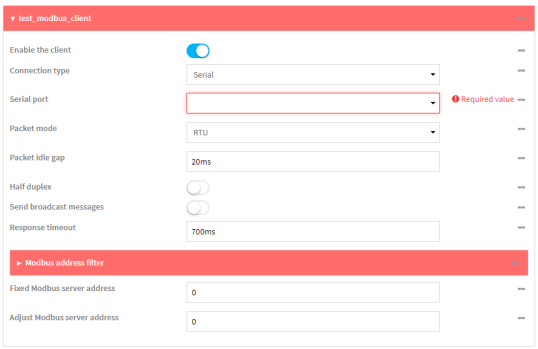
10. Repeat these steps to configure additional servers.

### *Configure clients*

1. Click to expand **Clients**.
2. For **Add Modbus client**, type a name for the client and click ✚.




The new Modbus gateway client configuration is displayed.




3. The new Modbus gateway client is enabled by default. Toggle off **Enable the client** to disable.
4. For **Connection type**, select **Socket** or **Serial**. Available options in the gateway server configuration vary depending on this setting.
   - If **Socket** is selected for **Connection type**:
     a. For **IP Protocol**, select **TCP** or **UDP**. The default is **TCP**.
     b. For **Port**, enter or select an appropriate port. The default is port **502**.
     c. For **Remote host**, type the hostname or IP address of the remote host on which the Modbus server is running.
   - If **Serial** is selected for **Connection type**:
     a. For **Serial port**, select the appropriate serial port on the Connect EZ 16/32 device.
5. For **Packet mode**, select **RTU** or **RAW** (if **Connection type** is set to **Socket**) or **ASCII** (if **Connection type**is set to **Serial**) for the type of packet that will be used by this connection. The default is **RTU**.
6. For **Packet idle gap**, type the maximum allowable time between bytes in a packet.

   Allowed values are between 10 milliseconds and one second, and take the format ***number*** {**ms|s**}.

   For example, to set **Packet idle gap** to 20 milliseconds, enter **20ms**.
7. If **Connection type** is set to **Socket**, for **Inactivity timeout**, type the amount of time to wait before disconnecting the socket when it has become inactive.

   Allowed values are any number of minutes or seconds up to a maximum of 15 minutes, and take the format ***number***{**m|s**}.

   For example, to set **Inactivity timeout** to ten minutes, enter **10m** or **600s**.
8. (Optional) If **Connection type** is set to **Serial**, click **Half duplex** to enable half duplex (two wire) mode.
9. (Optional) If **Connection type** is set to **Socket**, click to expand **Access control list**:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's web administration service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.

- **any**: No limit to IPv4 addresses that can access the web administration service.

d. Click ✚ again to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:
  a. Click **IPv6 Addresses**.
  b. For **Add Address**, click ✚.
  c. For **Address**, enter the IPv6 address or network that can access the device's web administration service. Allowed values are:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the web administration service.
  d. Click ✚ again to list additional IP addresses or networks.
- To limit access to hosts connected through a specified interface on the device:
  a. Click **Interfaces**.
  b. For **Add Interface**, click ✚.
  c. For **Interface**, select the appropriate interface from the dropdown.
  d. Click ✚ again to allow access through additional interfaces.
- To limit access based on firewall zones:
  a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
  b. For **Add Zone**, click ✚.
  c. For **Zone**, select the appropriate firewall zone from the dropdown.

     See Firewall configuration for information about firewall zones.
  d. Click ✚ again to allow access through additional firewall zones.

10. (Optional) Enable **Send broadcast messages** to configure the gateway to send broadcast messages to this client.
11. For **Response timeout**, type the maximum time to wait for a response to a message.

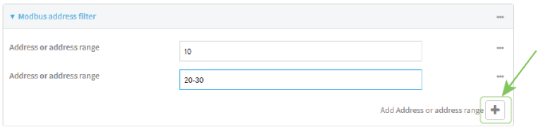
    Allowed values are between 1 millisecond and 700 milliseconds, and take the format ***number*ms**.

    For example, to set **Response timeout** to 100 milliseconds, enter **100ms**. The default is **700ms**.
12. Click to expand **Modbus address filter**.

    This filter is used by the gateway to determine if a message should be forwarded to a destination device. If the Modbus address in the message matches one or more of the filters, the message is forwarded. If it does not match the filters, the message is not forwarded.
13. For **Address or address range**, type a Modbus address or range of addresses. Allowed values are **1** through **255** or a hyphen-separated range.

    For example, to have this client filter for incoming messages that contain the Modbus address of 10, type **10**. To filter for all messages with addresses in the range of 20 to 30, type **20-30**.

    To add additional address filters for this client, click ✚.




14. For **Fixed Modbus server address**, if request messages handled by this client should always be forwarded to a specific device, type the device's Modbus address. Leave at the default setting of **0** to allow messages that match the **Modbus address filter** to be forwarded to devices based on the Modbuss address in the message.
15. For **Adjust Modbus server address**, type a value to adjust the Modbus server address downward by the specified value prior to delivering the message. Allowed values are **0** through **255**. Leave at the default setting of **0** to not adjust the server address.

    If a packet contains a Modbus server address above the amount entered here, the address will be adjusted downward by this amount before the packet is delivered. This allows you to configure clients on the gateway that will forward messages to remote devices with the same Modbus address on different buses. For example, if there are two devices on two different buses that have the same Modbus address of 10, you can create two clients on the gateway:

    - Client one:
      - **Modbus address filter** set to **10**.

      This will configure the gateway to deliver all messages that have the Modbus server address of 10 to this device.
    - Client two:
      - **Modbus address filter** set to **20**.
      - **Adjust Modbus server address** set to **10**.

      This will configure the gateway to deliver all messages that have the Modbus server address address of 20 to the device with address 10.
16. Repeat these steps to configure additional clients.
17. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the Modbus gateway:

```
(config)> service modbus_gateway enable true
(config)>
```

4. Configure servers:
   a. Add a server:

```
(config)> add service modbus_gateway server name
(config service modbus_gateway  server name)>
```

   where *name* is a name for the server, for example:

```
(config)> add service modbus_gateway server test_modbus_server
(config service modbus_gateway server test_modbus_server)>
```

   The Modbus server is enabled by default. To disable:

```
(config service modbus_gateway server test_modbus_server)> enable
false
(config service modbus_gateway server test_modbus_server)>
```

   b. Set the connection type:

```
(config service modbus_gateway server test_modbus_server)> connection_
type type
(config service modbus_gateway server test_modbus_server)>
```

   where *type* is either **socket** or **serial**. The default is **socket**.

   - If **connection_type** is set to **socket**:
     i. Set the IP protocol:

```
(config service modbus_gateway server test_modbus_server)>
socket protocol value
(config service modbus_gateway server test_modbus_server)>
```

     where *value* is either **tcp** or **udp**.

     ii. Set the port:

```
(config service modbus_gateway server test_modbus_server)>
socket port
(config service modbus_gateway server test_modbus_server)>
```

     where *port* is an integer between **1** and **65535**. The default is **502**.

     iii. Set the packet mode:

```
(config service modbus_gateway server test_modbus_server)>
socket packet_mode value
(config service modbus_gateway server test_modbus_server)>
```

     where *value* is either **rtu** or **raw**. The default is **rtu**.

     iv. Set the maximum allowable time between bytes in a packet:

```
(config service modbus_gateway server test_modbus_server)>
socket idle_gap value
(config service modbus_gateway server test_modbus_server)>
```

where *value* is any number between 10 milliseconds and one second, and take the format ***number*{ms|s}**.

For example, to set idle_gap to 20 milliseconds, enter **20ms**.

v. Set the amount of time to wait before disconnecting the socket when it has become inactive:

```
(config service modbus_gateway server test_modbus_server)>
inactivity_timeout value
(config service modbus_gateway server test_modbus_server)>
```

where *value* is any number of minutes or seconds up to a maximum of 15 minutes, and takes the format ***number*{m|s}**.

For example, to set **inactivity_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config service modbus_gateway server test_modbus_server)>
inactivity_timeout 600s
(config service modbus_gateway server test_modbus_server)>
```

- If **connection_type** is set to **serial**:

  i. Set the serial port:

  i. Use the **?** to determine available serial ports:

```
(config service modbus_gateway server test_modbus_
server)> ... serial port ?

Serial

  Additional Configuration
  ------------------------------------------------------
-------------------------
  port1                     Port 1

(config service modbus_gateway server test_modbus_
server)>
```

  ii. Set the port:

```
(config service modbus_gateway server test_modbus_
server)> serial port
(config service modbus_gateway server test_modbus_
server)>
```

  ii. Set the packet mode:

```
(config service modbus_gateway server test_modbus_server)>
serial packet_mode value
(config service modbus_gateway server test_modbus_server)>
```

where *value* is either **rtu** or **ascii**. The default is **rtu**.

iii. Set the maximum allowable time between bytes in a packet:

```
(config service modbus_gateway server test_modbus_server)>
serial idle_gap value
(config service modbus_gateway server test_modbus_server)>
```

where *value* is any number between 10 milliseconds and one second, and take the format ***number*{ms|s}**.

For example, to set idle_gap to one second, enter **1000ms** or **1s**.

iv. (Optional) Enable half-duplex (two wire) mode:

```
(config service modbus_gateway server test_modbus_server)>
serial half_duplex true
(config service modbus_gateway server test_modbus_server)>
```

c. Repeat the above instructions for additional servers.

5. Configure clients:

a. Type **...** to return to the root of the configuration:

```
(config)> add service modbus_gateway server test_modbus_server)> ...
(config)>
```

b. Add a client:

```
(config)> add service modbus_gateway client name
(config service modbus_gateway  client name)>
```

where *name* is a name for the client, for example:

```
(config)> add service modbus_gateway client test_modbus_client
(config service modbus_gateway client test_modbus_client)>
```

The Modbus client is enabled by default. To disable:

```
(config service modbus_gateway client test_modbus_client)> enable
false
(config service modbus_gateway client test_modbus_client)>
```

c. Set the connection type:

```
(config service modbus_gateway client test_modbus_client)> connection_
type type
(config service modbus_gateway client test_modbus_client)>
```

where *type* is either **socket** or **serial**. The default is **socket**.

- If **connection_type** is set to **socket**:

i. Set the IP protocol:

```
(config service modbus_gateway client test_modbus_client)>
socket protocol value
(config service modbus_gateway client test_modbus_client)>
```

where *value* is either **tcp** or **udp**.

ii. Set the port:

```
(config service modbus_gateway client test_modbus_client)>
socket port
(config service modbus_gateway client test_modbus_client)>
```

where *port* is an integer between **1** and **65535**. The default is **502**.

iii. Set the packet mode:

```
(config service modbus_gateway client test_modbus_client)>
socket packet_mode value
(config service modbus_gateway client test_modbus_client)>
```

where *value* is either **rtu** or **ascii**. The default is **rtu**.

iv. Set the maximum allowable time between bytes in a packet:

```
(config service modbus_gateway client test_modbus_client)>
socket idle_gap value
(config service modbus_gateway client test_modbus_client)>
```

where *value* is any number between 10 milliseconds and one second, and take the format ***number*{ms|s}**.

For example, to set idle_gap to 20 milliseconds, enter **20ms**.

v. Set the amount of time to wait before disconnecting the socket when it has become inactive:

```
(config service modbus_gateway client test_modbus_client)>
inactivity_timeout value
(config service modbus_gateway client test_modbus_client)>
```

where *value* is any number of minutes or seconds up to a maximum of 15 minutes, and takes the format ***number*{m|s}**.

For example, to set **inactivity_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config service modbus_gateway client test_modbus_client)>
inactivity_timeout 600s
(config service modbus_gateway client test_modbus_client)>
```

vi. Set the hostname or IP address of the remote host on which the Modbus server is running:

```
(config service modbus_gateway client test_modbus_client)>
remote_host ip_address|hostname
(config service modbus_gateway client test_modbus_client)>
```

- If **connection_type** is set to **serial**:
  i. Set the serial port:
    i. Use the **?** to determine available serial ports:

```
(config service modbus_gateway client test_modbus_
client)> ... serial port ?

Serial

  Additional Configuration
  ------------------------------------------------------
------------------------
  port1                     Port 1

(config service modbus_gateway client test_modbus_
client)>
```

    ii. Set the port:

```
(config service modbus_gateway client test_modbus_
client)> serial port
(config service modbus_gateway client test_modbus_
client)>
```

  ii. Set the packet mode:

```
(config service modbus_gateway client test_modbus_client)>
serial packet_mode value
(config service modbus_gateway client test_modbus_client)>
```

  where *value* is either **rtu** or **ascii**. The default is **rtu**.

  iii. Set the maximum allowable time between bytes in a packet:

```
(config service modbus_gateway client test_modbus_client)>
serial idle_gap value
(config service modbus_gateway client test_modbus_client)>
```

  where *value* is any number between 10 milliseconds and one second, and take the format ***number*{ms|s}**.

  For example, to set idle_gap to one second, enter **1000ms** or **1s**.

  iv. (Optional) Enable half-duplex (two wire) mode:

```
(config service modbus_gateway client test_modbus_client)>
serial half_duplex true
(config service modbus_gateway client test_modbus_client)>
```

d. (Optional) Enable the gateway to send broadcast messages to this client:

```
(config service modbus_gateway client test_modbus_client)> broadcast
true
(config service modbus_gateway client test_modbus_client)>
```

e. Set the maximum time to wait for a response to a message:

```
(config service modbus_gateway client test_modbus_client)> response_
timeout value
(config service modbus_gateway client test_modbus_client)>
```

Allowed values are between 1 millisecond and 700 milliseconds, and take the format ***number*ms**.

For example, to set response_timeout to 100 milliseconds:

```
(config service modbus_gateway client test_modbus_client)> response_
timeout 100ms
(config service modbus_gateway client test_modbus_client)>
```

The default is **700ms**.

f. Configure the address filter:

This filter is used by the gateway to determine if a message should be forwarded to a destination device. If the Modbus address in the message matches one or more of the filters, the message is forwarded. If it does not match the filters, the message is not forwarded. Allowed values are **1** through **255** or a hyphen-separated range.

For example:

- To have this client filter for incoming messages that contain the Modbus address of 10, set the index **0** entry to **10**:

```
(config service modbus_gateway client test_modbus_client)>
filter 0 10
(config service modbus_gateway client test_modbus_client)>
```

- To filter for all messages with addresses in the range of 20 to 30, set the index **0** entry to **20-30**:

```
(config service modbus_gateway client test_modbus_client)>
filter 0 20-30
(config service modbus_gateway client test_modbus_client)>
```

To add additional filters, increment the index number. For example, to add an additional filter for addresses in the range of 50-100:

```
(config service modbus_gateway client test_modbus_client)> filter 1
50-100
(config service modbus_gateway client test_modbus_client)>
```

g. If request messages handled by this client should always be forwarded to a specific device, , use **fixed_server_address** to set the device's Modbus address:

```
(config service modbus_gateway client test_modbus_client)> fixed_
server_address value
(config service modbus_gateway client test_modbus_client)>
```

Leave at the default setting of **0** to allow messages that match the Modbus address filter to be forwarded to devices based on the Modbuss address in the message.

h. To adjust the Modbus server address downward by the specified value prior to delivering the message, use **adjust_server_address**:

```
(config service modbus_gateway client test_modbus_client)> adjust_
server_address value
(config service modbus_gateway client test_modbus_client)>
```

where *value* is an integer from **0** to **255**. Leave at the default setting of **0** to not adjust the server address.

If a packet contains a Modbus server address above the amount entered here, the address will be adjusted downward by this amount before the packet is delivered. This allows you to configure clients on the gateway that will forward messages to remote devices with the same Modbus address on different buses. For example, if there are two devices on two different buses that have the same Modbus address of 10, you can create two clients on the gateway:

- Client one:
  - **filter** set to **10**.

  This will configure the gateway to deliver all messages that have the Modbus server address of 10 to this device.
- Client two:
  - **filter** set to **20**.
  - **adjust_server_address** set to **10**.

  This will configure the gateway to deliver all messages that have the Modbus server address address of 20 to the device with address 10.

i. Repeat the above instructions for additional clients.

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Modbus hardening

Modbus hardening refers to the process of enhancing the security and reliability of Modbus communications between devices over a network by implementing various protective measures. This includes configuring the Modbus systems to minimize vulnerabilities, applying access controls, using encryption, segmenting networks, upgrading firmware on the devices, as well as monitoring and logging. Modbus hardening is about making the serial communication between devices over a network more secure against cyber threats.

Hardening can involve implementing various security measures, such as:

- **Access control**

  Update the **Services** > **Modbus Gateway** > **Gateway servers** > **Access control list** settings to only allow access to the Modbus service on the specific network interfaces, firewall zones, and source IP addresses that you expect the Modbus queries to come from. See Configure the Modbus gateway for more information.
- **Encryption**

  Further lock down access to the Modbus gateway service on the Connect EZ 16/32 by configuring it to establish a VPN tunnel, then update the access control list as mentioned above to only allow access to the Modbus service through the VPN connection.
- **Network segmentation**

  Use a separate firewall zone for the network interface(s) and/or VPN tunnels that the user will be accessing the Modbus gateway service through to ensure that the Modbus access is separate from other network traffic
- **Monitoring and logging**

  Utilize Digi Remote Manager or an external logging service to monitor the activity on your Digi router
- **Firmware upgrades**

  Keep your firmware current so your Connect EZ 16/32 has the most recent security patches and bug fixes.

**Note** To see how you can implement security measures for you Modbus gateway service, see Use case | Secure your Modbus gateway service.

### *Use case | Secure your Modbus gateway service*

**Do you want to secure Modbus messaging across an internet connection to safeguard the information being communicated between Digi devices over your network?**
You can by implementing security measures, such as access control, encryption, network segmentation, monitoring and logging, and firmware upgrades to ensure the integrity and confidentiality of Modbus communications between Digi devices on your network.

1. Determine the devices on your network that need to communicate with each other via the Modbus Gateway service.
2. Isolate Modbus traffic using VLANS or separate network interfaces.
3. Implement strong authentication.
4. Define access policies.

   Update the **Services** > **Modbus Gateway** > **Gateway servers** > **Access control list** settings to only allow access to the Modbus service on the specific network interfaces, firewall zones, and source IP addresses that you expect the Modbus queries to come from. See Configure the Modbus gateway for more information.
5. Create a VPN tunnel, such as IPsec or Wireguard, to protect data in transit between your devices.
6. Configure firewalls to monitor and control incoming and outgoing traffic.

By implementing these advanced security protocols and ensuring reliable data transmission, this service effectively addresses the challenges of data integrity and privacy on your network.

## Show Modbus gateway status and statistics

You can view status and statistics about location information from either the WebUI or the command line.

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, select **Status** > **Modbus Gateway**.

   The **Modbus Gateway** page appears.

   Statistics related to the Modbus gateway server are displayed. If the message **Server connections not available** is displayed, this indicates that there are no connected clients.

   - To view information about Modbus gateway clients, click **Clients**.
   - To view statistics that are common to both the clients and server, click **Common Statistics**.
   - To view configuration details about the gateway, click the (configuration) icon in the upper right of the gateway's status pane.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the show modbus-gateway command at the system prompt:

```
> show modbus-gateway

 Server Connection  IP Address   Port   Uptime
 -----------------  -----------  -----  ------
 modbus_socket      10.45.1.139  49570  6
 modbus_socket      10.45.1.139  49568  13

 Client               Uptime
 -------------------  ------
 modbus_socket_41     0
 modbus_socket_21     0
 modbus_serial_client 428

>
```

   If the message **Server connections not available** is displayed, this indicates that there are no connected clients.

3. Use the show modbus-gateway verbose command at the system prompt to display more information:

```
> show modbus-gateway verbose

 Client               Uptime
```

```
--------------------  ------
modbus_socket_41      0
modbus_socket_21      0
modbus_serial_client  506

Common Statistics
-----------------
Configuration Updates          : 1
Client Configuration Failure   : 0
Server Configuration Failure   : 0
Configuration Load Failure     : 0
Incoming Connections           : 4
Internal Error                 : 0
Resource Shortages             : 0

Servers
-------

modbus_socket
-------------
Client Lookup Errors           : 0
Incoming Connections           : 4
Packet Errors                  : 0
RX Broadcasts                  : 0
RX Requests                    : 12
TX Exceptions                  : 0
TX Responses                   : 12

Clients
-------

modbus_socket_41
----------------
Address Translation Errors     : 0
Connection Errors              : 0
Packet Errors                  : 0
RX Responses                   : 4
RX Timeouts                    : 0
TX Broadcasts                  : 0
TX Requests                    : 4

modbus_socket_21
----------------
Address Translation Errors     : 0
Connection Errors              : 0
Packet Errors                  : 0
RX Responses                   : 4
RX Timeouts                    : 0
TX Broadcasts                  : 0
TX Requests                    : 4
```

```
modbus_serial_client
--------------------
Address Translation Errors     : 0
Connection Errors              : 0
Packet Errors                  : 0
RX Responses                   : 4
RX Timeouts                    : 0
TX Broadcasts                  : 0
TX Requests                    : 4

>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# System time synchronization

System time synchronization refers to the process of coordinating the system time of your Connect EZ 16/32 device with an external, more accurate time source. By default, this synchronization occurs one time per day, but will also synchronize at startup, and in response to a change in the route. There are two configuration parameters that control system time synchronization: **ntpdate** and **system.time.resyn_interval**.

The **ntpdate** default configurations include the following:

- Time zone: **UTC**
- NTP server: the Digi NTP server, **time.digicloud.com**

The **system.time.resyn_interval** default configuration includes the following:

- Frequency of the synchronization: **1d** (one day). Set to **O** (zero) for no synchronization except at startup and route change.

No additional configuration is required for the synchronization if this default configuration is sufficient for your setup. However, you can change per-day synchronization, the default time zone, and the default NTP server, as well as adding additional NTP servers. If multiple NTP servers are added, time samples are obtained from each server. Selection algorithms are used to determine the most accurate time. See Configure the system time synchronization for details about changing the default configuration.

The Connect EZ 16/32 device can also be configured to serve as an NTP server, providing NTP services to downstream devices. See Network Time Protocol for more information about NTP server support.

You can also set the local date and time manually, if there is no access to the configured NTP servers or modem time sources. See Manually set the system date and time for more information.

## Configure the system time synchronization

To configure or change the system time synchronization:

### Web

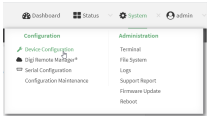
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **System** > **Time**.
4. Modify the settings.

---

**CAUTION!** If you enable the NTP service, either disable the server configured in `system time` or make sure to match the server(s) configured in `service ntp server`. If you do not do one of these options, then the System time synchronization may fail, which could result in the following error message: `ntpdate[2901]: the NTP socket is in use, exiting`.

---

| System time setting | UI Configuration |
|---|---|
| **Timezone** | Choose the time zone closest to where the device is located.<br>The default time zone is **UTC**. |
| **Resynchronization interval** | Type the frequency of the daily update.<br>The default is **1d** (one day).<br>Set to **0** (zero) for no synchronization. |
| **Time sources** | a. Click ✚ to add a new time source.<br>The time source is now enabled by default.<br>b. In **Type of time source**, choose whether you want to use an **NTP** or **Modem** as the external source to which the device synchronizes.<br>■ If using an NTP, click ✚ to add the **Server** hostname.<br>The default is time.devicecloud.com.<br>Note If multiple NTP servers are added, time samples are obtained from each server. Selection algorithms are used to determine the most accurate time.<br>■ If using a modem, specify the **Modem** and **Modem time offset**.<br>The default offset is **Local**. |

5. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Type **system time** to enter configuration mode for system time.

```
 > config system time
(config system time)>
```

4. Add a new time source or modify the settings.

**CAUTION!** If you enable the NTP service, either disable the server configured in `system time` or make sure to match the server(s) configured in `service ntp server`. If you do not do one of these options, then the System time synchronization may fail, which could result in the following error message: `ntpdate[2901]: the NTP socket is in use, exiting`.

| System time setting | UI Configuration |
|---|---|
| **Timezone** | (Optional) Set the timezone for the location of your Connect EZ 16/32 device. The default is **UTC**.<br>`(config)> system time timezone value`<br>`(config)>`<br>Where *value* is the timezone using the format specified with the following command:<br>`(config)> system time timezone ?`<br>`Timezone: The timezone for the location of this device. This is used to adjust the time for log messages. It also affects actions that occur at a specific time of day.`<br>`Format:`<br>`  Africa/Abidjan`<br>`  Africa/Accra`<br>`  Africa/Addis_Ababa`<br>`  ...`<br>`(config)>` |
| **Resynchronization interval** | Type the frequency of the daily update.<br>The default is **1d** (one day). Set to **0** (zero) for no synchronization.<br>`(config) system time resync_interval value`<br>`(config) >` |

| System time setting | UI Configuration |
|---|---|
| | Where *value* is {w\|d\|h\|m\|s}. For more information:<br>`(config)> system time resync_interval ?`<br><br>`Format: number {w\|d\|h\|m\|s}...`<br>`Optional: yes`<br>`Dafault value: 1 d`<br>`Current value: 1 d`<br>`(config)>` |
| **Time sources** | Add a new time source, either an NTP server or a modem.<br>**Note** The default NTP server is time.devicecloud.com.<br>■ If adding one or more NTP servers:<br>`add service ntp server 0 time.server.com`<br>**Note** If multiple NTP servers are added, time samples are obtained from each server. Selection algorithms are used to determine the most accurate time.<br>**Note** This list is synchronized with the list of servers included with NTP server configuration, and changes made to one will be reflected in the other. See Configure the device as an NTP server for more information about NTP server configuration.<br>■ If adding a modem, specify the mode and time offset:<br>The default offset is **Local**.<br>`(config system time source)> add end`<br>`(config system time source 1)>`<br>`(config system time source 1)> type modem`<br>`(config time source 1) > modem modem`<br>■ To see the modem and its settings:<br>`(config system time source 1)> show`<br>`enable true`<br>`no label`<br>`modem modem`<br>`offset local`<br>`type modem` |

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### Test the connection to the NTP servers

The following procedure tests the configured NTP servers for connectivity. This test does not affect the device's current local date and time.

#### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Test the configured NTP servers for connectivity:

```
> system time test
Testing NTP server time.devicecloud.com on UDP port 123...
server 52.2.40.158, stratum 2, offset -0.000216, delay 0.05800
server 35.164.164.69, stratum 2, offset -0.000991, delay 0.07188
24 Aug 22:01:20 ntpdate[28496]: adjust time server 52.2.40.158 offset -
0.000216 sec
NTP test sync successful

Testing NTP server time.accns.com on UDP port 123...
server 128.136.167.120, stratum 3, offset -0.001671, delay 0.08455
24 Aug 22:01:20 ntpdate[28497]: adjust time server 128.136.167.120 offset
-0.001671 sec
NTP test sync successful
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### Manually synchronize with the NTP server

The following procedure perform a NTP query to the configured servers and set the local time to the first server that responds.

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Synchronize the device's local date and time:

```
> system time sync
24 Aug 22:03:55 ntpdate[2520]: step time server 52.2.40.158 offset -
0.000487 sec
NTP sync to time.devicecloud.com successful
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### Manually set the system date and time

If your network restricts access to NTP servers, use this procedure to set the local date and time.

This procedure is available at the Admin CLI only.

#### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Set the device's local date and time:

```
> system time set value
>
```

   where *value* is the date in year-month-day hour:minute:second format. The *value* must be surrounded by double quotes. For example:

```
> system time set "2024-01-12 12:10:00"
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Network Time Protocol

Network Time Protocol (NTP) enables devices connected on local and worldwide networks to synchronize their internal software and hardware clocks to the same time source. The Connect EZ 16/32 device can be configured as an NTP server, allowing downstream hosts that are attached to the device's Local Area Networks to synchronize with the device.

When the device is configured as an NTP server, it also functions as an NTP client. The NTP client will be consistently synchronized with one or more upstream NTP servers, which means that NTP packets are transferred every few seconds. A minimum of one upstream NTP server is required. Additional NTP servers can be configured. If multiple servers are configured, a number of time

samples are obtained from each of the servers and a subset of the NTP clock filter and selection algorithms are applied to select the best of these.

See Configure the device as an NTP server for information about configuring your device as an NTP server.

## Configure the device as an NTP server

### Required Configuration Items

- Enable the NTP service.
- At least one upstream NTP server for synchronization. The default setting is the Digi NTP server, time.devicecloud.com.

### Additional Configuration Options

- Additional upstream NTP servers.
- Access control list to limit downstream access to the Connect EZ 16/32 device's NTP service.
- The time zone setting, if the default setting of UTC is not appropriate.

To configure the Connect EZ 16/32 device's NTP service:

### Web

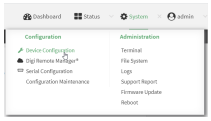
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **NTP**.
4. Enable the Connect EZ 16/32 device's NTP service by clicking **Enable**.
5. (Optional) Configure the access control list to limit downstream access to the Connect EZ 16/32 device's NTP service.

- To limit access to specified IPv4 addresses and networks:
  a. Click **IPv4 Addresses**.
  b. For **Add Address**, click ✚.
  c. For **Address**, enter the IPv4 address or network that can access the device's NTP service. Allowed values are:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the NTP service.
  d. Click ✚ again to list additional IP addresses or networks.
- To limit access to specified IPv6 addresses and networks:
  a. Click **IPv6 Addresses**.
  b. For **Add Address**, click ✚.
  c. For **Address**, enter the IPv6 address or network that can access the device's NTP service. Allowed values are:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the NTP service.
  d. Click ✚ again to list additional IP addresses or networks.
- To limit access to hosts connected through a specified interface on the device:
  a. Click **Interfaces**.
  b. For **Add Interface**, click ✚.
  c. For **Interface**, select the appropriate interface from the dropdown.
  d. Click ✚ again to allow access through additional interfaces.
- To limit access based on firewall zones:
  a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
  b. For **Add Zone**, click ✚.
  c. For **Zone**, select the appropriate firewall zone from the dropdown.
     See Firewall configuration for information about firewall zones.
  d. Click ✚ again to allow access through additional firewall zones.

**Note** By default, the access control list for the NTP service is empty, which means that all downstream hosts connected to the Connect EZ 16/32 device can use the NTP service.

6. Enable **Fall back to local clock** to allow the device's local system clock to be used as backup time source.
7. (Optional) Add upstream NTP servers that the device will use to synchronize its time. The default setting is **time.devicecloud.com**.
   - To change the default value of the NTP server:
     a. Click **NTP servers**.
     b. For **Server**, type a new server name.

- To add an NTP server:
  a. Click **NTP servers**.
  b. For **Add Server**, click ✚.
  c. For **Server**, enter the hostname of the upstream NTP server that the device will use to synchronize its time.
  d. Click ✚ to add additional NTP servers. If multiple servers are included, servers are tried in the order listed until one succeeds.

**Note** This list is synchronized with the list of servers included with NTP client configuration, and changes made to one will be reflected in the other. See Configure the system time synchronization for more information about NTP client configuration.

8. (Optional) Configure the system time zone. The default is **UTC**.
   a. Click **System** > **Time**
   b. Select the **Timezone** for the location of your Connect EZ 16/32 device.
9. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the ntp service:

```
(config)> service ntp enable true
(config)>
```

4. (Optional) Add an upstream NTP server that the device will use to synchronize its time to the appropriate location in the list of NTP servers. The default setting is **time.devicecloud.com**.
   - To delete the default NTP server, **time.devicecloud.com**:

```
(config)> del service ntp server 0
(config)>
```

   - To add the NTP server to the beginning of the list, use the index value of **0** to indicate that it should be added as the first server:

```
(config)> add service ntp server 0 time.server.com
(config)>
```

   - To add the NTP server to the end of the list, use the index keyword **end**:

```
(config)> add service ntp server end time.server.com
(config)>
```

- To add the NTP server in another location in the list, use an index value to indicate the appropriate position. For example:

```
(config)> add service ntp server 1 time.server.com
(config)>
```

**Note** This list is synchronized with the list of servers included with NTP client configuration, and changes made to one will be reflected in the other. See Configure the system time synchronization for more information about NTP client configuration.

5. Allow the device's local system clock to be used as backup time source:

```
(config)> service ntp local true
(config)>
```

6. (Optional) Configure the access control list to limit downstream access to the Connect EZ 16/32 device's NTP service.
   - To limit access to specified IPv4 addresses and networks:

```
(config)> add service ntp acl address end value
(config)>
```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the NTP server agent.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:

```
(config)> add service ntp acl address6 end value
(config)>
```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the NTP server agent.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config)> add service ntp acl interface end value
(config)>
```

     Where *value* is an interface defined on your device.

     Display a list of available interfaces:

     Use **... network interface ?** to display interface information:

     Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service ntp acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------------------
-----------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to include additional firewall zones.

**Note** By default, the access control list for the NTP service is empty, which means that all downstream hosts connected to the Connect EZ 16/32 device can use the NTP service.

7. (Optional) Set the timezone for the location of your Connect EZ 16/32 device. The default is **UTC**.

```
(config)> system time timezone value
(config)>
```

Where *value* is the timezone using the format specified with the following command:

```
(config)> system time timezone ?

Timezone: The timezone for the location of this device. This is used to
adjust the time for log
messages. It also affects actions that occur at a specific time of day.
Format:
  Africa/Abidjan
  Africa/Accra
  Africa/Addis_Ababa
```

```
  ...

(config)>
```

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show status and statistics of the NTP server

You can display status and statistics for active NTP servers

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the main menu, click **Status**.
2. Under **Services**, click **NTP**.

   The NTP server status page is displayed.

### Command line

#### *Show NTP information*

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the show ntp command at the system prompt:

```
> show ntp

 NTP Status Status
 -----------------
 Status      : Up
 Sync Status : Up

 Remote            Refid          ST  T  When  Poll  Reach  Delay
Offset  Jitter
 ----------------  -------------  --  -  ----  ----  -----  ------  -----
-  ------
 *ec2-52-2-40-158  129.6.15.32    2   u  191   1024  377    33.570
+1.561  0.991
 128.136.167.120   128.227.205.3  3   u  153   1024  1      43.583  -
```

```
1.895   0.382

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Configure a multicast route

Multicast routing allows a device to transmit data to a single multicast address, which is then distributed to a group of devices that are configured to be members of that group.

To configure a multicast route:

## Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

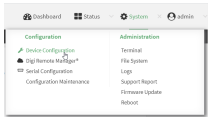
   b. Click the **Device ID**.

   c. Click **Settings**.

   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Services** > **Multicast**.
4. For **Add Multicast route**, type a name for the route and click ✚.
5. The new route is enabled by default. To disable, toggle off **Enable**.
6. Type the **Source address** for the route. This must be a multicast IP address between 224.0.0.1 and 239.255.255.255.
7. Select a **Source interface** where multicast packets will arrive.
8. To add one or more destination interface that the Connect EZ 16/32 device will send mutlicast packets to:

   a. Click to expand **Destination interfaces**.

   b. Click ✚.

c. For **Destination interface**, select the interface.
d. Repeat for additional destination interfaces.

9. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the multicast route. For example, to add a route named **test**:

```
(config)> add service multicast test
(config service multicast test)>
```

4. The multicast route is enabled by default. If it has been disabled, enable the route:

```
(config service multicast test)> enable true
(config service multicast test)>
```

5. Set the source address for the route. This must be a multicast IP address between 224.0.0.1 and 239.255.255.255.

```
(config service multicast test)> dst ip-address
(config service multicast test)>
```

6. Set the source interface for the route where multicast packets will arrive:
   a. Use the **?** to determine available interfaces:
   b. Set the interface. For example:

```
(config service multicast test)> src_interface /network/interface/eth1
(config service multicast test)>
```

7. Set a destination interface that the Connect EZ 16/32 device will send mutlicast packets to:
   a. Use the **?** to determine available interfaces:
   b. Set the interface. For example:

```
(config service multicast test)> add interface end
/network/interface/eth1
(config service multicast test)>
```

   c. Repeat for each additional destination interface.

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Ethernet network bonding

The Connect EZ 16/32 device supports bonding mode for the Ethernet network. This allows you to configure the device so that Ethernet ports share one IP address. When both ports are being used, they act as one Ethernet network port.

### *Required configuration items*

- Enable Ethernet bonding.
- The mode, either:
  - Active-backup. Provides fault tolerance.
  - Round-robin. Provides load balancing as well as fault tolerance.
- The Ethernet devices in the bonded pool.
- Create a new network interface for the bonded Ethernet devices, and disable the any interfaces associated with those Ethernet devices..

## Web

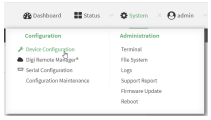
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

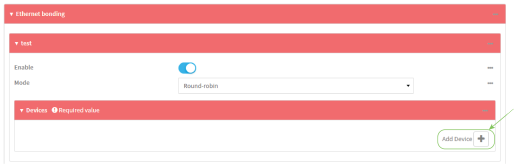
   

   The **Configuration** window is displayed.
3. Click **Network** > **Ethernet bonding**.

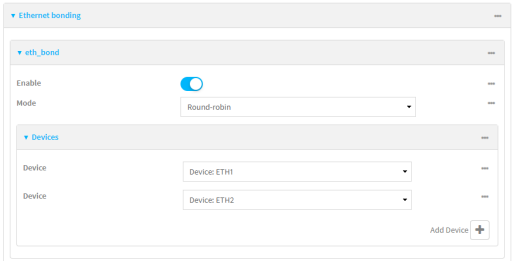
4. For **Add Bond device**, click ✚

The bond device is enabled by default. To disable, toggle off **Enable**.

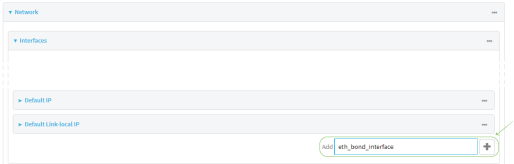
5. For **Mode**, selected either:
   - **Active-backup**: Transmits data on only one of the bonded devices at a time. When the active device fails, the next available device in the list is chosen. This mode provides for fault tolerance.
   - **Round-robin**: Alternates between bonded devices to provide load balancing as well as fault tolerance.
6. Click to expand **Devices**.
7. Add Ethernet devices:
   a. For **Add device**, click ✚.



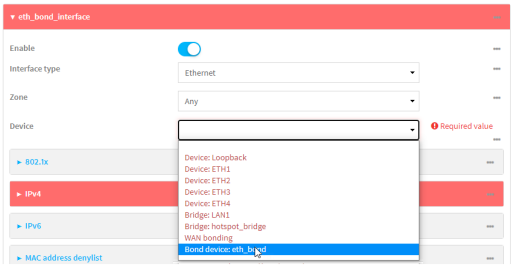

   b. For **Device**, select an Ethernet device to participate in the bond pool.
   c. Repeat for each appropriate Ethernet device.




8. Create a new network interface that is linked to the Ethernet bond:
   a. Click **Network** > **Interface**.
   b. For **Add Interface**, type a name for the interface and click ✚.



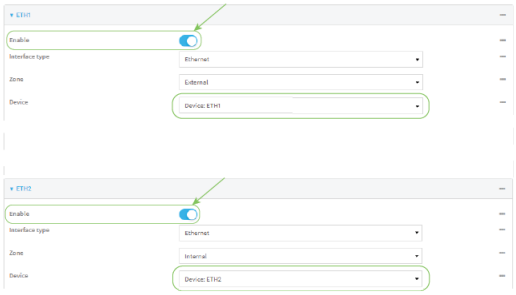
c. For **Device**, select the Ethernet bond created above:




d. Complete the rest of the interface configuration. See Configure a Wide Area Network (WAN) or Configure a Local Area Network (LAN) for further information.

e. Disable any other interfaces associated with the devices that were added to the Ethernet bond.

For example, if ETH1 and ETH2 were added to the Ethernet bond, disable the ETH1 and ETH2 interfaces:



In some cases, the device may be a part of a bridge, in which case you should remove the device from the bridge.

See Configure a bridge for more information.

9. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a network bond:

```
(config)> add network bond name
(config network bond name)>
```

For example, to create an Ethernet bond named eth_bond:

```
(config> add network bond eth_bond
(config network bond eth_bond)>
```

4. The new network bond is enabled by default. To disable:

```
(config network bond eth_bond)> enable false
(config network bond eth_bond)>
```

5. Set the mode:

```
(config network bond eth_bond)> mode value
(config network bond eth_bond)>
```

where value is either:

- **active-backup**: Transmits data on only one of the bonded devices at a time. When the active device fails, the next available device in the list is chosen. This mode provides for fault tolerance.
- **round-robin**: Alternates between bonded devices to provide load balancing as well as fault tolerance.

6. Add Ethernet devices:
   a. Use the **?** to determine available devices:

```
(config network bond eth_bond)> ... network device ?

 Additional Configuration
 ------------------------------------------------------------------------
-------

 loopback

(config network bond eth_bond)>
```

   b. To add this device name to the end of the list:

```
(config network bond eth_bond)> add device end /network/device/
(config network bond eth_bond)>
```

   c. Repeat to add additional device names to the list.

7. Create a new network interface that is linked to the Ethernet bond:
   a. Type **...** to return to the root of the configuration:

```
(config network bond eth_bond)> ...
(config)>
```

   b. Create a new interface, for example:

```
(config)> add network interface eth_bond_interface
(config network interface eth_bond_interface)>
```

c. For **device**, select the Ethernet bond created above:

```
(config network interface eth_bonding_interface)> device
/network/bond/eth_bond
(config network interface eth_bonding_interface)>
```

d. Complete the rest of the interface configuration. See Configure a Wide Area Network (WAN) or Configure a Local Area Network (LAN) for further information.

8. Disable any other interfaces associated with the devices that were added to the Ethernet bond.

   For example, if ETH1 and ETH2 were added to the Ethernet bond, and they are included with the ETH1 and ETH2 interfaces:

   a. Type **...** to return to the root of the configuration:

```
(config network interface eth_bonding_interface)> ...
(config)>
```

   b. Disable the interfaces:

```
(config)> network interface eth1 enable false
(config)> network interface eth2 enable false
(config)>
```

   In some cases, the device may be a part of a bridge, in which case you should remove the device from the bridge.

   See Configure a bridge for more information.

9. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Enable service discovery (mDNS)

Multicast DNS mDNS is a protocol that resolves host names in small networks that do not have a DNS server. You can enable the Connect EZ 16/32 device to use mDNS.

**Note** This feature is enabled by default.

## Web

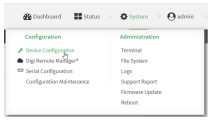
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
b. Click the **Device ID**.
c. Click **Settings**.
d. Click to expand **Config**.

Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services** > **Service Discovery (mDNS)**.
4. The mDNS service is enabled by default. To disable, click to toggle off **Enable**.
5. Click **Access control list** to configure access control:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's mDNS service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the mDNS service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's mDNS service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the mDNS service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.

- To limit access based on firewall zones:
  a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
  b. For **Add Zone**, click ✚.
  c. For **Zone**, select the appropriate firewall zone from the dropdown.
     See Firewall configuration for information about firewall zones.
  d. Click ✚ again to allow access through additional firewall zones.

6. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The mDNS service is enabled by default. To disable:

```
(config)> service mdns enable false
(config)>
```

4. Configure access control:
   - To limit access to specified IPv4 addresses and networks:

```
(config)> add service mdns acl address end value
(config)>
```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the mDNS service.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:

```
(config)> add service mdns acl address6 end value
(config)>
```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the mDNS service.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config)> add service mdns acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service mdns acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------------------
------------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to include additional firewall zones.

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Use the iPerf service

Your Connect EZ 16/32 device includes an iPerf3 server that you can use to test the performance of your network.

iPerf3 is a command-line tool that measures the maximum network throughput an interface can handle. This is useful when diagnosing network speed issues, to determine, for example, whether a cellular connection is providing expected throughput.

The Connect EZ 16/32 implementation of iPerf3 supports testing with both TCP and UDP.

**Note** Using iPerf clients that are at a version earlier than iPerf3 to connect to the Connect EZ 16/32 device's iPerf3 server may result in unpredictable results. As a result, Digi recommends using an iPerf client at version 3 or newer to connect to the Connect EZ 16/32 device's iPerf3 server.

### *Required configuration items*

- Enable the iPerf server on the Connect EZ 16/32 device.
- An iPerf3 client installed on a remote host. iPerf3 software can be downloaded at https://iperf.fr/iperf-download.php.

### *Additional configuration Items*

- The port that the Connect EZ 16/32 device's iPerf server will use to listen for incoming connections.
- The access control list for the iPerf server.

  When the iPerf server is enabled, the Connect EZ 16/32 device will automatically configure its firewall rules to allow incoming connections on the configured listening port. You can restrict access by configuring the access control list for the iPerf server.

To enable the iPerf3 server:

## Web

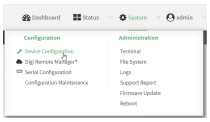
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services** > **iPerf**.
4. Click **Enable**.
5. (Optional) For **IPerf Server Port**, type the appropriate port number for the iPerf server listening port.
6. (Optional) Click to expand **Access control list** to restrict access to the iPerf server:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's iperf service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the iperf service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's iperf service. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the iperf service.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.
   - To limit access based on firewall zones:
     a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
     b. For **Add Zone**, click ✚.
     c. For **Zone**, select the appropriate firewall zone from the dropdown.
        See Firewall configuration for information about firewall zones.
     d. Click ✚ again to allow access through additional firewall zones.

7. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the iPerf server:

```
(config)> service iperf enable true
(config)>
```

4. (Optional) Set the port number for the iPerf server listening port. The default is 5201.

```
(config)> service iperf port port_number
(config)>
```

5. (Optional) Set the access control list to restrict access to the iPerf server:
   - To limit access to specified IPv4 addresses and networks:

     ```
     (config)> add service iperf acl address end value
     (config)>
     ```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the service-type.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:

     ```
     (config)> add service iperf acl address6 end value
     (config)>
     ```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the service-type.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

     ```
     (config)> add service iperf acl interface end value
     (config)>
     ```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service iperf acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------------------
------------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to include additional firewall zones.

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Example performance test using iPerf3

On a remote host with iPerf3 installed, enter the following command:

```
$ iperf3 -c device_ip
```

where *device_ip* is the IP address of the Connect EZ 16/32 device. For example:

```
$ iperf3 -c 192.168.2.1
Connecting to host 192.168.2.1, port 5201
[  4] local 192.168.3.100 port 54934 connected to 192.168.1.1 port 5201
[ ID] Interval           Transfer     Bandwidth       Retr  Cwnd
[  4]   0.00-1.00   sec  26.7 MBytes   224 Mbits/sec    8   2.68 MBytes
[  4]   1.00-2.00   sec  28.4 MBytes   238 Mbits/sec   29   1.39 MBytes
[  4]   2.00-3.00   sec  29.8 MBytes   250 Mbits/sec    0   1.46 MBytes
[  4]   3.00-4.00   sec  31.2 MBytes   262 Mbits/sec    0   1.52 MBytes
[  4]   4.00-5.00   sec  32.1 MBytes   269 Mbits/sec    0   1.56 MBytes
[  4]   5.00-6.00   sec  32.5 MBytes   273 Mbits/sec    0   1.58 MBytes
[  4]   6.00-7.00   sec  33.9 MBytes   284 Mbits/sec    0   1.60 MBytes
[  4]   7.00-8.00   sec  33.7 MBytes   282 Mbits/sec    0   1.60 MBytes
[  4]   8.00-9.00   sec  33.5 MBytes   281 Mbits/sec    0   1.60 MBytes
[  4]   9.00-10.00  sec  33.2 MBytes   279 Mbits/sec    0   1.60 MBytes
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bandwidth       Retr
[  4]   0.00-10.00  sec   315 MBytes   264 Mbits/sec   37             sender
[  4]   0.00-10.00  sec   313 MBytes   262 Mbits/sec                  receiver

iperf Done.
$
```

# Configure the ping responder service

Your Connect EZ 16/32 device's ping responder service replies to ICMP and ICMPv6 echo requests. The service is enabled by default. You can disable the service, or you can configure the service to use an access control list to limit the service to specified IP address, interfaces, and/or zones.

To enable the iPerf3 server:

## Web

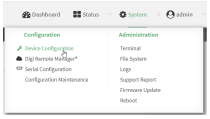
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Services** > **Ping responder**.

   The ping responder service is enabled by default. Click **Enable** to disable all ping responses.

4. Click to expand **Access control list** to restrict ping responses to specified IP address, interfaces, and/or zones:

   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's ping responder. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the ping responder.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's ping responder. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the ping responder.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.
   - To limit access based on firewall zones:
     a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
     b. For **Add Zone**, click ✚.
     c. For **Zone**, select the appropriate firewall zone from the dropdown.

        See Firewall configuration for information about firewall zones.
     d. Click ✚ again to allow access through additional firewall zones.

5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the iPerf server:

```
(config)> service iperf enable true
(config)>
```

4. (Optional) Set the port number for the iPerf server listening port. The default is 5201.

```
(config)> service iperf port port_number
(config)>
```

5. (Optional) Set the access control list to restrict access to the iPerf server:
   - To limit access to specified IPv4 addresses and networks:

     ```
     (config)> add service iperf acl address end value
     (config)>
     ```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 192.168.1.0/24.
     - **any**: No limit to IPv4 addresses that can access the service-type.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:

     ```
     (config)> add service iperf acl address6 end value
     (config)>
     ```

     Where *value* can be:
     - A single IP address or host name.
     - A network designation in CIDR notation, for example, 2001:db8::/48.
     - **any**: No limit to IPv6 addresses that can access the service-type.

     Repeat this step to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

     ```
     (config)> add service iperf acl interface end value
     (config)>
     ```

     Where *value* is an interface defined on your device.

     Display a list of available interfaces:

     Use **... network interface ?** to display interface information:

     Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service iperf acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------------------
-----------------------
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to include additional firewall zones.

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Example performance test using iPerf3

On a remote host with Iperf3 installed, enter the following command:

```
$ iperf3 -c device_ip
```

where *device_ip* is the IP address of the Connect EZ 16/32 device. For example:

```
$ iperf3 -c 192.168.2.1
Connecting to host 192.168.2.1, port 5201
[  4] local 192.168.3.100 port 54934 connected to 192.168.1.1 port 5201
[ ID] Interval           Transfer     Bandwidth       Retr  Cwnd
```

```
[  4]   0.00-1.00   sec  26.7 MBytes   224 Mbits/sec    8   2.68 MBytes
[  4]   1.00-2.00   sec  28.4 MBytes   238 Mbits/sec   29   1.39 MBytes
[  4]   2.00-3.00   sec  29.8 MBytes   250 Mbits/sec    0   1.46 MBytes
[  4]   3.00-4.00   sec  31.2 MBytes   262 Mbits/sec    0   1.52 MBytes
[  4]   4.00-5.00   sec  32.1 MBytes   269 Mbits/sec    0   1.56 MBytes
[  4]   5.00-6.00   sec  32.5 MBytes   273 Mbits/sec    0   1.58 MBytes
[  4]   6.00-7.00   sec  33.9 MBytes   284 Mbits/sec    0   1.60 MBytes
[  4]   7.00-8.00   sec  33.7 MBytes   282 Mbits/sec    0   1.60 MBytes
[  4]   8.00-9.00   sec  33.5 MBytes   281 Mbits/sec    0   1.60 MBytes
[  4]   9.00-10.00  sec  33.2 MBytes   279 Mbits/sec    0   1.60 MBytes
- - - - - - - - - - - - - - - - - - - - - - - - -
[ ID] Interval           Transfer     Bandwidth       Retr
[  4]   0.00-10.00  sec   315 MBytes   264 Mbits/sec   37             sender
[  4]   0.00-10.00  sec   313 MBytes   262 Mbits/sec                  receiver

iperf Done.
$
```

# Configure AnywhereUSB services

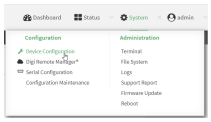
The AnywhereUSB services include enabling the service, creating an access control list, enabling mDNS discovery, specifying keepalive intervals, and loading an SSL identity certificate.

**Note** You can also configure the minimum TLS version in the **AnywhereUSB Manager**. See Configure the minimum TLS version.

To configure the AnywhereUSB services:

## Web

1. Log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:
   a. In the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.
3. Click **Services** > **AnywhereUSB**.
4. Click **Enable** to enable the service.
5. In the **Port** field, enter the port number that is used to access the Hub. The default value is 18574. If you change the port number you must also change the corresponding port number on your computer.

   **Note** You can also enable the AnywhereUSB service and specify the port on the **AnywhereUSB Configuration** page. To display this page, click **System** > **Configuration** > **AnywhereUSB Configuration**. See AnywhereUSB Configuration page.

6. Click **Access control list** to configure access control:
   - To limit access to specified IPv4 addresses and networks:
     a. Click **IPv4 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv4 address or network that can access the device's AnywhereUSB. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 192.168.1.0/24.
        - **any**: No limit to IPv4 addresses that can access the AnywhereUSB.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to specified IPv6 addresses and networks:
     a. Click **IPv6 Addresses**.
     b. For **Add Address**, click ✚.
     c. For **Address**, enter the IPv6 address or network that can access the device's AnywhereUSB. Allowed values are:
        - A single IP address or host name.
        - A network designation in CIDR notation, for example, 2001:db8::/48.
        - **any**: No limit to IPv6 addresses that can access the AnywhereUSB.
     d. Click ✚ again to list additional IP addresses or networks.
   - To limit access to hosts connected through a specified interface on the device:
     a. Click **Interfaces**.
     b. For **Add Interface**, click ✚.
     c. For **Interface**, select the appropriate interface from the dropdown.
     d. Click ✚ again to allow access through additional interfaces.
   - To limit access based on firewall zones:
     a. Click **Zones**. By default, there are three firewall zones already configured: Internal, Edge, and IPsec.
     b. For **Add Zone**, click ✚.
     c. For **Zone**, select the appropriate firewall zone from the dropdown.
        See Firewall configuration for information about firewall zones.
     d. Click ✚ again to allow access through additional firewall zones.
7. **Enable mDNS** to add the AnywhereUSB protocol to the list of services which may be discovered by global mDNS. See Enable service discovery (mDNS).
8. For **Minimum TLS version**, select the minimum TLS version that the AnywhereUSB service will accept. The default is **TLS version 1.2**.
9. In the **Keep-alive interval** field, enter how often the **AnywhereUSB Manager** sends a keepalive request to the Hubs connected to the network. This impacts network utilization because each **AnywhereUSB Manager** will send one packet at this interval to each Hub to which it is connected. Default is 3 seconds. The minimum value is 1 second.
10. In the **Keep-alive timeout** field, enter how long the **AnywhereUSB Manager** should wait for a keepalive response. When the value of the response time is reached, the **Manager** decides

that a Hub is no longer available, and the computer is disconnected from all groups and devices on that Hub. The default value is 20 seconds. The minimum value is 15 seconds.

- The keepalive timeout value would need to be longer if the network has more latency (such as a cellular or satellite link), or an internet link with unreliable packet delivery.
- If the value is too short, devices will be disconnected, which may have an adverse affect on some devices, such as USB memory.
- If the value is too long, Hubs that are removed from the network will not be noticed as gone for a long time, and devices that are no longer connected will be unresponsive for a long time.

11. (Optional) For **TLS identity certificate**, paste an SSL certificate and private key in PEM format. For detailed instructions about loading an SSL certificate for AnywhereUSB, see Load an SSL certificate.

**Note** If the **TLS identity certificate** is empty, the certificate for the web administration service is used.

12. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable the AnywhereUSB service.

```
(config)> service anywhereusb enable true
(config)>
```

4. Set the port number that is used to access the Hub:

```
(config)> service anywhereusb port int
(config)>
```

   where *int* is any integer between 1 and 65535. The default value is 18574. If you change the port number you must also change the corresponding port number on your computer.

5. Configure access control:

   - To limit access to specified IPv4 addresses and networks:

```
(config)> add service anywhereusb  acl address end value
(config)>
```

     Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 192.168.1.0/24.
- **any**: No limit to IPv4 addresses that can access the AnywhereUSB.

Repeat this step to list additional IP addresses or networks.

- To limit access to specified IPv6 addresses and networks:

```
(config)> add service anywhereusb  acl address6 end value
(config)>
```

Where *value* can be:

- A single IP address or host name.
- A network designation in CIDR notation, for example, 2001:db8::/48.
- **any**: No limit to IPv6 addresses that can access the AnywhereUSB.

Repeat this step to list additional IP addresses or networks.

- To limit access to hosts connected through a specified interface on the Connect EZ 16/32 device:

```
(config)> add service anywhereusb  acl interface end value
(config)>
```

Where *value* is an interface defined on your device.

Display a list of available interfaces:

Use **... network interface ?** to display interface information:

Repeat this step to list additional interfaces.

- To limit access based on firewall zones:

```
(config)> add service anywhereusb  acl zone end value
(config)>
```

Where *value* is a firewall zone defined on your device, or the **any** keyword.

Display a list of available firewall zones:

Type **... firewall zone ?** at the config prompt:

```
(config)> ... firewall zone ?

Zones: A list of groups of network interfaces that can be
referred to by packet
filtering rules and access control lists.

 Additional Configuration
 ------------------------------------------------------------
------------------------
  any
  dynamic_routes
  edge
```

```
  external
  internal
  ipsec
  loopback
  setup

(config)>
```

Repeat this step to include additional firewall zones.

6. Enable mDNS to add AnywhereUSB protocol to the list of services which may be discovered by global mDNS. See Enable service discovery (mDNS).

```
(config)> service anywhereusb mdns enable true
(config)>
```

7. Select the minimum TLS version that the AnywhereUSB service will accept.

```
(config)> service anywhereusb minimum_tls_version value
(config)>
```

where **value** is one of:

- **TLS-1_2**. This is the default.
- **TLS-1_3**

8. Set the keep-alive interval to how often the **AnywhereUSB Manager** sends a keepalive request to the Hubs connected to the network. This impacts network utilization because each **AnywhereUSB Manager** will send one packet at this interval to each Hub to which it is connected. Default is 3 seconds. The minimum value is 1 second.

```
(config)> service anywhereusb keep_alive_interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **keep_alive_interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> service anywhereusb keep_alive_interval 600s
(config)>
```

9. Set the keep-alive timeout to how long the **AnywhereUSB Manager** should wait for a keepalive response. When the value of the response time is reached, the **Manager** decides that a Hub is no longer available, and the computer is disconnected from all groups and devices on that Hub. The default value is 20 seconds. The minimum value is 15 seconds.

```
(config)> service anywhereusb keep_alive_timeout value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **keep_alive_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)> service anywhereusb keep_alive_timeout 600s
(config)>
```

10. (Optional) Paste an SSL certificate and private key in PEM format. If empty, the certificate for the web administration service is used.

```
(config)> service anywhereusb identity cert
(config)>
```

11. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Load an SSL certificate

If needed, you can replace the default self-signed certificate configured for the **Web Administration** service with a new certificate for a Hub that is signed by a CA.

**Note** If an SSL certificate for a Hub is not defined, the certificate for the web administration service is used.

The entire certificate chain, not just the primary certification, must be saved to the Connect EZ 16/32. The certificates must be in PEM format.

The certificates must be stored in this order:

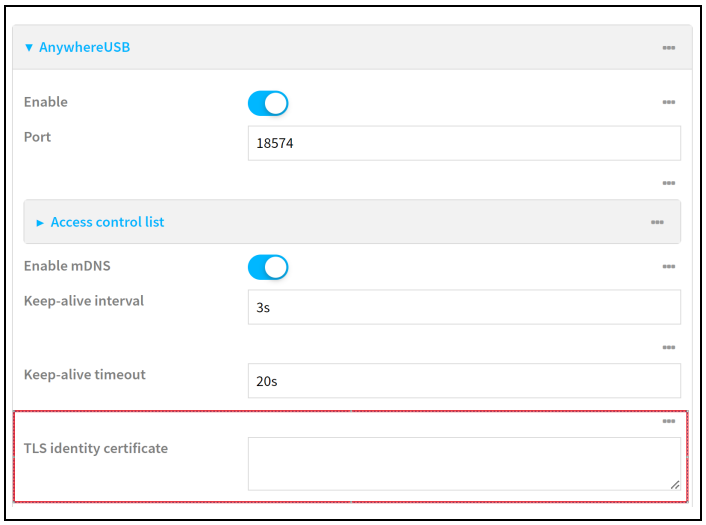
- Primary certificate
- Intermediate CA certificate
- Root CA certificate
- Private Key

To load an Connect EZ 16/32 SSL certificate:

1. Paste the SSL certificate (and any others) and the Private Key into an app such as Notepad, for ease of retrieval.

   **Note** The order in which these are pasted is important: SSL certificate must be first, followed by the Private Key. If additional certificates are included, the order is: Primary certificate, Intermediate CA certificate, Root CA certificate, and Private Key.

2. Open the web UI.
3. Load the SSL certificate and Private Key.
   a. Copy the certificate(s) and the Private Key from Notepad.
   b. Navigate to **System** > **Device Configuration** > **Services** > **AnywhereUSB**.




c. In the **TLS identity certificate** field, paste the certificate(s) and key. You will see the contents of the SSL certificate and the Private Key. The SSL certificate **must** be first, followed by the Private Key.

```
----BEGIN CERTIFICATE----
(primary cert)
----END CERTIFICATE----
----BEGIN PRIVATE KEY----
(private key for primary cert)
----END PRIVATE KEY----
```

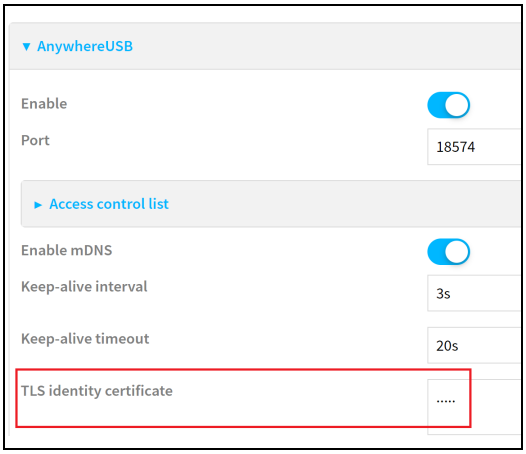
If an Intermediate CA certification and a Root CA certification is added, they must be added in the order shown:

```
----BEGIN CERTIFICATE----
(primary cert)
----END CERTIFICATE----
----BEGIN CERTIFICATE----
(intermediate CA cert)
----END CERTIFICATE----
----BEGIN CERTIFICATE----
(root CA cert)
----END CERTIFICATE----
----BEGIN PRIVATE KEY----
(private key for primary cert)
----END PRIVATE KEY----
```

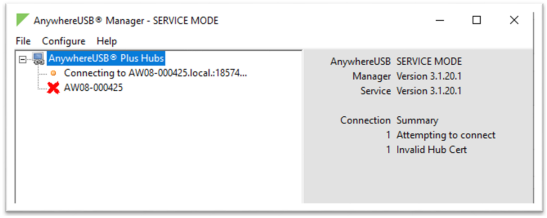
d. Click **Apply**.

4. Click **System** > **Reboot**.
5. After the reboot is complete, verify the certificate upload.
   a. Open the web UI.
   b. Navigate to **System** > **Device Configuration** > **Services** > **AnywhereUSB**.

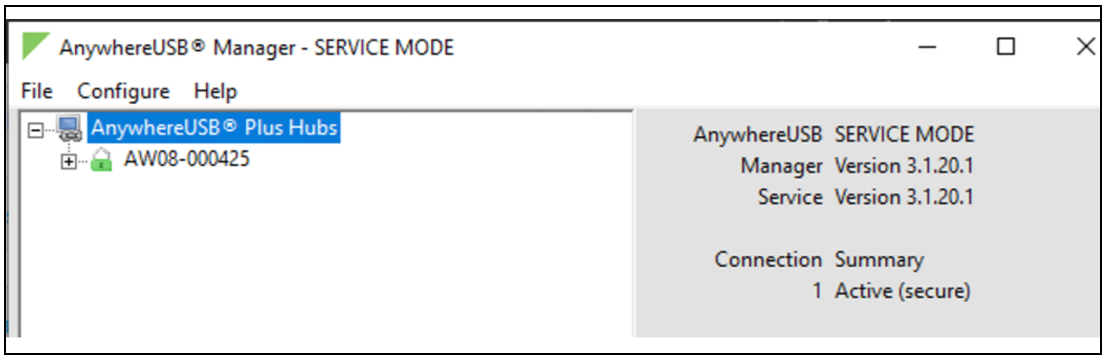
c. If the upload was successful, five dots display in the **TLS identity certificate** field.




6. Update the SSL certificate in the **AnywhereUSB Manager**.
   a. Launch the AnywhereUSB Manager.
   b. A red X displays next to the name of the Hub for which you uploaded the SSL certificate. In the **Connection Summary** section, the **Invalid Hub Cert** message displays.




   c. Select **File** > **Preferences**. The **Preferences** dialog displays.
   d. Click **Restore Default Settings**. A dialog displays.
   e. Click **OK** to close the dialog.
   f. In the **Preferences** dialog, click **Save** to apply the new SSL certificate.
   g. In a few seconds, the red X changes to a green padlock.




7. Verify the SSL certificate in a browser window by viewing the site information.
   a. Close the web UI and close the browser window.
   b. Open a new browser window and open the web UI.

c. In the address bar, where you enter a URL, hover over the padlock. The **View Site Information** link displays. Click the padlock.

d. Click **Connection is secure**.

e. Click **Certificate is Valid** to view the certificate.

# Applications

The Connect EZ 16/32 supports Python 3.6 and provides you with the ability to run Python applications on the device interactively or from a file. You can also specify Python applications and other scripts to be run each time the device system restarts, at specific intervals, or at a specified time.

This chapter contains the following topics:


Develop Python applications ..... 666
Set up the Connect EZ 16/32 to automatically run your applications ..... 702
Start an interactive Python session ..... 711
Run a Python application at the shell prompt ..... 712
Configure scripts to run manually ..... 713
Start a manual script ..... 719
Python versions and corresponding DAL OS firmware versions ..... 720

# Develop Python applications

The Connect EZ 16/32 features a standard Python 3.6 distribution. Python is a dynamic, object-oriented language for developing software applications, from simple programs to complex embedded applications. Digi offers the Digi IoT PyCharm Plugin to help you while writing, building, and testing your application. See Create and test a Python application.

In addition to the standard Python library, the Connect EZ 16/32 includes a set of extensions to access its configuration and interfaces. See Python modules.

The Connect EZ 16/32 provides you with the ability to:

- Run Python applications on the device interactively or from a file.
- Specify Python applications and other scripts to be run each time the device system restarts, at specific intervals, or at a specified time. See Configure scripts to run automatically.
- Use pip to install Python packages.

> **Note** Although pip is provided to help facilitate the installation of Python packages, there are limitations in Python package support due to package dependencies, storage limitations, and other issues.

This section contains the following topics:

Set up the Connect EZ 16/32 for Python development ..... 667
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## Set up the Connect EZ 16/32 for Python development

1. Access the Connect EZ 16/32 local web interface
   a. Use an Ethernet cable to connect the Connect EZ 16/32 to your local laptop or PC.
   The factory Setup IP address is **192.168.2.1**
   b. Log into the Connect EZ 16/32 WebUI as a user with full admin access rights.
   The default user name is **admin** and the default password is the unique password printed on the label packaged with your device.
2. Go to the Configuration window
   a. On the menu, click **System**.
   b. Under **Configuration**, click **Device Configuration**. The Configuration window displays.
3. Enable service discovery (mDNS)
   a. Click **Services** > **Service Discovery (mDNS)**.
   b. **Enable** the mDNS service.

---

**Note** For more information, see Enable service discovery (mDNS).

---

4. Configure SSH access
   a. Click **Services** > **SSH**.
   b. Click **Enable**.

---

**Note** For more information, see the following topics: Configure SSH access, Use SSH with key authentication, and Allow remote access for web administration and SSH.

---

5. Enable shell access
   a. Click **Authentication** > **Groups** > **admin**.
   b. Click the **Interactive shell access** option.
   c. If this option is not displayed, see Disable shell access.
6. Click **Apply** to save the configuration and apply the changes.
   The **Apply** button is located at the top of the WebUI page. You may need to scroll to the top of the page to locate it.

## Create and test a Python application

To develop a Python application for the Connect EZ 16/32:

1. Set up the Connect EZ 16/32 for Python development.
2. Create and test your application with:

- PyCharm. You can create, build, and remotely launch your application in the Connect EZ 16/32.
- Your preferred editor and manually transfer the application, install dependencies, and launch in the Connect EZ 16/32.

### Develop an application in PyCharm

The Digi IoT PyCharm Plugin allows you to write, build and run Python applications for Digi devices in a quick and easy way. See the Digi XBee PyCharm IDE Plugin User Guide for details.

This is what you can do with it:

- Create Python projects from scratch or import one of the available examples.
- Get help while you write your code thanks to the syntax highlight, quick documentation, and code completion features.
- Build and upload Python applications to your Digi device with just one click.
- Add libraries that facilitate the usage of external peripherals or non-standard APIs.
- Communicate with your Digi device through the integrated SSH console to see the application output or execute quick tests.

### Manually install and launch an application

To create, build, and launch your application:

1. Write your Python application code. Code can include:
   - Any Python 3.6 standard feature.
   - Access to the Connect EZ 16/32 configuration and hardware with the Python modules.
   - Third-party modules included in the Connect EZ 16/32, for example:
     - pySerial 3.4
     - Eclipse Paho MQTT Python Client
   - Any other third-party module implemented in Python.
2. Install the application in **/etc/config/scripts** directory.
3. Launch your application:
   - Run your application at the shell prompt.
   - Configure your application to run automatically.

### PyCharm FAQ: My Connect EZ 16/32 is not listed in Digi Device Selector

If an Connect EZ 16/32 does not appear on the list of the Digi Device Selector:

- Ensure that your device has the mDNS service enabled and is on the same network as the computer. See Set up the Connect EZ 16/32 for Python development.
- Or click the link **Click here to add it manually** to specify the IP address, port, username, and password.

### *Example: Configure a custom port to listen for incoming socket connections*

The following example Python script configures a custom port, port 9999, to accept incoming socket connections.

You will also need to add a custom firewall rule to accept the incoming traffic on this port.

**Example script**

```
import socket
import socketserver

class MyTCPHandler(socketserver.BaseRequestHandler):
    """
    The request handler class for our server.

    It is instantiated once per connection to the server, and must
    override the handle() method to implement communication to the
    client.
    """

    def handle(self):
        # self.request is the TCP socket connected to the client
        self.data = self.request.recv(1024).strip()
        print("{} wrote:".format(self.client_address[0]))
        print(self.data)
        # just send back the same data, but upper-cased
        self.request.sendall(self.data.upper())
```

```
if __name__ == "__main__":
    HOST, PORT ='', 9999

    # Create the server, binding to localhost on port 9999
    with socketserver.TCPServer((HOST, PORT), MyTCPHandler) as server:
        # Activate the server; this will keep running until you
        # interrupt the program with Ctrl-C
        print("Waiting for data...")
        server.serve_forever()
```

### Create a custom firewall rule

#### Web

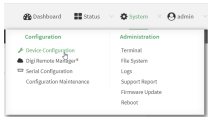
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

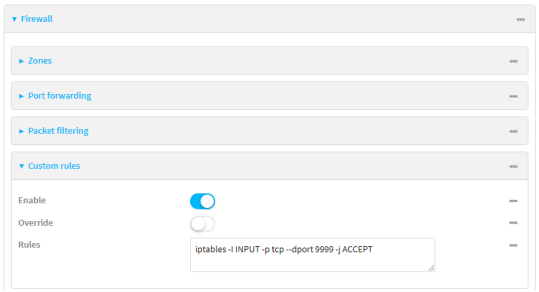
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Firewall** > **Custom rules**.
4. **Enable** the custom rules.
5. For **Rules**, type the following:

   ```
   iptables -I INPUT -p tcp --dport 9999 -j ACCEPT
   ```

   
   
6. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable custom firewall rules:

```
(config)> firewall custom enable true(config)>
```

4. Set the shell command that will execute the custom firewall rules script:

```
(config)> firewall custom rules "iptables -I INPUT -p tcp --dport 9999 -j
ACCEPT"
(config)>
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Python modules

The Connect EZ 16/32 supports Python 3.6 and provides you with the ability to run Python applications on the device interactively or from a file. It also offers extensions to manage your Connect EZ 16/32:

- The **digidevice** module provides platform-specific extensions that allow you to interact with the device's configuration and interfaces.
  The following submodules are included with the **digidevice** module:
  - LEDs: **digidevice.led**
  - SMS: **digidevice.sms**
  - GPS: **digidevice.location**
  - Digi Remote Manager:
    - **digidevice.datapoint**
    - **digidevice.device_request**
    - **digidevice.name**
  - Device configuration: **digidevice.config**
  - Command line interface: **digidevice.cli**

  - Access runtime database: **digidevice.runt**
  - Set the maintenance window: **digidevice.maintenance**
- Use the Python **serial** module—pySerial—to access the serial ports.
- Eclipse Paho MQTT Python client enables applications to connect to an MQTT broker to publish messages, and to subscribe to topics and receive published messages.

**Note** Module-related documentation is in the Digidevice module section.

### *Digidevice module*

The Python **digidevice** module provides platform-specific extensions that allow you to interact with the device's configuration and interfaces. The following submodules are included with the **digidevice** module:

This section contains the following topics:

**Use digidevice.cli to execute CLI commands**

Use the **digidevice.cli** Python module to issue CLI commands from Python to retrieve status and statistical information about the device.

For example, to display the system status and statistics by using an interactive Python session, use the show system command with the **cli** module:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **cli** submodule:

```
>>> from digidevice import cli
>>>
```

4. Execute a CLI command using the **cli.execute(*command*)** function. For example, to print the system status and statistics to stdout using the **show system** command:

```
>>> response = cli.execute("show system")
>>>
>>> print (response)

  Model                    : Digi Connect EZ 16/32
  Serial Number            : Connect EZ 16/32xxxxxxxxyyyyxx
  SKU                      : Connect EZ 16/32
  Hostname                 : Connect EZ 16/32
  MAC Address              : DF:DD:E2:AE:21:18

  Hardware Version         : 50001947-01 1P
  Firmware Version         : 25.2
  Alt. Firmware Version    : 25.2
  Alt. Firmware Build Date : Fri, Jan 12, 2024 12:10:00
  Bootloader Version       : 19.7.23.0-15f936e0ed

  Current Time             : Thu, Jan 11, 2024 12:10:00 +0000
  CPU                      : 1.4%
  Uptime                   : 6 days, 6 hours, 21 minutes, 57 seconds
(541317s)
  Temperature              : 40C
  Location                 :
  Contact                  :

>>>
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

#### *Help for using Python to execute Connect EZ 16/32 CLI commands*

Get help executing a CLI command from Python by accessing help for **cli.execute**:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

   ```
   # python
   Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
   Type "help", "copyright", "credits" or "license" for more information.
   >>>
   ```
3. Import the **cli** submodule:

   ```
   >>> from digidevice import cli
   >>>
   ```
4. Use the help command with **cli.execute**:

   ```
   >>> help(cli.execute)
   Help on function execute in module digidevice.cli:

   execute(command, timeout=5)
   Execute a CLI command with the timeout specified returning the results.
   ...
   ```
5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

#### Use digidevice.datapoint to upload custom datapoints to Digi Remote Manager

Use the **datapoint** Python module to upload custom datapoints to Digi Remote Manager.

The following characteristics can be defined for a datapoint:

- Stream ID
- Value
- (Optional) Data type
  - integer
  - long
  - float
  - double
  - string
  - binary
- Units (optional)
- Timestamp (optional)
- Location (optional)

    - Tuple of latitude, longitude and altitude
- Description (optional)
- Quality (optional)
    - An integer describing the quality of the data point

For example, to use an interactive Python session to upload datapoints related to velocity, temperature, and the state of the emergency door:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

   ```
   # python
   Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
   Type "help", "copyright", "credits" or "license" for more information.
   >>>
   ```
3. Import the **datapoint** submodule and other necessary modules:

   ```
   >>> from digidevice import datapoint
   >>> import time
   >>>
   ```
4. Upload the datapoints to Remote Manager:

   ```
   >>> datapoint.upload("Velocity", 69, units="mph")
   >>> datapoint.upload("Temperature", 24, geo_location=(54.409469, -
   1.718836, 129))
   >>> datapoint.upload("Emergency_Door", "closed", timestamp=time.time())
   ```
5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

You can also upload multiple datapoints:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

   ```
   # python
   Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
   Type "help", "copyright", "credits" or "license" for more information.
   >>>
   ```

3. Import the **datapoint** submodule and other necessary modules:

```
>>> from digidevice import datapoint
>>> import time
>>>
```

4. Create datapoint objects:

```
>>> p1 = datapoint.DataPoint("Velocity", 69, units="mph")
>>> p2 = datapoint.DataPoint("Temperature", 24, geo_location=(54.409469,
-1.718836, 129))
>>> p3 = datapoint.DataPoint("Emergency_Door", "closed",
timestamp=time.time())
>>>
```

5. Upload the datapoints to Remote Manager:

```
>>> datapoint.upload_multiple([p1, p2, p3])
>>>
```

6. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

Once the datapoints have been uploaded to Remote Manager, they can be viewed via Remote Manager or accessed using Web Services calls. See the *Digi Remote Manager Programmers Guide* for more information on web services and datapoints.

#### *Help for using Python to upload custom datapoints to Remote Manager*

Get help for uploading datapoints to your Digi Remote Manager account by accessing help for **datapoint.upload** and **datapoint.upload_multiple**:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **datapoint** submodule and other necessary modules:

```
>>> from digidevice import datapoint
>>>
```

4. Use the help command with **datapoint.upload**:

```
>>> help(datapoint.upload)
Help on function upload in module digidevice.datapoint:
```

```
upload(stream_id:str, data, *, description:str=None,
timestamp:float=None, units:str=None,
geo_location:Tuple[float, float, float]=None, quality:int=None,
data_type:digidevice.datapoint.DataType=None, timeout:float=None)
...
```

5. Use the help command with **datapoint.upload_multiple**:

```
>>> help(datapoint.upload_multiple)
Help on function upload_multiple in module digidevice.datapoint:

upload_multiple(datapoints:List[digidevice.datapoint.DataPoint],
timeout:float=None)
...
```

6. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

#### Use digidevice.config for device configuration

Use the **config** Python module to access and modify the device configuration.

##### *Read the device configuration*

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **config** submodule:

```
>>> from digidevice import config
>>>
```

4. Use **config.load()** and the **get()** method to return the device's configuration:
   a. Return the entire configuration:

```
>>> from pprint import pprint # use pprint vs. print to make the
output easier to read
>>> cfg = config.load()
>>> pprint(cfg.dump().splitlines())
```

   This returns the device configuration:

```
...
network.interface.lan1.device=/network/bridge/lan1
```

```
network.interface.lan1.enable=true
network.interface.lan1.ipv4.address=192.168.2.1/24
network.interface.lan1.ipv4.connection_monitor.attempts=3
...
```

b. Print a list of available interfaces:

```
>>> cfg = config.load()
>>> interfaces = cfg.get("network.interface")
>>> print(interfaces.keys())
```

This returns the following:

```
['setupip', 'setuplinklocal', 'lan1', 'loopback', 'wan1', 'wwan1',
'wwan2']
```

c. Print the IPv4 address of the LAN interface:

```
>>> cfg = config.load()
>>> interfaces = cfg.get(“network.interfaces”)
>>> print(interfaces.get("lan.ipv4.address"))
```

Which returns:

```
192.168.2.1/24
```

***Modify the device configuration***

Use the **set()** and **commit()** methods to modify the device configuration:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **config** submodule:

```
>>> from digidevice import config
>>>
```

4. Use **config.load(writable=True)** to enable write mode for the configuration:

```
>>> cfg = config.load(writable=True)
>>>
```

5. Use the **set()** method to make changes to the configuration:

```
>>> cfg.set("system.name", "New-Name")
>>>
```

6. Use the **commit()** method to save the changes:

```
>>> cfg.commit()
True
>>>
```

7. Use the **get()** method to verify the change:

```
>>> print(cfg.get("system.name"))
New-Name
>>>
```

***Help for using Python to read and modify device configuration***

Get help for reading and modifying the device configuration by accessing help for **digidevice.config**:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **config** submodule:

```
>>> from digidevice import config
>>>
```

4. Use the help command with **config**:

```
>>> help(config)
Help on module acl.config in acl:

NAME
acl.config - Python interface to ACL configuration (libconfig).
...
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

**Use Python to respond to Digi Remote Manager SCI requests**

The **device_request** Python module allows you to interact with Digi Remote Manager by using Remote Manager's Server Command Interface (SCI), a web service that allows users to access information and perform commands that relate to their devices.

Use Remote Manager's SCI interface to create SCI requests that are sent to your Connect EZ 16/32 device, and use the **device_request** module to send responses to those requests to Remote Manager. See the *Digi Remote Manager Programmers Guide* for more information on SCI.

***Task one: Use the device_request module on your Connect EZ 16/32 device to create a response***

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **device_request** module:

```
>>> from digidevice import device_request
>>>
```

4. Create a function to handle the request from Remote Manager:

```
>>> def handler(target, request):
     print ("received request %s for target %s" % (request, target))
     return "OK"
>>>
```

5. Register a callbackup function that will be called when the device receives a SCI request from Remote Manager:

```
>>> device_request.register("myTarget", handler)
>>>
```

**Note** Leave the interactive Python session active while completing task two, below. Once you have completed task two, exit the interactive session by using **Ctrl-D**. You can also exit the session using **exit()** or **quit()**.

***Task two: Create and send an SCI request from Digi Remote Manager***

The second step in using the **device_request** module is to create an SCI request that Remote Manager will forward to the device. For example, you can create in SCI request a the Remote Manager API explorer:

1. In Remote Manager, click **Documentation** > **API Explorer**.
2. Select the device to use as the SCI target:
   a. Click **SCI Targets**.
   b. Click **Add Targets**.
   c. Enter or select the device ID of the device.

d. Click **Add**.

e. Click **OK**.

3. Click **Examples** > **SCI** > **Data Service** > **Send Request**.

   Code similar to the following will be displayed in the HTTP message body text box:

```
<sci_request version="1.0">
  <data_service>
  <targets>
    <device id="00000000-00000000-0000FFFF-A83CF6A3"/>
  </targets>
    <requests>
      <device_request target_name="myTarget">
        my payload string
      </device_request>
    </requests>
  </data_service>
</sci_request>
```

**Note** The value of the **target_name** parameter in the **device_request** element must correspond to the **target** parameter of the **device_request.register** function in the Python script. In this example, the two are the same.

4. Click **Send**.

   Once that the request has been sent to the device, the handler on the device is executed.

   - On the device, you will receive the following output:

```
>>> received request
       my payload string
      for target myTarget
>>>
```

   - In Remote Manager, you will receive a response similar to the following:

```
<sci_reply version="1.0">
  <data_service>
    <device id="00000000-00000000-0000FFFF-A83CF6A3"/>
      <requests>
        <device_request target_name="myTarget"
status="0">OK</device_request>
      </requests>
    </device>
  </data_service>
</sci_request>
```

### Example: Use digidevice.cli with digidevice.device_request

In this example, we will use the **digidevice.cli** module in conjunction with the **digidevice.device_request** module to return information about multiple devices to Remote Manager.

1. Create a Python application, called showsystem.py, that uses the **digidevice.cli** module to create a response containing information about device and the **device_request** module to respond with this information to a request from Remote Manager:

```
from digidevice import device_request
from digidevice import cli
import time

def handler(target, request):
    return cli.execute("show system verbose")

def status_cb(error_code, error_description):
    if error_code != 0:
        print("error handling showSystem device request: %s" % error_
description)

device_request.register("showSystem", handler, status_callback = status_
cb)

# Do not let the process finish so that it handles device requests
while True:
    time.sleep(10)
```

2. Upload the showsystem.py application to the /etc/config/scripts directory on two or more Digi devices. In this example, we will upload it to two devices, and use the same request in Remote Manager to query both devices.

   See Configure scripts to run automatically for information about uploading Python applications to your device. You can also create the script on the device by using the **vi** command when logged in with shell access.

3. For both devices:
   a. Configure the device to automatically run the showsystem.py application on reboot, and to restart the application if it crashes. This can be done from either the WebUI or the command line:

      ### Web

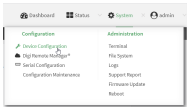
      i. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
      ii. Access the device configuration:

      Remote Manager:

      i. Locate your device as described in Use Digi Remote Manager to view and manage your device.
      ii. Click the **Device ID**.
      iii. Click **Settings**.
      iv. Click to expand **Config**.

      Local Web UI:

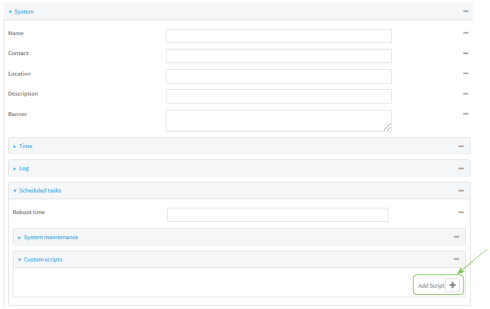
      i. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

The **Configuration** window is displayed.

iii. Click **System** > **Scheduled tasks** > **Custom scripts**.

iv. Click ✚ to add a custom script.

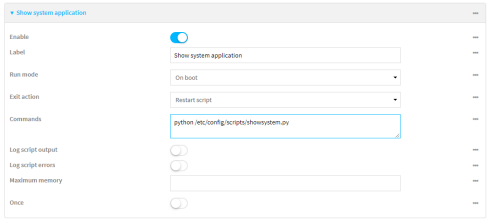



v. For **Label**, type **Show system application**.

vi. For **Run mode**, select **On boot**.

vii. For **Exit action**, select **Restart script**.

viii. For **Commands**, type **python /etc/config/scripts/showsystem.py**.




ix. Click **Apply** to save the configuration and apply the change.

## Command line

i. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

ii. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

iii. Add an application entry:

```
(config)> add system schedule script end
(config system schedule script 0)>
```

Scheduled scripts are enabled by default. To disable:

```
(config system schedule script 0)> enable false
(config system schedule script 0)>
```

iv. Provide a label for the script:

```
(config system schedule script 0)> label "Show system application"
```

v. Configure the application to run automatically when the device reboots:

```
(config system schedule script 0)> when boot
(config system schedule script 0)>
```

vi. Configure the application to restart if it crashes:

```
(config system schedule script 0)> exit_action restart
(config system schedule script 0)>
```

vii. Set the command that will execute the application:

```
(config system schedule script 0)> commands "python
/etc/config/scripts/showsystem.py"
(config system schedule script 0)>
```

viii. Save the configuration and apply the change:

```
(config)> save
Configuration saved.
>
```

b. Run the showsystem.py application. You can run the application by either rebooting the device, or by running it from the shell prompt.

- To reboot the device:
  i. From the WebUI:
     i. From the main menu, click **System**.
     ii. Click **Reboot**.
  i. From the command line, at the Admin CLI prompt, type:

```
> reboot
```

- To run the application from the shell prompt:
  i. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

     Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
  ii. Type the following at the shell prompt:

```
# python /etc/config/scripts/showsystem.py &
#
```

iii. Exit the shell:

```
# exit
```

4. In Remote Manager, click **Documentation** > **API Explorer**.
5. Select the devices to use as the SCI targest:
   a. Click **SCI Targets**.
   b. Click **Add Targets**.
   c. Enter or select the device ID of one of the devices.
   d. Click **Add**.
   e. Enter or select the device ID of the second device and click **Add**.
   f. Click **OK**.
6. Click **Examples** > **SCI** > **Data Service** > **Send Request**.

   Code similar to the following will be displayed in the HTTP message body text box:

```
<sci_request version="1.0">
  <data_service>
  <targets>
    <device id="00000000-00000000-0000FFFF-A83CF6A3"/>
    <device id="00000000-00000000-0000FFFF-485740BC"/>
  </targets>
    <requests>
      <device_request target_name="myTarget">
        my payload string
      </device_request>
    </requests>
  </data_service>
</sci_request>
```

7. For the **device_request** element, replace the value of **target_name** with **showSystem**. This matches the **target** parameter of the **device_request.register** function in the showsystem.py application.

```
      <device_request target_name="showSystem">
```

8. Click **Send**.

   You should receive a response similar to the following:

```
<sci_reply version="1.0">
  <data_service>
    <device id="00000000-00000000-0000FFFF-A83CF6A3"/>
      <requests>
        <device_request target_name="showSystem" status="0">Model
           : Digi Connect EZ 16/32
          Serial Number            : Connect EZ 16/32-000068
          Hostname                 : Connect EZ 16/32
          MAC                      : 00:40:D0:13:35:36

          Hardware Version         : 50001959-01 A
          Firmware Version         : 25.2
          Bootloader Version       : 1
```

```
          Firmware Build Date      : Fri, Jan 12, 2024 12:10:00
          Schema Version           : 461

          Timezone                 : UTC
          Current Time             : Thu, Jan 11, 2024 12:10:00
          CPU                      : 1.1
          Uptime                   : 1 day, 21 hours, 49 minutes, 47
seconds (164987s)
          Temperature              : 39C

          Contact                  : Jane Smith

          Disk
          ----
          Load Average             : 0.10, 0.05, 0.00
          RAM Usage                : 85.176MB/250.484MB(34%)
          Disk /etc/config Usage   : 0.068MB/13.416MB(1%)
          Disk /opt Usage          : 47.724MB/5309.752MB(1%)
          Disk /overlay Usage      : MB/MB(%)
          Disk /tmp Usage          : 0.004MB/40.96MB(0%)
          Disk /var Usage          : 0.820MB/32.768MB(3%)</device_
request>
      </requests>
    </device>
    <device id="00000000-00000000-0000FFFF-485740BC"/>
      <requests>
        <device_request target_name="showSystem" status="0">Model
           : Digi Connect EZ 16/32
          Serial Number            : Connect EZ 16/32-000023
          Hostname                 : Connect EZ 16/32
          MAC                      : 00:40:D0:26:79:1C

          Hardware Version         : 50001959-01 A
          Firmware Version         : 25.2
          Bootloader Version       : 1
          Firmware Build Date      : Fri, Jan 12, 2024 12:10:00
          Schema Version           : 461

          Timezone                 : UTC
          Current Time             : Thu, Jan 11, 2024 12:10:00
          CPU                      : 1.1
          Uptime                   : 4 day, 13 hours, 43 minutes, 22
seconds (395002s)
          Temperature              : 37C

          Contact                  : Omar Ahmad
          Disk
          ----
          Load Average             : 0.10, 0.05, 0.00
          RAM Usage                : 85.176MB/250.484MB(34%)
          Disk /etc/config Usage   : 0.068MB/13.416MB(1%)
          Disk /opt Usage          : 47.724MB/5309.752MB(1%)
          Disk /overlay Usage      : MB/MB(%)
          Disk /tmp Usage          : 0.004MB/40.96MB(0%)
          Disk /var Usage          : 0.820MB/32.768MB(3%)</device_
request>
      </requests>
```

```
    </device>
  </data_service>
</sci_request>
```

***Help for using Python to respond to Digi Remote Manager SCI requests***

Get help for respond to Digi Remote Manager Server Command Interface (SCI) requests by accessing help for **digidevice.device_request**:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

   ```
   # python
   Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
   Type "help", "copyright", "credits" or "license" for more information.
   >>>
   ```
3. Import the **device_request** submodule:

   ```
   >>> from digidevice import device_request
   >>>
   ```
4. Use the help command with **device_request**:

   ```
   >>> help(device_request)
   Help on module digidevice.device_request in digidevice:

   NAME
   digidevice.device_request - APIs for registering device request handlers
   ...
   ```

   You can also use the help command with available **device_request** functions:

   - Use the help command with **device_request.register**:

     ```
     >>> help(device_request.register)
     Help on function register in module digidevice.device_request:

     register(target:str, response_callback:Callable[[str, str], str],
     status_callback:Callable[[int, str], NoneType]=None, xml_
     encoding:str='UTF-8')
     ...
     ```

   - Use the help command with **device_request.unregister**:

     ```
     >>> help(device_request.unregister)
     Help on function unregister in module digidevice.device_request:
     ```

```
unregister(target:str) -> bool
...
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

**Use digidevice runtime to access the runtime database**

Use the **runt** submodule to access and modify the device runtime database.

***Read from the runtime database***

Use the **keys()** and **get()** methods to read the device configuration:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **runt** submodule:

```
>>> from digidevice import runt
>>>
```

4. Use the **start()** method to open the runtime database:

```
>>> runt.start()
>>>
```

5. Use the **keys()** method to display available keys in the runtime database, and use the **get()** method to print information from the runtime database:
   a. Print available keys:

```
>>> print(runt.keys(""))
```

   This returns available keys:

```
['advanced', 'drm', 'firmware', 'location', 'manufacture', 'metrics',
'mm', 'network', 'pam', 'serial', 'system']
```

   b. Print available keys for the system key:

```
>>> print(runt.keys("system"))
```

   This will return the following:

```
['boot_count', 'chassis', 'cpu_temp', 'cpu_usage', 'disk', 'load_avg',
'local_time', 'mac', 'mcu', 'model', 'ram', 'serial', 'uptime']
```

c. Use the **get()** method to print the device's MAC address:

```
>>> print(runt.get("system.mac"))
```

This will return the MAC address of the device.

6. Use the **stop()** method to close the runtime database:
7. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

***Modify the runtime database***

Use the **set()** method to modify the runtime database:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **runt** submodule:

```
>>> from digidevice import runt
>>>
```

4. Use **start()** method to open the runtime database:

```
>>> runt.start()
>>>
```

5. Use the **set()** method to make changes to the runtime database:

```
>>> runt.set("my-variable", "my-value")
>>>
```

6. Use the **get()** method to verify the change:

```
>>> print(runt.get("my-variable"))
my-variable
>>>
```

7. Close the runtime database:

```
>>> runt.stop()
>>>
```

8. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

***Help for using Python to access the runtime database***

Get help for reading and modifying the device runtime database by accessing help for **digidevice.runt**:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **runt** submodule:

```
>>> from digidevice import runt
>>>
```

4. Use the help command with **runt**:

```
>>> help(runt)

Help on module acl.runt in digidevice:

NAME
acl.runt - Python interface to ACL runtime database (runtd).
...
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

**Use Python to upload the device name to Digi Remote Manager**

The **name** submodule can be used to upload a custom name for your device to Digi Remote Manager.

When you use the **name** submodule to upload a custom device name to Remote Manager, the following issues apply:

- If the name is being used by to another device in your Remote Manager account, the name will be removed from the previous device and added to the new device.
- If Remote Manager is configured to apply a profile to a device based on the device name, changing the name of the device may cause Remote Manager to automatically push a profile onto the device.

Together, these two features allow you to swap one device for another by using the **name** submodule to change the device name, while guaranteeing that the new device will have the same configuration as the previous one.

**Note** Because causing a profile to be automatically pushed from Remote Manager may change the behavior of the device, including overwriting existing usernames and passwords, the **name** submodule should be used with caution. As a result, support for this functionality is disabled by default on Remote Manager.

***Enable support on Digi Remote Manager for uploading custom device names***

1. In Remote Manager, click **API Explorer**.
2. For the HTTP method, select **PUT**.
3. For **Enter and API or select an example**, type **/ws/v1/settings/inventory/AllowDeviceToSetOwnNameEnabled**.
4. In the HTTP message body text box, type the following:

```
{
   "name" : "AllowDeviceToSetOwnNameEnabled",
   "value" : "true"
}
```

5. Click **Send**.

***Upload a custom name***

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **name** submodule:

```
>>> from digidevice import name
```

4. Upload the name to Remote Manager:

```
>>> name.upload("my_name")
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

***Help for uploading the device name to Digi Remote Manager***

Get help for uploading the device name to Digi Remote Managerby accessing help for **digidevice.name**:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command

line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **name** submodule:

```
>>> from digidevice import name
>>>
```

4. Use the help command with **name**:

```
>>> help(name)

Help on module digidevice.name in digidevice:

NAME
digidevice.name - API for uploading name from the device
...
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

**Use Python to set the maintenance window**

The **maintenance** Python module allows you to set the service state of a device. When the module sets the device to out of service, this can be used as trigger to begin maintenance activity. See Schedule system maintenance tasks for more details.

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **maintenance** module:

```
>>> from digidevice import maintenance
>>>
```

4. To determine the current service state of the device:

```
>>> maintenance.state()
'IN_SERVICE'
>>>
```

5. To set the device to out of service:

```
>>> maintenance.out_of_service()
>>> maintenance.state()
'OUT_OF_SERVICE'
>>>
```

6. To set the device to in service:

```
>>> maintenance.in_service()
>>> maintenance.state()
'IN_SERVICE'
>>>
```

**Note** Leave the interactive Python session active while completing task two, below. Once you have completed task two, exit the interactive session by using **Ctrl-D**. You can also exit the session using **exit()** or **quit()**.

***Help for the digidevice maintenance module***

Get help for the **digidevice** maintenance module:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Import the **maintenance** submodule:

```
>>> from digidevice import maintenance
>>>
```

4. Use the help command with **maintenance** :

```
>>> help(maintenance )
Help on module digidevice.maintenance in digidevice:

NAME
    digidevice.maintenance
```

```
DESCRIPTION
    API for setting the device's service state. The service state is
stored
    in runt.
...
```

5. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

### Use Python to send and receive SMS messages

You can create Python scripts that send and receive SMS message in tandem with the Digi Remote Manager by using the digidevice.sms module. To use a script to send or receive SMS messages, you must also enable the ability to schedule SMS scripting.

#### *Enable the ability to schedule SMS scripting*

**Web**

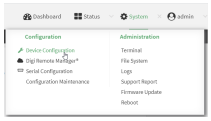
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

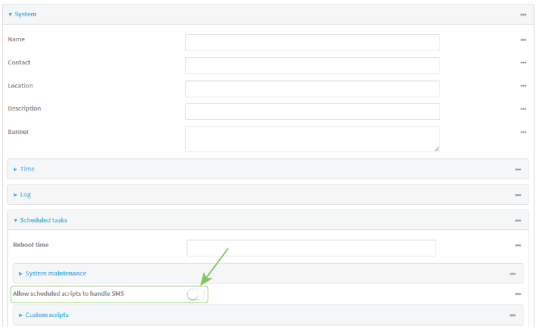
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **System** > **Scheduled tasks**.

4. Click to enable **Allow scheduled scripts to handle SMS**.




5. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> system schedule sms_script_handling true
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

See Configure scripts to run automatically for more information about scheduling scripts.

***Example digidevice.sms script***

The following example script receives an SMS message and sends a response:

```
#!/usr/bin/python3.10.1


import os
import threading
import sys
from digidevice.sms import Callback, send
COND = threading.Condition()
```

```
def sms_test_callback(sms, info):
    print(f"SMS message from {info['content.number']} received")
    print(sms)
    print(info)
    COND.acquire()
    COND.notify()
    COND.release()

def send_sms(destination, msg):
    print("sending SMS message", msg)
    if len(destination) == 10:
        destination = "+1" + destination
    send(destination, msg)

if __name__ == '__main__':
    if len(sys.argv) > 1:
        dest = sys.argv[1]
    else:
        dest = '+15005550006'
    my_callback = Callback(sms_test_callback, metadata=True)
    send_sms(dest, 'Hello World!')
    print("Please send an SMS message now.")
    print("Execution halted until a message is received or 60 seconds have
passed.")
    # acquire the semaphore and wait until a callback occurs
    COND.acquire()
    try:
        COND.wait(60.0)
    except Exception as err:
        print("exception occured while waiting")
        print(err)
    COND.release()
    my_callback.unregister_callback()
```

#### *Example script using digidevice.sms to send CLI commands*

The following example script listens for an incoming SMS message from a specific phone number (2223334444) and then executes the SMS message as a CLI command. If the CLI command being run has output, it will send that output as a response SMS message. If the CLI command being run has no output but ran successfully, the script will instead send an OK response SMS message. Errors in running the CLI will have those error messages sent as a SMS response.

```
#!/usr/bin/python

# Take an incoming SMS message from a specified phone number and run it as
# a CLI command. Send a reponse SMS to the sender before running the command

import os
import threading
import sys
from digidevice import cli
from digidevice.sms import Callback, send
COND = threading.Condition()
allowed_incoming_phone_number = '2223334444'

def sms_test_callback(sms, info):
    if info['content.number'] == allowed_incoming_phone_number:
        print(f"SMS message from {info['content.number']} received")
```

```
        print(sms)
        print(info)
        #if sms == "Reboot":
        #  send_sms(dest, 'Reboot message received, rebooting device...')
        #  response = cli.execute("reboot")
        #  print (response)
        send_sms(dest, 'Message received (' + sms + ').  Performing as CLI
command...')
        response = cli.execute(sms)
        if not response:
            response = 'OK'
        send_sms(dest, 'CLI results: ' + response)
        print (response)
    COND.acquire()
    COND.notify()
    COND.release()

def send_sms(destination, msg):
    print("sending SMS message", msg)
    if len(destination) == 10:
    destination = "+1" + destination
    send(destination, msg)

if __name__ == '__main__':
    if len(sys.argv) > 1:
        dest = sys.argv[1]
    else:
        dest = allowed_incoming_phone_number
    my_callback = Callback(sms_test_callback, metadata=True)
    #send_sms(dest, 'Ready to receive incoming SMS message')
    print("Waiting up to 60 seconds for incoming SMS message")
    # acquire the semaphore and wait until a callback occurs
    COND.acquire()
    try:
        COND.wait(60.0)
    except Exception as err:
        print("exception occured while waiting")
        print(err)
    COND.release()
    my_callback.unregister_callback()
    os.system('rm -f /var/run/sms/scripts/*') # remove all stored SMS messages,
since we've processed them
    print("SMS script finished.  Please re-run if you want to check for more
incoming SMS messages")
    os._exit(0)
```

### *Use Python to access serial ports*

You can use the Python **serial** module to access serial ports on your Connect EZ 16/32 device that are configured to be in Application mode. See Configure Application mode for a serial port for information about configuring a serial port in Application mode.

To use Python to access serial ports:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. Determine the path to the serial port:

```
# ls /dev/serial/
by-id   by-path   port1
#
```

3. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

4. Import the **serial** module:

```
>>> import serial
>>>
```

5. You can now perform operations on the serial port. For example, to write a message to the serial port:

```
>>> s = serial.Serial("/dev/serial/port1", 115200)
>>> s.write(b"Hello from serial port")
26
>>>
```

6. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

### *Use the Paho MQTT python library*

Your Connect EZ 16/32 device includes support for the Paho MQTT python library. MQTT is a lightweight messaging protocol used to communicate with various applications including cloud-based applications such as Amazon Web Services and Microsoft Azure. The following is example code that reads CPU and RAM usage on the device, updates the device firmware, then publishes information about DHCP clients and system information to the MQTT server at 192.168.1.100. The MQTT server IP is configurable.

```
"""
MQTT client example:
- Reporting some device metrics from runt
- Reporting DHCP clients
- Firmware update feature (simple implementation, read TODO in cmd_fwupdate)
"""

import sys
import time
import paho.mqtt.client as mqtt
import json
from acl import runt, config
from http import HTTPStatus
import urllib.request
import tempfile
```

```
import os
from digidevice import cli

POLL_TIME = 60

def cmd_reboot(params):
    print("Rebooting unit...")
    try:
        cli.execute("reboot", 10)
    except:
        print("Failed to run 'reboot' command")
        return HTTPStatus.INTERNAL_SERVER_ERROR

return HTTPStatus.OK

def cmd_fwupdate(params):
    try:
        fw_uri = params["uri"]
    except:
        print("Firmware file URI not passed")
        return HTTPStatus.BAD_REQUEST

    print("Request to update firmware with URI: {}".format(fw_uri))

       try:
        fd, fname = tempfile.mkstemp()
        os.close(fd)
        try:
            urllib.request.urlretrieve(fw_uri, fname)
        except:
            print("Failed to download FW file from URI {}".format(fw_uri))
            return HTTPStatus.NOT_FOUND

        try:
            ret = cli.execute("system firmware update file " + fname, 60)
        except:
            print("Failed to run firmware update command")
            return HTTPStatus.INTERNAL_SERVER_ERROR

        if not "Firmware update completed" in ret:
            print("Failed to update firmware")
            return HTTPStatus.INTERNAL_SERVER_ERROR
    finally:
        os.remove(fname)

    print("Firmware update finished")

    return HTTPStatus.OK

CMD_HANDLERS = {
    "reboot": cmd_reboot,
    "fw-update": cmd_fwupdate
}


def send_cmd_reply(client, cmd_path, cid, cmd, status):
    if not status or not cid:
        return

    if cmd_path.startswith(PREFIX_CMD):
```

```
        path = cmd_path[len(PREFIX_CMD):]
    else:
        print("Invalid command path ({}), cannot send reply".format(cmd_path))
        return

    reply = {
        "cmd": cmd,
        "status": status
    }

    client.publish(PREFIX_RSP + path + "/" + cid, json.dumps(reply, separators=
(',',':')))

def on_connect(client, userdata, flags, rc):
    print("Connected to MQTT server")
    client.subscribe(PREFIX_CMD + "/system")

def on_message(client, userdata, msg):
    """ Supporting only a single topic for now, no need for filters
    Expects the following message format:
    {
        "cid": "<client-id>",
        "cmd": "<command>",
        "params": {
           <optional_parameters>
        }
    }

    Supported commands:
    - "fw-update"
        params:
            - "uri": "<firmware_file_URL>"
    - "reboot"
        params:
    """

    try:
        m = json.loads(msg.payload)
        cid = m["cid"]
        cmd = m["cmd"]
        try:
            payload = m["params"]
        except:
            payload = None
    except:
        print("Invalid command format: {}".format(msg.payload))
        if not cid:
            # Return if client-ID not passed
            return None
        send_cmd_reply(client, msg.topic, cid, cmd, HTTPStatus.BAD_REQUEST)

    try:
        status = CMD_HANDLERS[cmd](payload)
    except:
        print("Invalid command: {}".format(cmd))
        status = HTTPStatus.NOT_IMPLEMENTED

    send_cmd_reply(client, msg.topic, cid, cmd, status)
```

```
def publish_dhcp_leases():
    leases = []
    try:
        with open('/etc/config/dhcp.leases', 'r') as f:
            for line in f:
                elems = line.split()
                if len(elems) != 5:
                    continue
                leases.append({"mac": elems[1], "ip": elems[2], "host": elems
[3]})
        if leases:
            client.publish(PREFIX_EVENT + "/leases", json.dumps(leases,
separators=(',',':')))
    except:
        print("Failed to open DHCP leases file")

def publish_system():
    avg1, avg5, avg15 = runt.get("system.load_avg").split(', ')
    ram_used = runt.get("system.ram.per")
    disk_opt = runt.get("system.disk./opt.per")
    disk_config = runt.get("system.disk./etc/config.per")

    msg = json.dumps({
        "load_avg": {
            "1min": avg1,
            "5min": avg5,
            "15min": avg15
        },
        "disk_usage": {
            "/opt": disk_opt,
            "/etc/config:": disk_config,
            "ram": ram_used
        }
    })

    client.publish(PREFIX_EVENT + "/system", json.dumps(msg))

runt.start()
serial = runt.get("system.serial")

PREFIX = "router/" + serial
PREFIX_EVENT = "event/" + PREFIX
PREFIX_CMD = "cmd/" + PREFIX
PREFIX_RSP = "rsp/" + PREFIX

client = mqtt.Client()
client.on_connect = on_connect
client.on_message = on_message

try:
    client.connect("192.168.1.100", 1883, 60)
    client.loop_start()
except:
    print("Failed to connect to MQTT server")
    sys.exit(1)

while True:
    publish_dhcp_leases()
    publish_system()
    time.sleep(POLL_TIME)
```

# Set up the Connect EZ 16/32 to automatically run your applications

This section contains the following topics:


- Configure scripts to run automatically
- Show script information
- Stop a script that is currently running


## Configure scripts to run automatically

You can configure a script or a python application to run automatically when the system restarts, at specific intervals, or at a specified time. By default, scripts execute in a "sandbox," which restricts access to the file system and available commands that can be used by the script.

### Required configuration items

- Upload or create the script. The script must be uploaded to /etc/config/scripts or a subdirectory.
- Enable the script.
- Select whether the script should run:
  - When the device boots.
  - At a specified time.
  - At a specified interval.
  - During system maintenance.

### Additional configuration items

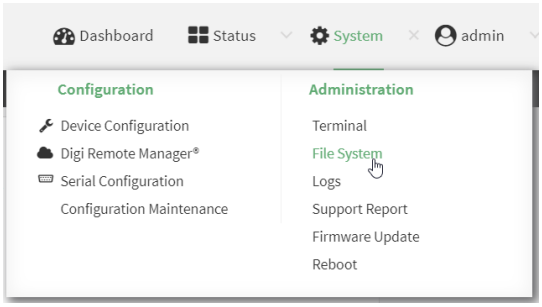
- If the script is a Python application, include the full path to the script.
- A label used to identify the script.
- The action to take if the script finishes. The actions that can be taken are:
  - None.
  - Restart the script.
  - Reboot the device.
- Whether to write the script output and errors to the system log.
- If the script is set to run at a specified interval, whether another instance of the script should be run at the specified interval if the previous instance is still running.
- The memory available to be used by the script .
- Whether the script should run one time only.

### *Task one: Upload the application*

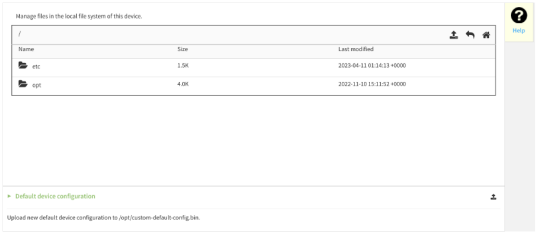
Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, click **System**. Under **Administration**, click **File System**.




The **File System** page appears.



2. Highlight the **scripts** directory and click to open the directory.
3. Click (upload).
4. Browse to the location of the script on your local machine. Select the file and click **Open** to upload the file.

The uploaded file is uploaded to the **/etc/config/scripts** directory.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, use the scp command to upload the Python application script to the Connect EZ 16/32 device:

```
> scp host hostname-or-ip user username remote remote-path local local-path to local
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the path and filename of the file on the remote host that will be copied to the Connect EZ 16/32 device.
- *local-path* is the location on the Connect EZ 16/32 device where the copied file will be placed.

For example:

To upload a script from a remote host with an IP address of 192.168.4.1 to the /etc/config/scripts directory on the Connect EZ 16/32 device, issue the following command:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/test.py local
/etc/config/scripts/ to local
admin@192.168.4.1's password: adminpwd
test.py                          100%    36MB    11.1MB/s        00:03
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

**Note** You can also create scripts by using the **vi** command when logged in with shell access.

### *Task two: Configure the application to run automatically*

**Note** This feature does not provide syntax or error checking. Certain commands can render the device inoperable. Use with care.

## Web

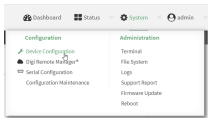
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

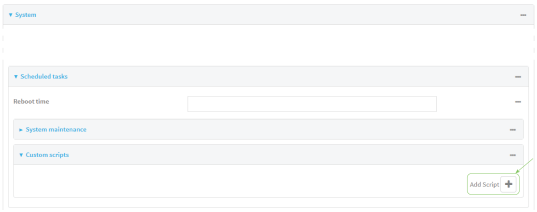
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

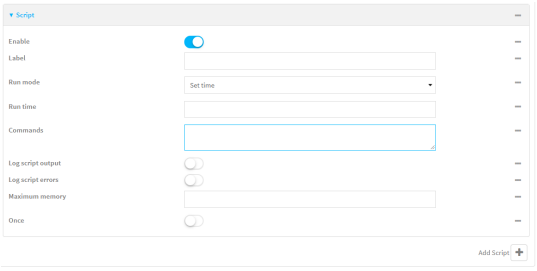
   

   The **Configuration** window is displayed.
3. Click **System** > **Scheduled tasks** > **Custom scripts**.

4. For **Add Script**, click ✚.




The script configuration window is displayed.




Custom scripts are enabled by default. To disable, toggle off **Enable** to toggle off.

5. (Optional) For **Label**, provide a label for the script.
6. For **Run mode**, select the mode that will be used to run the script. Available options are:
   - **On boot**: The script will run once each time the device boots.
     - If **On boot** is selected, select the action that will be taken when the script completes in **Exit action**. Available options are:
       - **None**: Action taken when the script exits.
       - **Restart script**: Runs the script repeatedly.
       - **Reboot**: The device will reboot when the script completes.
   - **Interval**: The script will start running at the specified interval, within 30 seconds after the configuration change is saved.
     - If **Interval** is selected, in **Interval**, type the interval.

       Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

       For example, to set **Interval** to ten minutes, enter **10m** or **600s**.
     - Click to enable **Run single** to run only a single instance of the script at a time.

       If **Run single** is not enabled, a new instance of the script will be started at every interval, regardless of whether the script is still running from a previous interval.
   - **Set time**: Runs the script at a specified time of the day.
     - If **Set Time** is selected, specify the time that the script should run in **Run time**, using the format *HH*:*MM*.
   - **During system maintenance**: The script will run during the system maintenance time window.
7. For **Commands**, type the commands that will execute the script.

- If a Python script is being used, include the full path to the Python script. For example:

```
python /etc/config/scripts/test.py
```

- If the script begins with **#!**, then the script will be invoked in the location specified by the path for the script command. Otherwise, the default shell will be used (equivalent to **#!/bin/sh**).

8. Script logging options:
   a. Click to enable **Log script output** to log the script's output to the system log.
   b. Click to enable **Log script errors** to log script errors to the system log.

   If neither option is selected, only the script's exit code is written to the system log.
9. For **Maximum memory**, enter the maximum amount of memory available to be used by the script and its subprocesses, using the format *number*{**b**|**bytes**|**KB**|**k**|**MB**|**MB**|**M**|**GB**|**G**|**TB**|**T**}.
10. **Sandbox** is enabled by default, which restricts access to the file system and available commands that can be used by the script. This option protects the script from accidentally destroying the system it is running on.
11. Click to enable **Once** to configure the script to run only once at the specified time.

    If **Once** is enabled, rebooting the device will cause the script to not run again. The only way to re-run the script is to:
    - Remove the script from the device and add it again.
    - Make a change to the script.
    - Uncheck **Once**.
12. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a script:

```
(config)> add system schedule script end
(config system schedule script 0)>
```

   Scheduled scripts are enabled by default. To disable:

```
(config system schedule script 0)> enable false
(config system schedule script 0)>
```

4. (Optional) Provide a label for the script.

```
(config system schedule script 0)> label value
(config system schedule script 0)>
```

where *value* is any string. if spaces are used, enclose *value* within double quotes.

5. Set the mode that will be used to run the script:

```
(config system schedule script 0)> when mode
(config system schedule script 0)>
```

where *mode* is one of the following:

- **boot**: The script will run once each time the device boots.
  - If **boot** is selected, set the action that will be taken when the script completes:

```
(config system schedule script 0)> exit_action action
(config system schedule script 0)>
```

    where *action* is one of the following:
    - **none**: Action taken when the script exits.
    - **restart**: Runs the script repeatedly.
    - **reboot**: The device will reboot when the script completes.
- **interval**: The script will start running at the specified interval, within 30 seconds after the configuration change is saved. If **interval** is selected:
  - Set the interval:

```
(config system schedule script 0)> on_interval value
(config system schedule script 0)>
```

    where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

    For example, to set **on_interval** to ten minutes, enter either **10m** or **600s**:

```
(config system schedule script 0)> on_interval  600s
(config system schedule script 0)>
```

  - (Optional) Configure the script to run only a single instance at a time:

```
(config system schedule script 0)> once true
(config system schedule script 0)>
```

    If **once** is set to **false**, a new instance of the script will be started at every interval, regardless of whether the script is still running from a previous interval.
- **set_time**: Runs the script at a specified time of the day.
  - If **set_time** is set, set the time that the script should run, using the format *HH*:*MM*:

```
(config system schedule script 0)> run_time HH:MM
(config system schedule script 0)>
```

- **maintenance_time**: The script will run during the system maintenance time window.

6. Set the commands that will execute the script:

```
(config system schedule script 0)> commands filename
(config system schedule script 0)>
```

where *filename* is the path and filename of the script, and any related command line information.

- If a Python script is being used, include the full path to the Python script and enclose in quotation marks. For example:

```
(config system schedule script 0)> commands python
"/etc/config/scripts/test.py"
(config system schedule script 0)>
```

- If the script begins with **#!**, then the script will be invoked in the location specified by the path for the script command. Otherwise, the default shell will be used (equivalent to **#!/bin/sh**).

7. Script logging options:
   - To log the script's output to the system log:

```
(config system schedule script 0)> syslog_stdout true
(config system schedule script 0)>
```

   - To log script errors to the system log:

```
(config system schedule script 0)> syslog_stderr true
(config system schedule script 0)>
```

   If **syslog_stdout** and **syslog_stderr** are not enabled, only the script's exit code is written to the system log.

8. Set the maximum amount of memory available to be used by the script and its subprocesses:

```
(config system schedule script 0)> max_memory value
(config system schedule script 0)>
```

where *value* uses the syntax ***number***{**b**|**bytes**|**KB**|**k**|**MB**|**MB**|**M**|**GB**|**G**|**TB**|**T**}.

9. To run the script only once at the specified time:

```
(config system schedule script 0)> once true
(config system schedule script 0)>
```

If **once** is enabled, rebooting the device will cause the script to run again. The only way to re-run the script is to:

- Remove the script from the device and add it again.
- Make a change to the script.
- Disable **once**.

10. **Sandbox** is enabled by default. This option protects the script from accidentally destroying the system it is running on.

```
(config system schedule script 0)> sandbox true
(config system schedule script 0)>
```

11. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Show script information

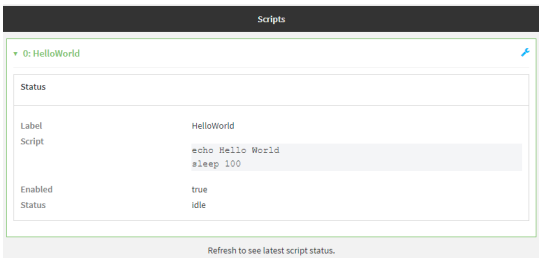
You can view status and statistics about location information from either the WebUI or the command line.

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. At the **Status** page, click **Scripts**.

   The **Scripts** page displays:




### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the show scripts command at the system prompt:

```
> show scripts

 Index  Label        Enabled  Status  Run time
 -----  -----------  -------  ------  --------
 0      script1      true     active
 1      script2      true     idle     01:00
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Stop a script that is currently running

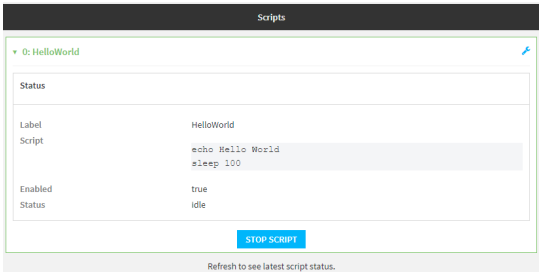
You can stop a script that is currently running.

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. At the **Status** page, click **Scripts**.

   The **Scripts** page displays:




2. For scripts that are currently running, click **Stop Script** to stop the script.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Determine the name of scripts that are currently running:

```
> show scripts

 Index  Label        Enabled  Status  Run time
 -----  -----------  -------  ------  --------
 0      script1      true     active
 1      script2      true     idle     01:00
>
```

   Scripts that are currently running have the status of **active**.

3. Stop the appropriate script:

```
)> system script stop script1
>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Start an interactive Python session

Use the **python** command without specifying any parameters to start an interactive Python session. The Python session operates interactively using REPL (Read Evaluate Print Loop) to allow you to write Python code on the command line.

**Note** The Python interactive session is not available from the Admin CLI. You must access the device shell in order to run Python applications from the command line. See Authentication groups for information about configuring authentication groups that include shell access.

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, use the **python** command with no parameters to enter an interactive Python session:

```
# python
Python 3.10.1 (main, Mar 30 2023, 23:47:13) [GCC 11.2.0] on linux
Type "help", "copyright", "credits" or "license" for more information.
>>>
```

3. Type Python commands at the Python prompt. For example, to view help for the digidevice module, type:

```
>>> help("digidevice")
Help on package digidevice:

NAME
    digidevice - Digi device python extensions

DESCRIPTION
    This module includes various extensions that allow Python
    to interact with additional features offered by the device.
...
```

4. Use **Ctrl-D** to exit the Python session. You can also exit the session using **exit()** or **quit()**.

# Run a Python application at the shell prompt

Python applications can be run from a file at the shell prompt. The Python application will run until it completes, displaying output and prompting for additional user input if needed. To interrupt the application, enter **CTRL-C**.

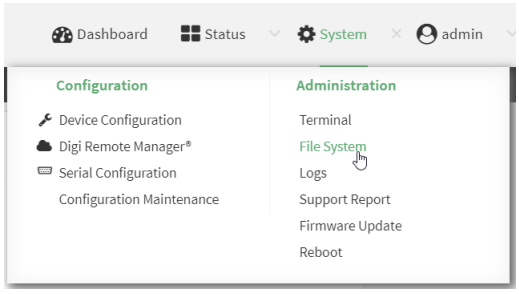
**Note** Python applications cannot be run from the Admin CLI. You must access the device shell in order to run Python applications from the command line. See Authentication groups for information about configuring authentication groups that include shell access.

1. Upload the Python application to the Connect EZ 16/32 device:

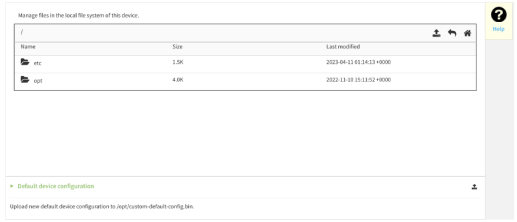
## Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

a. On the menu, click **System**. Under **Administration**, click **File System**.




The **File System** page appears.



b. Highlight the **scripts** directory and click to open the directory.

c. Click (upload).

d. Browse to the location of the script on your local machine. Select the file and click **Open** to upload the file.

The uploaded file is uploaded to the **/etc/config/scripts** directory.

## Command line

a. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

b. At the command line, use the scp command to upload the Python application script to the Connect EZ 16/32 device:

```
> scp host hostname-or-ip user username remote remote-path local
local-path to local
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the path and filename of the file on the remote host that will be copied to the Connect EZ 16/32 device.
- *local-path* is the location on the Connect EZ 16/32 device where the copied file will be placed.

For example:

To upload a script from a remote host with an IP address of 192.168.4.1 to the /etc/config/scripts directory on the Connect EZ 16/32 device, issue the following command:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/test.py local
/etc/config/scripts/ to local
admin@192.168.4.1's password: adminpwd
test.py                        100%    36MB    11.1MB/s        00:03
>
```

c. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

**Note** You can also create scripts by using the **vi** command when logged in with shell access.

2. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

3. Use the **python** command to run the Python application. In the following example, the Python application, **test.py**, takes 3 parameters: **120**, **ports** and **storage**:

```
# python /etc/config/scripts/test.py 120 ports storage
```

# Configure scripts to run manually

You can configure an scripts to be manually run.

### *Required configuration items*

- Upload or create the script.
- Enable the script.
- Set the script to run manually.

### Additional configuration items

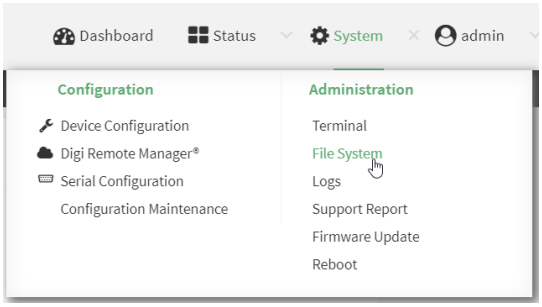
- A label used to identify the script.
- The arguments for the script.
- Whether to write the script output and errors to the system log.
- The memory available to be used by the script.
- Whether the script should run one time only.

## Task one: Upload the application

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, click **System**. Under **Administration**, click **File System**.




The **File System** page appears.

2. Highlight the **scripts** directory and click ↱ to open the directory.
3. Click ⬆ (upload).
4. Browse to the location of the script on your local machine. Select the file and click **Open** to upload the file.

The uploaded file is uploaded to the **/etc/config/scripts** directory.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, use the scp command to upload the Python application script to the Connect EZ 16/32 device:

```
> scp host hostname-or-ip user username remote remote-path local local-
path to local
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the path and filename of the file on the remote host that will be copied to the Connect EZ 16/32 device.
- *local-path* is the location on the Connect EZ 16/32 device where the copied file will be placed.

For example:

To upload a script from a remote host with an IP address of 192.168.4.1 to the /etc/config/scripts directory on the Connect EZ 16/32 device, issue the following command:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/test.py local
/etc/config/scripts/ to local
admin@192.168.4.1's password: adminpwd
test.py                         100%    36MB    11.1MB/s        00:03
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

Note You can also create scripts by using the **vi** command when logged in with shell access.

## Task two: Configure the application to run automatically

Note This feature does not provide syntax or error checking. Certain commands can render the device inoperable. Use with care.

### Web

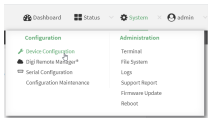
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

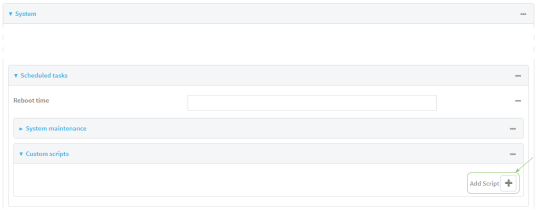
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

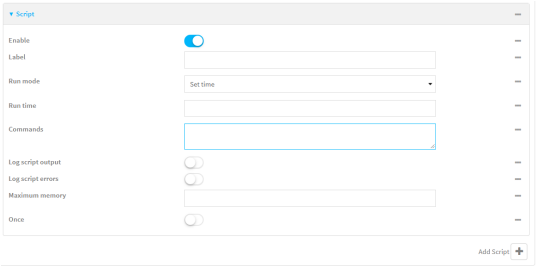


The **Configuration** window is displayed.

3. Click **System** > **Scheduled tasks** > **Custom scripts**.
4. For **Add Script**, click ✚.



The script configuration window is displayed.



Custom scripts are enabled by default. To disable, toggle off **Enable** to toggle off.

5. (Optional) For **Label**, provide a label for the script.
6. For **Run mode**, select **Manual**.
7. For **Commands**, type the commands that will execute the script.
   - If a Python script is being used, include the full path to the Python script. For example:

     ```
     python /etc/config/scripts/test.py
     ```

   - If the script begins with **#!**, then the script will be invoked in the location specified by the path for the script command. Otherwise, the default shell will be used (equivalent to **#!/bin/sh**).
8. Script logging options:
   a. Click to enable **Log script output** to log the script's output to the system log.
   b. Click to enable **Log script errors** to log script errors to the system log.

   If neither option is selected, only the script's exit code is written to the system log.
9. For **Maximum memory**, enter the maximum amount of memory available to be used by the script and its subprocesses, using the format *number*{**b**|**bytes**|**KB**|**k**|**MB**|**MB**|**M**|**GB**|**G**|**TB**|**T**}.

10. **Sandbox** is enabled by default, which restricts access to the file system and available commands that can be used by the script. This option protects the script from accidentally destroying the system it is running on.
11. Click to enable **Once** to configure the script to run only once at the specified time.

    If **Once** is enabled, rebooting the device will cause the script to not run again. The only way to re-run the script is to:

    - Remove the script from the device and add it again.
    - Make a change to the script.
    - Uncheck **Once**.
12. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a script:

```
(config)> add system schedule script end
(config system schedule script 0)>
```

   Scheduled scripts are enabled by default. To disable:

```
(config system schedule script 0)> enable false
(config system schedule script 0)>
```

4. (Optional) Provide a label for the script.

```
(config system schedule script 0)> label value
(config system schedule script 0)>
```

   where *value* is any string. if spaces are used, enclose *value* within double quotes.
5. Set the run mode to manual:

```
(config system schedule script 0)> when manual
(config system schedule script 0)>
```

6. Set the commands that will execute the script:

```
(config system schedule script 0)> commands filename
(config system schedule script 0)>
```

   where *filename* is the path and filename of the script, and any related command line information.

- If a Python script is being used, include the full path to the Python script and enclose in quotation marks. For example:

```
(config system schedule script 0)> commands python
"/etc/config/scripts/test.py"
(config system schedule script 0)>
```

- If the script begins with **#!**, then the script will be invoked in the location specified by the path for the script command. Otherwise, the default shell will be used (equivalent to **#!/bin/sh**).

7. Script logging options:
   - To log the script's output to the system log:

```
(config system schedule script 0)> syslog_stdout true
(config system schedule script 0)>
```

   - To log script errors to the system log:

```
(config system schedule script 0)> syslog_stderr true
(config system schedule script 0)>
```

   If **syslog_stdout** and **syslog_stderr** are not enabled, only the script's exit code is written to the system log.
8. Set the maximum amount of memory available to be used by the script and its subprocesses:

```
(config system schedule script 0)> max_memory value
(config system schedule script 0)>
```

   where *value* uses the syntax ***number***{**b**|**bytes**|**KB**|**k**|**MB**|**MB**|**M**|**GB**|**G**|**TB**|**T**}.
9. To run the script only once at the specified time:

```
(config system schedule script 0)> once true
(config system schedule script 0)>
```

   If **once** is enabled, rebooting the device will cause the script to run again. The only way to re-run the script is to:
   - Remove the script from the device and add it again.
   - Make a change to the script.
   - Disable **once**.
10. **Sandbox** is enabled by default. This option protects the script from accidentally destroying the system it is running on.

```
(config system schedule script 0)> sandbox true
(config system schedule script 0)>
```

11. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Start a manual script

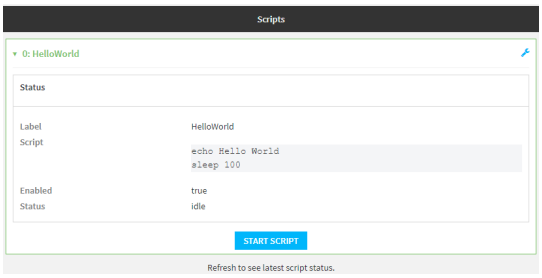
You can start a script that is enabled and configured to have a run mode of **Manual**.

## Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. At the **Status** page, click **Scripts**.

   The **Scripts** page displays:




2. For scripts that are enabled and configured to have a run mode of **Manual**, click **Start Script** to start the script.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Determine the name of scripts that are currently running:

```
> show scripts

 Index  Label        Enabled  Status  Run time
 -----  -----------  -------  ------  --------
 0      script1      true     active
 1      script2      true     idle     01:00
>
```

3. Start the script:

```
)> system script start script1
>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Python versions and corresponding DAL OS firmware versions

The table lists the Python versions where changes were made the to programming language and the corresponding DAL OS version to which those changes align.

| Python version history | DAL OS version history |
|---|---|
| Python 3.13 | DAL OS 24.12.153.120 |
| Python 3.10.13 | DAL OS 24.3.28.88 |
| Python 3.6.15 | DAL OS 21.11.60.63 |

To see the Python change log, go to https://docs.python.org/3/whatsnew/changelog.html#.

# User authentication

This chapter contains the following topics:


Connect EZ 16/32 user authentication ..... 722
User authentication methods ..... 722
Authentication groups ..... 729
Local users ..... 739
Terminal Access Controller Access-Control System Plus (TACACS+) ..... 753
Remote Authentication Dial-In User Service (RADIUS) ..... 760
LDAP ..... 765
Configure serial authentication ..... 773
Disable shell access ..... 775
Set the idle timeout for Connect EZ 16/32 users ..... 777
Example user configuration ..... 779

# Connect EZ 16/32 user authentication

User authentication on the Connect EZ 16/32 has the following features and default configuration:

| Feature | Description | Default configuration |
|---|---|---|
| **Idle timeout** | Determines how long a user session can be idle before the system automatically disconnects. | ■ 10 minutes |
| **Allow shell** | If disabled, prevents all authentication prohibits access to the shell prompt for all authentication groups. This does not prevent access to the Admin CLI.<br>Note If shell access is disabled, re-enabling it will erase the device's configuration and perform a factory reset. | ■ Enabled |
| **Methods** | Determines how users are authenticated for access: **local users**, **TACACS+**, or **RADIUS**. | ■ **local users** |
| **Groups** | Associates access permissions for a group. . You can modify the released groups and create additional groups as needed for your site. A user can be assigned to more than one group. | ■ **admin**: Provides the logged-in user with administrative and shell access.<br>■ **serial**: Provides the logged-in user with access to serial ports. |
| **Users** | Defines local users for the Connect EZ 16/32. | ■ **admin**: Belongs to both the **admin** and **serial** groups. |
| **TACACS+** | Configures support for TACACS+ (Terminal Access Controller Access-Control System Plus) servers and users. | ■ Not configured |
| **RADIUS** | Configures support for RADIUS (Remote Authentication Dial-In User Service) servers and users. | ■ Not configured |
| **LDAP** | Configures support for LDAP (Lightweight Directory Access Protocol) servers and users. | ■ Not configured |
| **Serial** | Configures authentication for serial TCP and autoconnect services. | ■ Not configured |

# User authentication methods

Authentication methods determine how users of the Connect EZ 16/32 device are authenticated. Available authentication methods are:

- **Local users**: User are authenticated on the local device.
- **RADIUS**: Users authenticated by using a remote RADIUS server for authentication.

  See Remote Authentication Dial-In User Service (RADIUS) for information about configuring RADIUS authentication.
- **TACACS+**: Users authenticated by using a remote TACACS+ server for authentication.

  See Terminal Access Controller Access-Control System Plus (TACACS+) for information about configuring TACACS+ authentication.
- **LDAP**: Users authenticated by using a remote LDAP server for authentication.

  See LDAP for information about configuring LDAP authentication.

# Add a new authentication method

## *Required configuration items*

- The types of authentication method to be used:

To add an authentication method:

### Web

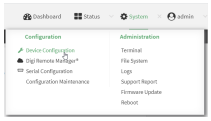
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

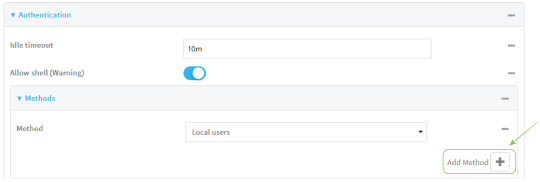
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

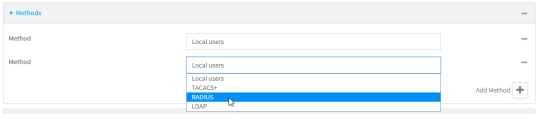
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Authentication** > **Methods**.
4. For **Add Method**, click ✚.




5. Select the appropriate authentication type for the new method from the **Method** drop-down.



**Note** Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. See Rearrange the position of authentication methods for information about how to reorder the authentication methods.

6. Repeat these steps to add additional methods.
7. Click **Apply** to save the configuration and apply the change.

### Command line

Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. This procedure describes how to add methods to various places in the list.

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the new authentication method to the appropriate location in the list:
   - To determine the current list of authentication methods:
     a. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

        Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
     b. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

     c. Use the **show auth method** command to display the current authentication methods configuration:

```
(config)> show auth method
0 local
(config)>
```

   - To add the new authentication method to the beginning of the list, use the index value of **0** to indicate that it should be added as the first method:

```
(config)> add auth method 0 auth_type
(config)>
```

     where *auth_type* is one of **local**, **radius**, **tacacs+**, or **ldap**.
   - To add the new authentication method to the end of the list, use the index keyword **end**:

```
(config)> add auth method end auth_type
(config)>
```

where *auth_type* is one of **local**, **radius**, **tacacs+**, or **ldap**.

- To add the new authentication in another location in the list, use an index value to indicate the appropriate position. For example:

```
(config)> add auth method 1 auth_type
(config)>
```

where *auth_type* is one of **local**, **radius**, **tacacs+**, or **ldap**.

- You can also use the **move** command to rearrange existing methods. See Rearrange the position of authentication methods for information about how to reorder the authentication methods.

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Delete an authentication method

### Web

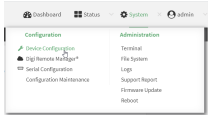
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

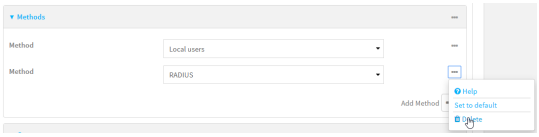
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication** > **Methods**.
4. Click the menu icon (**...**) next to the method and select **Delete**.




5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **show auth method** command to determine the index number of the authentication method to be deleted:

```
(config)> show auth method
0 local
1 radius
2 tacacs+
(config)>
```

4. Delete the appropriate authentication method:

```
(config)> del auth method n
```

   Where *n* is index number of the authentication method to be deleted. For example, to delete the TACACS+ authentication method as displayed by the example **show** command, above:

```
(config)> del auth method 2
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

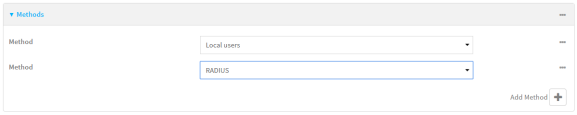
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Rearrange the position of authentication methods

## Web

Authentication methods are reordered by changing the method type in the **Method** drop-down for each authentication method to match the appropriate order.

For example, the following configuration has **Local users** as the first method, and **RADIUS** as the second.




To reorder these so that **RADIUS** is first and **Local users** is second:

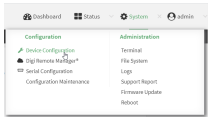
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

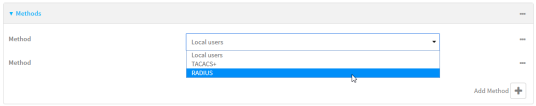
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

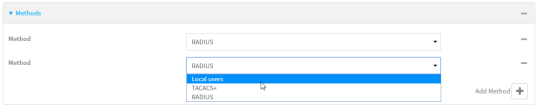
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click to expand the first **Method**.
4. In the **Method** drop-down, select **RADIUS**.

   
   
5. Click to expand the second **Method**.
6. In the **Method** drop-down, select **Local users**.

   
   
7. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **show** command to display current configuration:

```
(config)> show auth method
0 local
1 radius
(config)>
```

4. Use the **move** command to rearrange the methods:

```
(config)> move auth method 1 0
(config)>
```

5. Use the **show** command again to verify the change:

```
(config)> show auth method
0 radius
1 local
(config)>
```

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Authentication groups

Authentication groups are used to assign access rights to Connect EZ 16/32 users. Three types of access rights can be assigned:

- **Admin access**: Users with Admin access can be configured to have either:
  - The ability to manage the Connect EZ 16/32 device by using the WebUI or the Admin CLI.
  - Read-only access to the WebUI and Admin CLI.
- **Shell access**: Users with Shell access have the ability to access the shell when logging into the Connect EZ 16/32 via ssh, telnet, or the serial console.

  Shell access is not available if the **Allow shell** parameter has been disabled. See Disable shell access for more information about the **Allow shell** parameter.

- **Serial access**: Users with Serial access have the ability to log into the Connect EZ 16/32 device by using the serial console.

### Preconfigured authentication groups

The Connect EZ 16/32 device has two preconfigured authentication groups:

- The **admin** group is configured by default to have full **Admin access**.
- The **serial** group is configured by default to have **Serial access**.

The preconfigured authentication groups cannot be deleted, but the access rights defined for the group are configurable.

This section contains the following topics:

Change the access rights for a predefined group ..... 731
Add an authentication group ..... 733
Delete an authentication group ..... 737

## Change the access rights for a predefined group

By default, two authentication groups are predefined: **admin** and **serial**. To change the access rights of the predefined groups:

### Web

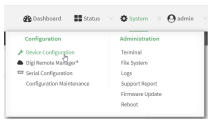
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

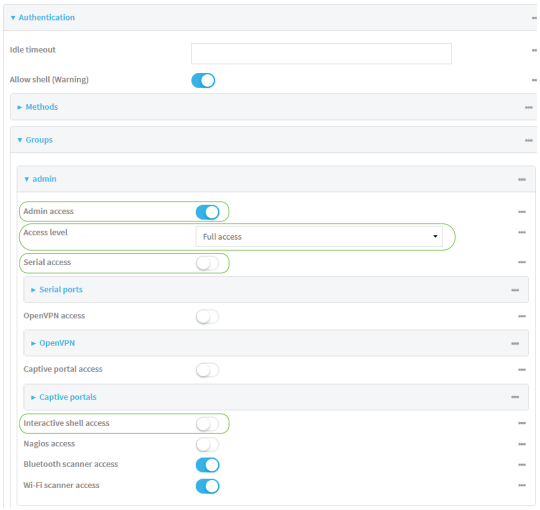
   

   The **Configuration** window is displayed.
3. Click **Authentication** > **Groups**.
4. Click the authentication group to be changed, either **admin** or **serial**, to expand its configuration node.
5. Click the box next to the following options, as appropriate, to enable or disable access rights for each:
   - **Admin access**

     For groups assigned Admin access, you can also determine whether the **Access level** should be **Full access** or **Read-only access**.
     - **Full access** provides users of this group with the ability to manage the Connect EZ 16/32 device by using the WebUI or the Admin CLI.
     - **Read-only access** provides users of this group with read-only access to the WebUI and Admin CLI.

     The default is **Full access**.
   - **Serial access**
   - **Interactive shell access**

     Shell access is not available if the **Allow shell** parameter has been disabled. See Disable shell access for more information about the **Allow shell** parameter.




6. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable or disable access rights for the group. For example:
   - Admin access:
     - To set the access level for Admin access of the **admin** group:

```
(config)> auth group admin acl admin level value
(config)>
```

       where *value* is either:
       - **full**: provides users of this group with the ability to manage the Connect EZ 16/32 device by using the WebUI or the Admin CLI.
       - **read-only**: provides users of this group with read-only access to the WebUI and Admin CLI.

       The default is **full**.
     - To disable Admin access for the **admin** group:

```
(config)> auth group admin acl admin enable false
(config)>
```

   - Shell access:

- To enable Shell access for the **serial** group:

```
(config)> auth group serial acl shell enable true
(config)>
```

Shell access is not available if the **Allow shell** parameter has been disabled. See Disable shell access for more information about the **Allow shell** parameter.

- Serial access:
  - To enable Serial access for the **admin** group:

```
(config)> auth group admin acl serial enable true
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Add an authentication group

### Required configuration items

- The access rights to be assigned to users that are assigned to this group.

### Additional configuration items

- Access rights to OpenVPN tunnels, and the tunnels to which they have access.
- Access rights to captive portals, and the portals to which they have access.
- Access rights to query the device for Nagios monitoring.

To add an authentication group:

### Web

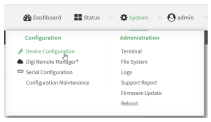
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

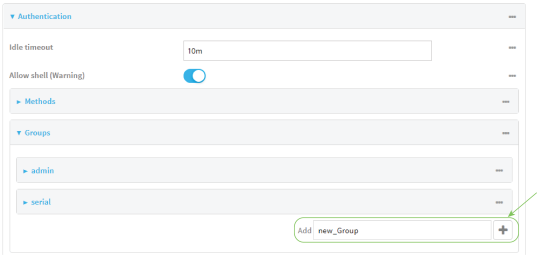
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

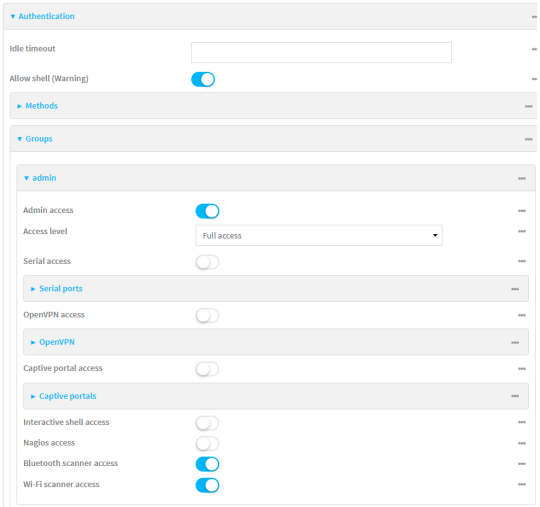


The **Configuration** window is displayed.

3. Click **Authentication** > **Groups**.
4. For **Add**, type a name for the group and click **+**.




The group configuration window is displayed.




5. Click the following options, as appropriate, to enable or disable access rights for each:
   - **Admin access**

     For groups assigned Admin access, you can also determine whether the **Access level** should be **Full access** or **Read-only access**.

     where *value* is either:

     - **Full access full**: provides users of this group with the ability to manage the Connect EZ 16/32 device by using the WebUI or the Admin CLI.
     - **Read-only access read-only**: provides users of this group with read-only access to the WebUI and Admin CLI.

     The default is **Full access full**.

- **Serial access**

6. (Optional) Configure OpenVPN access. See for further information.
7. (Optional) Configure captive portal access:
   a. Enable captive portal access rights for users of this group by checking the box next to **Captive portal access**.
   b. Click **Captive portals** to expand the **Captive portal** node.
   c. For **Add Captive portal**, click ✚.
   d. In the **Captive portal** dropdown, select a captive portal to which users of this group will have access.
   e. Click ✚ again to add additional captive portals.
8. **Interactive shell access**

   Shell access is not available if the **Allow shell** parameter has been disabled. See Disable shell access for more information about the **Allow shell** parameter.
9. (Optional) Enable users that belong to this group to query the device for Nagios monitoring by checking the box next to **Nagios access**.
10. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **add auth group** command to add a new authentication. For example, to add a group named **test**:

```
(config)> add auth group test
(config auth group test)>
```

4. Enable access rights for the group:
   - Admin access:

```
(config auth group test)> acl admin enable true
(config)>
```

   - Set the access level for Admin access:

```
(config)> auth group admin acl admin level value
(config)>
```

     where *value* is either:
     - **full**: provides users of this group with the ability to manage the Connect EZ 16/32 device by using the WebUI or the Admin CLI.

- **read-only**: provides users of this group with read-only access to the WebUI and Admin CLI.

The default is **full**.

- Shell access:

```
(config auth group test)> acl shell enable true
(config)>
```

Shell access is not available if the **Allow shell** parameter has been disabled. See Disable shell access for more information about the **Allow shell** parameter.

- Serial access:

```
(config auth group test)> acl serial enable true
(config)>
```

5. (Optional) Configure captive portal access:
   a. Return to the config prompt by typing three periods (**...**):

```
(config auth group test)> ...
(config)>
```

   b. Enable captive portal access rights for users of this group:

```
(config)> auth group test acl portal enable true
(config)>
```

   c. Add a captive portal to which users of this group will have access:
      i. Determine available portals:

```
(config)> show firewall portal
portal1
       auth none
       enable true
       http redirect
       no interface
       no message
       no redirect_url
       no terms
       timeout 24h
       no title
(config)>
```

      ii. Add a captive portal:

```
(config)> add auth group test acl portal portals end portal1
(config)>
```

6. (Optional) Configure Nagios monitoring:

```
(config)> auth group test acl nagios enable true
(config)>
```

7. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Delete an authentication group

By default, the Connect EZ 16/32 device has two preconfigured authentication groups: **admin** and **serial**. These groups cannot be deleted.

To delete an authentication group that you have created:

### Web

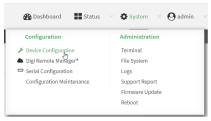
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

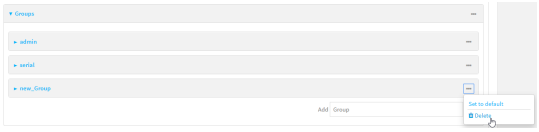
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Authentication** > **Groups**.
4. Click the menu icon **(...)** next to the group to be deleted and select **Delete**.

   
5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> del auth group groupname
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Local users

Local users are authenticated on the device without using an external authentication mechanism such as TACACS+ or RADIUS. Local user authentication is enabled by default, with one preconfiged default user.

### *Default user*

At manufacturing time, each Connect EZ 16/32 device comes with a default user configured as follows:

- Username: **admin**.
- Password: The default password is displayed on the label on the bottom of the device.

> **Note** The default password is a unique password for the device, and is the most critical security feature for the device. If you reset the device to factory defaults, you must log in using the default user and password, and you should immediately change the password to a custom password. Before deploying or mounting the Connect EZ 16/32 device, record the default password, so you have the information available when you need it even if you cannot physically access the label on the bottom of the device.

The default **admin** user is preconfigured with both Admin and Serial access. You can configure the **admin** user account to fit with the needs of your environment.

This section contains the following topics:

Change a local user's password ..... 740
Configure a local user ..... 742
Delete a local user ..... 750

## Change a local user's password

**Note** When updating the password for the local user, you will be prompted to enter the current password before applying the configuration update.

To change a user's password:

### Web

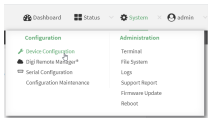
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

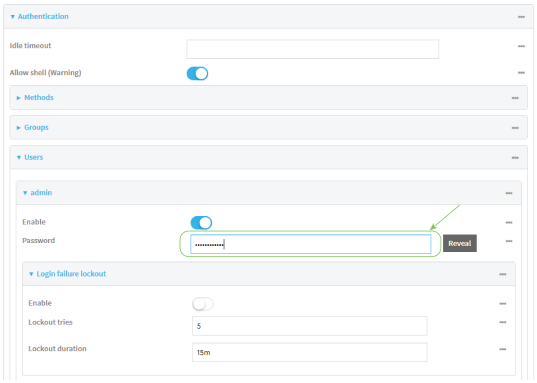
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

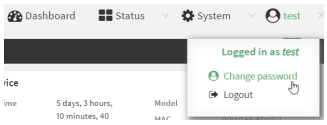
   The **Configuration** window is displayed.
3. Click **Authentication** > **Users**.
4. Click the username to expand the user's configuration node.
5. For **Password**, enter the new password. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.

   For the **admin** user, the password field can be left blank:

   - If the password field for the **admin** user is left blank, the **admin** user's password will be the default password printed on the device's label.
   - If the **admin** user's password has been changed from the default and the configuration saved, if you then clear the password field for the **admin** user, this will result in the device device's configuration being erased and reset to the default configuration.




You can also change the password for the active user by clicking the user name in the menu bar:




The active user must have full Admin access rights to be able to change the password.

6. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> auth user username password pwd
```

   Where:

   - *username* is the name of the user.
   - *pwd* is the new password for the user. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.
4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure a local user

#### Required configuration items

- A username.
- A password. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character. For security reasons, passwords are stored in hash form. There is no way to get or display passwords in clear-text form, although prior to saving the configuration, the password can be shown by clicking **Reveal**.
- The authentication group or groups from which the user will inherit access rights. See Authentication groups for information about configuring groups.

#### Additional configuration items

- An alias for the user. Because the username cannot contain any special characters, such as hyphens (-) or periods (.), an alias allows the user to log in using a name that contains special characters.
- The number of unsuccessful login attempts before the user is locked out of the system.

- The amount of time that the user is locked out of the system after the specified number of unsuccessful login attempts.
- An optional public ssh key, to authenticate the user when using passwordless SSH login.
- Two-factor authentication information for user login over SSH, telnet, and the serial console:
  - The verification type for two-factor authentication: Either time-based or counter-based.
  - The security key.
  - Whether to allow passcode reuse (time based verification only).
  - The passcode refresh interval (time based verification only).
  - The valid code window size.
  - The login limit.
  - The login limit period.
  - One-time use eight-digit emergency scratch codes.

To configure a local user:

### Web

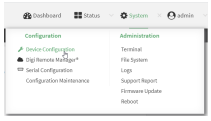
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

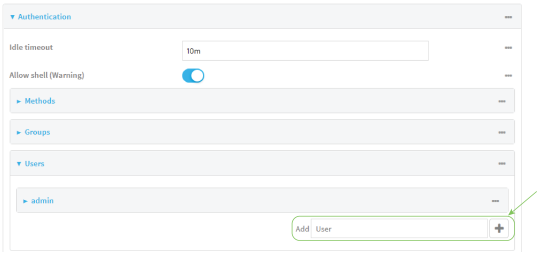
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

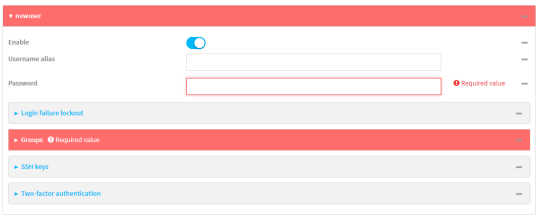
   

   The **Configuration** window is displayed.
3. Click **Authentication** > **Users**.

4. In **Add User**, type a name for the user and click ✚.




The user configuration window is displayed.




The user is enabled by default. To disable, toggle off **Enable**.

5. (Optional) For **Username alias**, type an alias for the user.

   Because the name used to create the user and cannot contain special characters such as hyphens (-) or periods (.), an alias allows the user to log in using a name that contains special characters. For security purposes, if two users have the same alias, the alias will be disabled.

6. Enter a password for the user. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.

7. Click to expand **Login failure lockout**.

   The login failure lockout feature is enabled by default. To disable, toggle off **Enable**.

   a. For **Lockout tries**, type the number of unsuccessful login attempts before the user is locked out of the device. The default is **5**.

   b. For **Lockout duration**, type the amount of time that the user is locked out after the number of unsuccessful login attempts defined in **Lockout tries**.

      Allowed values are any number of minutes, or seconds, and take the format ***number***{**m|s**}.

      For example, to set **Lockout duration** to ten minutes, enter **10m** or **600s**.

      The minimum value is 1 second, and the maximum is 15 minutes. The default is 15 minutes.

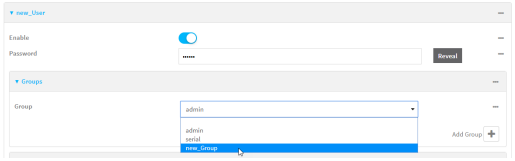
8. Add groups for the user.

   Groups define user access rights. See Authentication groups for information about configuring groups.

a. Click to expand **Groups**.

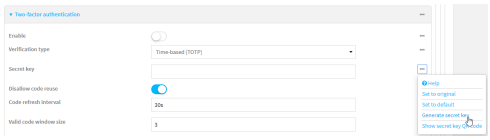
b. For **Add Group**, click ✚.

c. For **Group**, select an appropriate group.



**Note** Every user must be configured with at least one group. You can add multiple groups to a user by clicking **Add** again and selecting the next group.

9. (Optional) Add SSH keys for the user to use passwordless SSH login:
   a. Click **SSH keys**.
   b. In **Add SSH key**, paste or type a public encryption key that this user can use for passwordless SSH login and click ✚.
10. (Optional) Configure two-factor authentication for SSH, telnet, and serial console login:
   a. Click **Two-factor authentication**.
   b. Check **Enable** to enable two-factor authentication for this user.
   c. Select the **Verification type**:
      - **Time-based (TOTP)**: Time-based One-Time Password (TOTP) authentication uses the current time to generate a one-time password.
      - **Counter-based (HOTP)**: HMAC-based One-Time Password (HOTP) uses a counter to validate a one-time password.
   d. Generate a **Secret key**:
      i. Click **...** next to the field label and select **Generate secret key**.



      ii. Copy the secret key for use with an application or mobile device to generate passcodes.
   e. For time-based verification only, select **Disallow code reuse** to prevent a code from being used more than once during the time that it is valid.
   f. For time-based verification only, in **Code refresh interval**, type the amount of time that a code will remain valid.

      Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}. For example, to set **Code refresh interval** to ten minutes, enter **10m** or **600s**.

g. In **Valid code window size**, type the allowed number of concurrently valid codes. In cases where TOTP is being used, increasing the **Valid code window size** may be necessary when the clocks used by the server and client are not synchronized.

h. For **Login limit**, type the number of times that the user is allowed to attempt to log in during the **Login limit period**. Set **Login limit** to **0** to allow an unlimited number of login attempts during the **Login limit period**.

i. For **Login limit period**, type the amount of time that the user is allowed to attempt to log in.

Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}. For example, to set **Login limit period** to ten minutes, enter **10m** or **600s**.

j. Scratch codes are emergency codes that may be used once, at any time. To add a scratch code:

i. Click **Scratch codes**.

ii. For **Add Code**, click ✚.

iii. For **Code**, enter the scratch code. The code must be eight digits, with a minimum of 10000000.

iv. Click ✚ again to add additional scratch codes.

11. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a user. For example, to create a user named **new_user**:

```
(config)> add auth user new_user
(config auth user new_user)>
```

   The user is enabled by default. To disable the user, type:

```
(config auth user new_user)> enable false
(config auth user new_user)>
```

4. (Optional) Create a username alias for the user.

   Because the name to create the user cannot contain special characters such as hyphens (-) or periods (.), an alias allows the user to log in using a name that contains special characters. For security purposes, if two users have the same alias, the alias will be disabled.

```
(config auth user new_user> username username_alias
(config auth user new_user)>
```

5. Set the user's password. The password must be at least eight characters long and must contain at least one uppercase letter, one lowercase letter, one number, and one special character.

```
(config auth user new_user> password pwd
(config auth user new_user)>
```

6. Configure login failure lockout settings:

   The login failure lockout feature is enabled by default. To disable:

```
(config auth user new_user> lockout enable false
(config auth user new_user)>
```

   a. Set the number of unsuccessful login attempts before the user is locked out of the device.

      where *value* is any integer. The minimum value is **1**, and the default value is **5**.

   b. Set the amount of time that the user is locked out after the number of unsuccessful login attempts defined in **lockout tries**:

```
(config auth user new_user> lockout duration value
(config auth user new_user)>
```

      where *value* is any number of minutes, or seconds, and takes the format ***number***{**m|s**}.

      For example, to set **duration** to ten minutes, enter either **10m** or **600s**:

```
(config auth user new_user)> lockout duration 600s
(config auth user new_user)>
```

      The minimum value is 1 second, and the maximum is 15 minutes. The default is 15 minutes.

7. Add groups for the user.

   Groups define user access rights. See Authentication groups for information about configuring groups.

   a. Add a group to the user. For example, to add the admin group to the user:

```
(config auth user new_user> add group end admin
(config auth user new_user)>
```

      **Note** Every user must be configured with at least one group.

   b. (Optional) Add additional groups by repeating the add group command:

```
(config auth user new_user> add group end serial
(config auth user new_user)>
```

   To remove a group from a user:

a. Use the **show** command to determine the index number of the group to be deleted:

```
(config auth user new_user> show group
0 admin
1 serial
(config auth user new_user>
```

b. Type the following:

```
(config auth user new_user)> del group n
(config auth user new_user)>
```

Where *n* is index number of the authentication method to be deleted. For example, to delete the serial group as displayed by the example **show** command, above:

```
(config auth user new_user)> del group 1
(config auth user new_user)>
```

8. (Optional) Add SSH keys for the user to use passwordless SSH login:
   a. Change to the user's ssh_key node:

```
(config auth user new_user)> ssh_key
(config auth user new_user ssh_key)>
```

   b. Add the key by using the ssh_key command and pasting or typing a public encryption key that this user can use for passwordless SSH login:

```
(config auth user new_user ssh_key)> ssh_key key
(config auth user new_user ssh_key)>
```

9. (Optional) Configure two-factor authentication for SSH, telnet, and serial console login:
   a. Change to the user's two-factor authentication node:

```
(config auth user new_user)> 2fa
(config auth user new_user 2fa)>
```

   b. Enable two-factor authentication for this user:

```
(config auth user new_user 2fa)> enable true
(config auth user new_user 2fa)>
```

   c. Configure the verification type. Allowed values are:
      - **totp**: Time-based One-Time Password (TOTP) authentication uses the current time to generate a one-time password.
      - **hotp**: HMAC-based One-Time Password (HOTP) uses a counter to validate a one-time password.

   The default value is **totp**.

```
(config auth user new_user 2fa)> type totp
(config auth user new_user 2fa)>
```

d. Add a secret key:

```
(config auth user new_user 2fa)> secret key
(config auth user new_user 2fa)>
```

This key should be used by an application or mobile device to generate passcodes.

e. For time-based verification only, enable **disallow_reuse** to prevent a code from being used more than once during the time that it is valid.

```
(config auth user new_user 2fa)> disallow_reuse true
(config auth user new_user 2fa)>
```

f. For time-based verification only, configure the code refresh interval. This is the amount of time that a code will remain valid.

```
(config auth user new_user 2fa)> refresh_interval value
(config auth user new_user 2fa)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **refresh_interval** to ten minutes, enter either **10m** or **600s**:

```
(config auth user name 2fa)> refresh_interval 600s
(config auth user name 2fa)>
```

The default is **30s**.

g. Configure the valid code window size. This represents the allowed number of concurrently valid codes. In cases where TOTP is being used, increasing the valid code window size may be necessary when the clocks used by the server and client are not synchronized.

```
(config auth user new_user 2fa)> window_size 3
(config auth user new_user 2fa)>
```

h. Configure the login limit. This represents the number of times that the user is allowed to attempt to log in during the Login limit period. Set to 0 to allow an unlimited number of login attempts during the Login limit period

```
(config auth user new_user 2fa)> login_limit 3
(config auth user new_user 2fa)>
```

i. Configure the login limit period. This is the amount of time that the user is allowed to attempt to log in.

```
(config auth user new_user 2fa)> login_limit_period value
(config auth user new_user 2fa)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **login_limit_period** to ten minutes, enter either **10m** or **600s**:

```
(config auth user name 2fa)> login_limit_period 600s
(config auth user name 2fa)>
```

The default is **30s**.

j. Scratch codes are emergency codes that may be used once, at any time. To add a scratch code:

i. Change to the user's scratch code node:

```
(config auth user new_user 2fa)> scratch_code
(config auth user new_user 2fa scratch_code)>
```

ii. Add a scratch code:

```
(config auth user new_user 2fa scratch_code)> add end code
(config auth user new_user 2fa scratch_code)>
```

Where code is an digit number, with a minimum of 10000000.

iii. To add additional scratch codes, use the **add end *code*** command again.

10. Save the configuration and apply the change.

```
(config auth user new 2fa scratch_code)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Delete a local user

To delete a user from your Connect EZ 16/32:

### Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

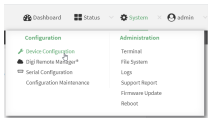
b. Click the **Device ID**.

c. Click **Settings**.

d. Click to expand **Config**.

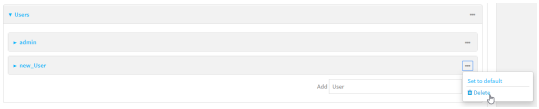
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.




The **Configuration** window is displayed.

3. Click **Authentication** > **Users**.
4. Click the menu icon (**...**) next to the name of the user to be deleted and select **Delete**.




5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> del auth user username
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Terminal Access Controller Access-Control System Plus (TACACS+)

Your Connect EZ 16/32 device supports Terminal Access Controller Access-Control System Plus (TACACS+), a networking protocol that provides centralized authentication and authorization management for users who connect to the device. With TACACS+ support, the Connect EZ 16/32 device acts as a TACACS+ client, which sends user credentials and connection parameters to a TACACS+ server over TCP. The TACACS+ server then authenticates the TACACS+ client requests and sends back a response message to the device.

When you are using TACACS+ authentication, you can have both local users and TACACS+ users able to log in to the device. To use TACACS+ authentication, you must set up a TACACS+ server that is accessible by the Connect EZ 16/32 device prior to configuration. The process of setting up a TACACS+ server varies by the server environment.

This section contains the following topics:

TACACS+ user configuration ..... 754
TACACS+ server failover and fallback to local authentication ..... 755
Configure your Connect EZ 16/32 device to use a TACACS+ server ..... 755

## TACACS+ user configuration

When configured to use TACACS+ support, the Connect EZ 16/32 device uses a remote TACACS+ server for user authentication (password verification) and authorization (assigning the access level of the user). Additional TACACS+ servers can be configured as backup servers for user authentication.

This section outlines how to configure a TACACS+ server to be used for user authentication on your Connect EZ 16/32 device.

### *Example TACACS+ configuration*

With TACACS+, users are defined in the server configuration file. On Ubuntu, the default location and filename for the server configuration file is **/etc/tacacs+/tac_plus.conf**.

**Note** TACACS+ configuration, including filenames and locations, may vary depending on your platform and installation. This example assumes a Ubuntu installation.

To define users:

1. Open the TACACS+ server configuration file in a text editor. For example:

```
$ sudo gedit /etc/tacacs+/tac_plus.conf
```

2. Add users to the file using the following format. This example will create two users, one with admin and serial access, and one with only serial access.

```
user = user1 {
       name ="User1 for Connect EZ 16/32"
       pap = cleartext password1
       service = system {
         groupname = admin,serial
       }
}
user = user2 {
       name ="User2 for Connect EZ 16/32"
       pap = cleartext password2
       service = system {
         groupname = serial
       }
}
```

   The **groupname** attribute is optional. If used, the value must correspond to authentication groups configured on your Connect EZ 16/32. Alternatively, if the user is also configured as a local user on the Connect EZ 16/32 device and the LDAP server authenticates the user but does not return any groups, the local configuration determines the list of groups. See Authentication groups for more information about authentication groups. The **groupname** attribute can contain one group or multiple groups in a comma-separated list.

3. Save and close the file.
4. Verify that your changes did not introduce any syntax errors:

```
$ sudo tac_plus -C /etc/tacacs+/tac_plus.conf -P
```

   If successful, this command will echo the configuration file to standard out. If the command encounters any syntax errors, a message similar to this will display:

```
Error: Unrecognised token on line 1
```

5. Restart the TACACS+ server:

```
$ sudo /etc/init.d/tacacs_plus restart
```

## TACACS+ server failover and fallback to local authentication

In addition to the primary TACACS+ server, you can also configure your Connect EZ 16/32 device to use backup TACACS+ servers. Backup TACACS+ servers are used for authentication requests when the primary TACACS+ server is unavailable.

### *Falling back to local authentication*

With user authentication methods, you can configure your Connect EZ 16/32 device to use multiple types of authentication. For example, you can configure both TACACS+ authentication and local authentication, so that local authentication can be used as a fallback mechanism if the primary and backup TACACS+ servers are unavailable. Additionally, users who are configured locally but are not configured on the TACACS+ server are still able to log into the device. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned; therefore if you want to ensure that users are authenticated first through the TACACS+ server, and only authenticated locally if the TACACS+ server is unavailable or if the user is not defined on the TACACS+ server, then you should list the TACACS+ authentication method prior to the Local users authentication method.

See User authentication methods for more information about authentication methods.

If the TACACS+ servers are unavailable and the Connect EZ 16/32 device falls back to local authentication, only users defined locally on the device are able to log in. TACACS+ users cannot log in until the TACACS+ servers are brought back online.

## Configure your Connect EZ 16/32 device to use a TACACS+ server

This section describes how to configure a Connect EZ 16/32 device to use a TACACS+ server for authentication and authorization.

#### Required configuration items

- Define the TACACS+ server IP address or domain name.
- Define the TACACS+ server shared secret.
- The group attribute configured in the TACACS+ server configuration.
- The service field configured in the TACACS+ server configuration.
- Add TACACS+ as an authentication method for your Connect EZ 16/32 device.

#### Additional configuration items

- Whether other user authentication methods should be used in addition to the TACACS+ server, or if the TACACS+ server should be considered the authoritative login method.
- Enable command authorization, so that the device will communicate with the TACACS+ server to determine if the user is authorized to execute a specific command.
- Enable command accounting, so that the device will communicate with the TACACS+ server to log commands that the user executes.

- The TACACS+ server port. It is configured to 49 by default.
- Add additional TACACS+ servers in case the first TACACS+ server is unavailable.

### Web

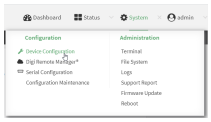
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

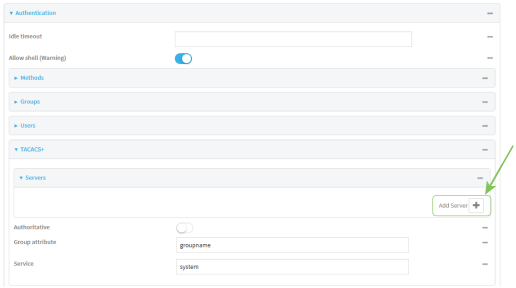
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Authentication** > **TACACS+** > **Servers**.
4. Add TACACS+ servers:
   a. For **Add server**, click ✚.

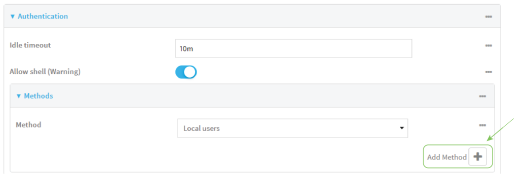
   b. For **Hostname**, type the hostname or IP address of the TACACS+ server.
   c. (Optional) Change the default **Port** setting to the appropriate port. Normally this should be left at the default setting of port 49.
   d. For **Secret**, type the TACACS+ server's shared secret. This is configured in the key parameter of the TACACS+ server's tac_plus.conf file, for example:

```
key = testing123
```

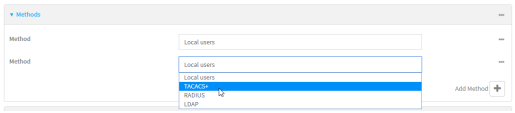
> **Note** DAL authentication does not support the use of the # character in the key (e.g., DAL#123;&). If included, the server will be unable to decipher the request.

e. (Optional) Click ✚ again to add additional TACACS+ servers.

5. (Optional) Enable **Authoritative** to prevent other authentication methods from being attempted if TACACS+ login fails.
6. (Optional) For **Group attribute**, type the name of the attribute used in the TACACS+ server's configuration to identify the Connect EZ 16/32 authentication group or groups that the user is a member of. For example, in TACACS+ user configuration, the group attribute in the sample tac_plus.conf file is **groupname**, which is also the default setting in the Connect EZ 16/32 configuration.
7. (Optional) For **Service**, type the value of the **service** attribute in the the TACACS+ server's configuration. For example, in TACACS+ user configuration, the value of the **service** attribute in the sample tac_plus.conf file is **system**, which is also the default setting in the Connect EZ 16/32 configuration.
8. (Optional) Enable **Command authorization**, which instructs the device to communicate with the TACACS+ server to determine if the user is authorized to execute a specific command. Only the first configured TACACS+ server will be used for command authorization.
9. (Optional) Enable **Command accounting**, which instructs the device to communicate with the TACACS+ server to log commands that the user executes. Only the first configured TACACS+ server will be used for command accounting.
10. Add TACACS+ to the authentication methods:
    a. Click **Authentication** > **Methods**.
    b. For **Add method**, click ✚.




    c. Select **TACACS+** for the new method from the **Method** drop-down.




Authentication methods are attempted in the order they are listed until an authentication response, either pass or fail, is received. If **Authoritative** is enabled (see above), non-authoritative methods are not attempted. See Rearrange the position of authentication methods for information about rearranging the position of the methods in the list.

11. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Prevent other authentication methods from being used if TACACS+ authentication fails. Other authentication methods will only be used if the TACACS+ server is unavailable.

```
(config)> auth tacacs+ authoritative true
(config)>
```

4. (Optional) Configure the group_attribute. This is the name of the attribute used in the TACACS+ server's configuration to identify the Connect EZ 16/32 authentication group or groups that the user is a member of. For example, in TACACS+ user configuration, the group attribute in the sample tac_plus.conf file is **groupname**, which is also the default setting for the group_attribute in the Connect EZ 16/32 configuration.

```
(config)> auth tacacs+ group_attribute attribute-name
(config)>
```

5. (Optional) Configure the type of service. This is the value of the **service** attribute in the the TACACS+ server's configuration. For example, in TACACS+ user configuration, the value of the **service** attribute in the sample tac_plus.conf file is **system**, which is also the default setting in the Connect EZ 16/32 configuration.

```
(config)> auth tacacs+ service service-name
(config)>
```

6. (Optional) Enable command authorization, which instructs the device to communicate with the TACACS+ server to determine if the user is authorized to execute a specific command. Only the first configured TACACS+ server will be used for command authorization.

```
(config)> auth tacacs+ command_authorization true
(config)>
```

7. (Optional) Enable command accounting, which instructs the device to communicate with the TACACS+ server to log commands that the user executes. Only the first configured TACACS+ server will be used for command accounting.

```
(config)> auth tacacs+ command_accounting true
(config)>
```

8. Add a TACACS+ server:
   a. Add the server:

```
(config)> add auth tacacs+ server end
(config auth tacacs+ server 0)>
```

b. Enter the TACACS+ server's IP address or hostname:

```
(config auth tacacs+ server 0)> hostname hostname|ip-address
(config auth tacacs+ server 0)>
```

c. (Optional) Change the default port setting to the appropriate port:

```
(config auth tacacs+ server 0)> port port
(config auth tacacs+ server 0)>
```

d. (Optional) Repeat the above steps to add additional TACACS+ servers.

9. Add TACACS+ to the authentication methods. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. This example will add TACACS+ to the end of the list. See User authentication methods for information about adding methods to the beginning or middle of the list.

```
(config)> add auth method end tacacs+
(config)>
```

10. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Remote Authentication Dial-In User Service (RADIUS)

Your Connect EZ 16/32 device supports Remote Authentication Dial-In User Service (RADIUS), a networking protocol that provides centralized authentication and authorization management for users who connect to the device. With RADIUS support, the Connect EZ 16/32 device acts as a RADIUS client, which sends user credentials and connection parameters to a RADIUS server over UDP. The RADIUS server then authenticates the RADIUS client requests and sends back a response message to the device.

When you are using RADIUS authentication, you can have both local users and RADIUS users able to log in to the device. To use RADIUS authentication, you must set up a RADIUS server that is accessible by the Connect EZ 16/32 device prior to configuration. The process of setting up a RADIUS server varies by the server environment. An example of a RADIUS server is FreeRADIUS.

This section contains the following topics:

RADIUS user configuration ..... 761
RADIUS server failover and fallback to local configuration ..... 761
Configure your Connect EZ 16/32 device to use a RADIUS server ..... 762

## RADIUS user configuration

When configured to use RADIUS support, the Connect EZ 16/32 device uses a remote RADIUS server for user authentication (password verification) and authorization (assigning the access level of the user). Additional RADIUS servers can be configured as backup servers for user authentication.

This section outlines how to configure a RADIUS server to be used for user authentication on your Connect EZ 16/32 device.

### *Example FreeRADIUS configuration*

With FreeRADIUS, users are defined in the **users** file in your FreeRADIUS installation. To define users:

1. Open the FreeRadius user file in a text editor. For example:

```
$ sudo gedit /etc/freeradius/3.0/users
```

2. Add users to the file using the following format:

```
user1 Cleartext-Password := "user1"
       Unix-FTP-Group-Names := "admin"

user2 Cleartext-Password := "user2"
       Unix-FTP-Group-Names := "serial"
```

   The **Unix-FTP-Group-Names** attribute is optional. If used, the value must correspond to authentication groups configured on your Connect EZ 16/32. Alternatively, if the user is also configured as a local user on the Connect EZ 16/32 device and the RADIUS server authenticates the user but does not return any groups, the local configuration determines the list of groups. See Authentication groups for more information about authentication groups. The **Unix-FTP-Group-Names** attribute can contain one group or multiple groups in a comma-separated list.

3. Save and close the file.
4. Verify that your changes did not introduce any syntax errors:

```
$ sudo freeradius -CX
```

   This should return a message that completes similar to:

```
...
Configuration appears to be OK
```

5. Restart the FreeRADIUS server:

```
$ sudo /etc/init.d/freeradius restart
```

## RADIUS server failover and fallback to local configuration

In addition to the primary RADIUS server, you can also configure your Connect EZ 16/32 device to use backup RADIUS servers. Backup RADIUS servers are used for authentication requests when the primary RADIUS server is unavailable.

### *Falling back to local authentication*

With user authentication methods, you can configure your Connect EZ 16/32 device to use multiple types of authentication. For example, you can configure both RADIUS authentication and local

authentication, so that local authentication can be used as a fallback mechanism if the primary and backup RADIUS servers are unavailable. Additionally, users who are configured locally but are not configured on the RADIUS server are still able to log into the device. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned; therefore if you want to ensure that users are authenticated first through the RADIUS server, and only authenticated locally if the RADIUS server is unavailable or if the user is not defined on the RADIUS server, then you should list the RADIUS authentication method prior to the Local users authentication method.

See User authentication methods for more information about authentication methods.

If the RADIUS servers are unavailable and the Connect EZ 16/32 device falls back to local authentication, only users defined locally on the device are able to log in. RADIUS users cannot log in until the RADIUS servers are brought back online.

## Configure your Connect EZ 16/32 device to use a RADIUS server

This section describes how to configure a Connect EZ 16/32 device to use a RADIUS server for authentication and authorization.

#### Required configuration items

- Define the RADIUS server IP address or domain name.
- Define the RADIUS server shared secret.
- Add RADIUS as an authentication method for your Connect EZ 16/32 device.

#### Additional configuration items

- Whether other user authentication methods should be used in addition to the RADIUS server, or if the RADIUS server should be considered the authoritative login method.
- The RADIUS server port. It is configured to 1812 by default.
- Add additional RADIUS servers in case the first RADIUS server is unavailable.
- The server NAS ID. If left blank, the default value is used:
  - If you are access the Connect EZ 16/32 device by using the WebUI, the default value is for NAS ID is **httpd**.
  - If you are access the Connect EZ 16/32 device by using ssh, the default value is **sshd**.
- Time in seconds before the request to the server times out. The default is 3 seconds and the maximum possible value is 60 seconds.
- Enable additional debug messages from the RADIUS client.

### Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

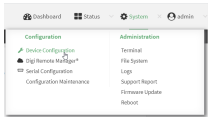
   b. Click the **Device ID**.

c. Click **Settings**.

d. Click to expand **Config**.

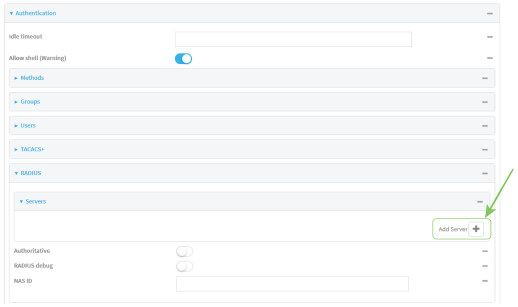
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication** > **RADIUS** > **Servers**.
4. Add RADIUS servers:
   a. For **Add server**, click ✚.

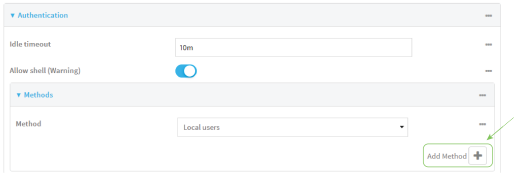


   b. For **Hostname**, type the hostname or IP address of the RADIUS server.
   c. (Optional) Change the default **Port** setting to the appropriate port. Normally this should be left at the default setting of port 1812.
   d. For **Secret**, type the RADIUS server's shared secret. This is configured in the secret parameter of the RADIUS server's client.conf file, for example:

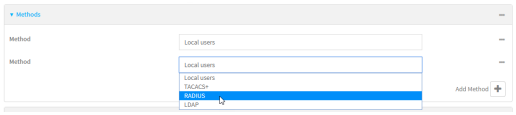
```
secret=testing123
```

   e. For **Timeout**, type or select the amount of time in seconds to wait for the RADIUS server to respond. Allowed value is any integer from **3** to **60**. The default value is **3**.
   f. (Optional) Click ✚ again to add additional RADIUS servers.
5. (Optional) Enable **Authoritative** to prevent other authentication methods from being attempted if RADIUS login fails.
6. (Optional) Click **RADIUS debug** to enable additional debug messages from the RADIUS client.
7. (Optional) For **NAS ID**, type the unique identifier for this network access server (NAS). You can use the fully-qualified domain name of the NAS or any arbitrary string. If not set, the default value is used:
   - If you are accessing the Connect EZ 16/32 device by using the WebUI, the default value is for NAS ID is **httpd**.
   - If you are accessing the Connect EZ 16/32 device by using ssh, the default value is **sshd**.

8. Add RADIUS to the authentication methods:
   a. Click **Authentication** > **Methods**.
   b. For **Add method**, click ✚.




   c. Select **RADIUS** for the new method from the **Method** drop-down.




   Authentication methods are attempted in the order they are listed until an authentication response, either pass or fail, is received. If **Authoritative** is enabled (see above), non-authoritative methods are not attempted. See Rearrange the position of authentication methods for information about rearranging the position of the methods in the list.
9. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Prevent other authentication methods from being used if RADIUS authentication fails. Other authentication methods will only be used if the RADIUS server is unavailable.

```
(config)> auth radius authoritative true
(config)>
```

4. (Optional) Enable debug messages from the RADIUS client:

```
(config)> auth radius debug true
(config)>
```

5. (Optional) Configure the NAS ID. This is a unique identifier for this network access server (NAS). You can use the fully-qualified domain name of the NAS or any arbitrary string. If not set, the default value is used:
   - If you are accessing the Connect EZ 16/32 device by using the WebUI, the default value is for NAS ID is **httpd**.

- If you are accessing the Connect EZ 16/32 device by using ssh, the default value is **sshd**.

```
(config)> auth radius nas_id id
(config)>
```

6. Add a RADIUS server:
   a. Add the server:

```
(config)> add auth radius server end
(config auth radius server 0)>
```

   b. Enter the RADIUS server's IP address or hostname:

```
(config auth radius server 0)> hostname hostname|ip-address
(config auth radius server 0)>
```

   c. (Optional) Change the default port setting to the appropriate port:

```
(config auth radius server 0)> port port
(config auth radius server 0)>
```

   d. Configure the amount of time in seconds to wait for the RADIUS server to respond. Allowed value is any integer from **3** to **60**. The default value is **3**.

```
(config auth radius server 0)> timeout value
(config auth radius server 0)>
```

   e. (Optional) Repeat the above steps to add additional RADIUS servers.
7. Add RADIUS to the authentication methods. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. This example will add RADIUS to the end of the list. See User authentication methods for information about adding methods to the beginning or middle of the list.

```
(config)> add auth method end radius
(config)>
```

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# LDAP

Your Connect EZ 16/32 device supports LDAP (Lightweight Directory Access Protocol), a protocol used for directory information services over an IP network. LDAP can be used with your Connect EZ 16/32 device for centralized authentication and authorization management for users who connect to the device. With LDAP support, the Connect EZ 16/32 device acts as an LDAP client, which sends user

credentials and connection parameters to an LDAP server. The LDAP server then authenticates the LDAP client requests and sends back a response message to the device.

When you are using LDAP authentication, you can have both local users and LDAP users able to log in to the device. To use LDAP authentication, you must set up a LDAP server that is accessible by the Connect EZ 16/32 device prior to configuration. The process of setting up a LDAP server varies by the server environment.

This section contains the following topics:

LDAP user configuration ..... 767
LDAP server failover and fallback to local configuration ..... 768
Configure your Connect EZ 16/32 device to use an LDAP server ..... 768

## LDAP user configuration

When configured to use LDAP support, the Connect EZ 16/32 device uses a remote LDAP server for user authentication (password verification) and authorization (assigning the access level of the user). Additional LDAP servers can be configured as backup servers for user authentication.

This section outlines how to configure a LDAP server to be used for user authentication on your Connect EZ 16/32 device.

There are several different implementations of LDAP, including Microsoft Active Directory. This section uses OpenLDAP as an example configuration. Other implementations of LDAP will have different configuration methods.

### *Example OpenLDAP configuration*

With OpenLDAP, users can be configured in a text file using the LDAP Data Interchange Format (LDIF). In this case, we will be using a file called **add_user.ldif**.

1. Create the **add_user.ldif** file in a text editor. For example:

```
$ gedit ./add_user.ldif
```

2. Add users to the file using the following format:

```
dn: uid=john,dc=example,dc=com
objectClass: inetOrgPerson
cn: John Smith
sn: Smith
uid: john
userPassword: password
ou: admin serial
```

   - The value of **uid** and **userPassword** must correspond to the username and password used to log into the Connect EZ 16/32 device.
   - The **ou** attribute is optional. If used, the value must correspond to authentication groups configured on your Connect EZ 16/32. Alternatively, if the user is also configured as a local user on the Connect EZ 16/32 device and the LDAP server authenticates the user but does not return any groups, the local configuration determines the list of groups. See Authentication groups for more information about authentication groups.

   Other attributes may be required by the user's objectClass. Any objectClass may be used as long it allows the **uid**, **userPassword**, and **ou** attributes.
3. Save and close the file.
4. Add the user to the OpenLDAP server:

```
$ ldapadd -x -H 'ldap:///' -D 'cn=admin,dc=example,dc=com' -W -f add_
user.ldif
adding new entry "uid=john,dc=example,dc=com"
```

5. Verify that the user has been added by performing an LDAP search:

```
$ ldapsearch -x -LLL -H 'ldap:///' -b 'dc=example,dc=com'
uid=john
dn: uid=john,dc=example,dc=com
```

```
objectClass: inetOrgPerson
cn: John Smith
sn: Smith
uid: john
ou: admin serial
```

## LDAP server failover and fallback to local configuration

In addition to the primary LDAP server, you can also configure your Connect EZ 16/32 device to use backup LDAP servers. Backup LDAP servers are used for authentication requests when the primary LDAP server is unavailable.

### *Falling back to local authentication*

With user authentication methods, you can configure your Connect EZ 16/32 device to use multiple types of authentication. For example, you can configure both LDAP authentication and local authentication, so that local authentication can be used as a fallback mechanism if the primary and backup LDAP servers are unavailable. Additionally, users who are configured locally but are not configured on the LDAP server are still able to log into the device. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned; therefore if you want to ensure that users are authenticated first through the LDAP server, and only authenticated locally if the LDAP server is unavailable or if the user is not defined on the LDAP server, then you should list the LDAP authentication method prior to the Local users authentication method.

See User authentication methods for more information about authentication methods.

If the LDAP servers are unavailable and the Connect EZ 16/32 device falls back to local authentication, only users defined locally on the device are able to log in. LDAP users cannot log in until the LDAP servers are brought back online.

## Configure your Connect EZ 16/32 device to use an LDAP server

This section describes how to configure a Connect EZ 16/32 device to use an LDAP server for authentication and authorization.

#### Required configuration items

- Define the LDAP server IP address or domain name.
- Add LDAP as an authentication method for your Connect EZ 16/32 device.

#### Additional configuration items

- Whether other user authentication methods should be used in addition to the LDAP server, or if the LDAP server should be considered the authoritative login method.
- The LDAP server port. It is configured to 389 by default.
- Whether to use Transport Layer Security (TLS) when communicating with the LDAP server.
- The distinguished name (DN) and password used to communicate with the server.
- The distinguished name used to search to user base.
- The group attribute.
- The number of seconds to wait to receive a message from the server.
- Add additional LDAP servers in case the first LDAP server is unavailable.

## Web

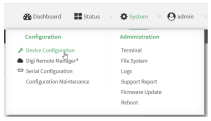
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

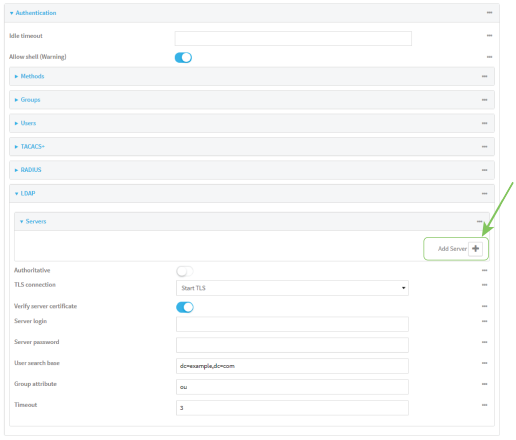
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

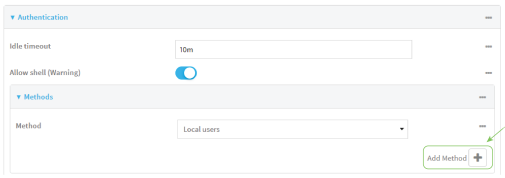
   

   The **Configuration** window is displayed.
3. Click **Authentication** > **LDAP** > **Servers**.
4. Add LDAP servers:
   a. For **Add server**, click ✚.

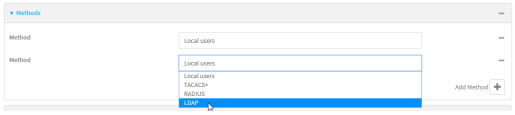
   

   b. For **Hostname**, type the hostname or IP address of the LDAP server.
   c. (Optional) Change the default **Port** setting to the appropriate port. Normally this should be left at the default setting of port 389 for non-TLS and 636 for TLS.
   d. (Optional) Click ✚ again to add additional LDAP servers.
5. (Optional) Enable **Authoritative** to prevent other authentication methods from being attempted if LDAP login fails.

6. For **TLS connection**, select the type of TLS connection used by the server:
   - **Disable TLS**: Uses a non-secure TCP connection on the LDAP standard port, 389.
   - **Enable TLS**: Uses an SSL/TLS encrypted connection on port 636.
   - **Start TLS**: Makes a non-secure TCP connection to the LDAP server on port 389, then sends a request to upgrade the connection to a secure TLS connection. This is the preferred method for LDAP.
7. If **Enable TLS** or **Start TLS** are selected for **TLS connection**:
   - Leave **Verify server certificate** at the default setting of enabled to verify the server certificate with a known Certificate Authority.
   - Disable **Verify server certificate** if the server is using a self-signed certificate.
8. (Optional) For **Server login**, type a distinguished name (DN) that is used to bind to the LDAP server and search for users, for example **cn=user,dc=example,dc=com**. Leave this field blank if the server allows anonymous connections.
9. (Optional) For **Server password**, type the password used to log into the LDAP server. Leave this field blank if the server allows anonymous connections.
10. For **User search base**, type the distinguished name (DN) on the server to search for users. This can be the root of the directory tree (for example, **dc=example,dc=com**) or a sub-tree (for example. **ou=People,dc=example,dc=com**).
11. For **Login attribute**, enter the user attribute containing the login of the authenticated user. For example, in the LDAP user configuration, the login attribute is **uid**. If this attribute is not set, the user will be denied access.
12. (Optional) For **Group attribute**, type the name of the user attribute that contains the list of Connect EZ 16/32 authentication groups that the authenticated user has access to. See LDAP user configuration for further information about the group attribute.
13. For **Timeout**, type or select the amount of time in seconds to wait for the LDAP server to respond. Allowed value is between **3** and **60** seconds.
14. Add LDAP to the authentication methods:
    a. Click **Authentication** > **Methods**.
    b. For **Add method**, click ✚.




    c. Select **LDAP** for the new method from the **Method** drop-down.




Authentication methods are attempted in the order they are listed until an authentication response, either pass or fail, is received. If **Authoritative** is enabled (see above), non-authoritative methods are not attempted. See Rearrange the position of authentication methods for information about rearranging the position of the methods in the list.

15. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Prevent other authentication methods from being used if LDAP authentication fails. Other authentication methods will only be used if the LDAP server is unavailable.

```
(config)> auth ldap authoritative true
(config)>
```

4. Set the type of TLS connection used by the LDAP server:

```
(config)> auth ldap tls value
(config)>
```

   where *value* is one of:

   - **off**: Uses a non-secure TCP connection on the LDAP standard port, 389.
   - **on**: Uses an SSL/TLS encrypted connection on port 636.
   - **start_tls**: Makes a non-secure TCP connection to the LDAP server on port 389, then sends a request to upgrade the connection to a secure TLS connection. This is the preferred method for LDAP.

   The default is **off**.
5. If **tls** is set to **on** or **start_tls**, configure whether to verify the server certificate:

```
(config)> auth ldap verify_server_cert value
(config)>
```

   where *value* is either:

   - **true**: Verifies the server certificate with a known Certificate Authority.
   - **false**: Does not verify the certificate. Use this option if the server is using a self-signed certificate.

   The default is **true**.
6. Set the distinguished name (DN) that is used to bind to the LDAP server and search for users. Leave this option unset if the server allows anonymous connections.

```
(config)> auth ldap bind_dn dn_value
(config)>
```

   For example:

```
(config)> auth ldap bind_dn cn=user,dc=example,dc=com
(config)>
```

7. Set the password used to log into the LDAP server. Leave this option unset if the server allows anonymous connections.

```
(config)> auth ldap bind_password password
(config)>
```

8. Set the distinguished name (DN) on the server to search for users. This can be the root of the directory tree (for example, **dc=example,dc=com**) or a sub-tree (for example. **ou=People,dc=example,dc=com**).

```
(config)> auth ldap base_dn value
(config)>
```

9. Set the login attribute:

```
(config)> auth ldap login_attribute value
(config)>
```

where value is the user attribute containing the login of the authenticated user. For example, in the LDAP user configuration, the login attribute is **uid**. . If this attribute is not set, the user will be denied access.

10. (Optional) Set the name of the user attribute that contains the list of Connect EZ 16/32 authentication groups that the authenticated user has access to. See LDAP user configuration for further information about the group attribute.

```
(config)> auth ldap group_attribute value
(config)>
```

For example:

```
(config)> auth ldap group_attribute ou
(config)>
```

11. Configure the amount of time in seconds to wait for the LDAP server to respond.

```
(config)> auth ldap timeout value
(config)>
```

where *value* is any integer from **3** to **60**. The default value is **3**.

12. Add an LDAP server:
    a. Add the server:

```
(config)> add auth ldap server end
(config auth ldap server 0)>
```

    b. Enter the LDAP server's IP address or hostname:

```
(config auth ldap server 0)> hostname hostname|ip-address
(config auth ldap server 0)>
```

c. (Optional) Change the default port setting to the appropriate port:

```
(config auth ldap server 0)> port port
(config auth ldap server 0)>
```

d. (Optional) Repeat the above steps to add additional LDAP servers.

13. Add LDAP to the authentication methods. Authentication methods are attempted in the order they are listed until the first successful authentication result is returned. This example will add LDAP to the end of the list. See User authentication methods for information about adding methods to the beginning or middle of the list.

```
(config)> add auth method end ldap
(config)>
```

14. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

15. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Configure serial authentication

This section describes how to configure authentication for serial access.

## Web

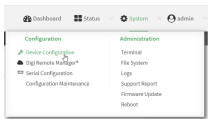
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Authentication** > **Serial**.

4. (Optional) For **TLS identity certificate**, paste a TLS certificate and private key in PEM format. If empty, the certificate for the web administration service is used. See Configure the web administration service for more information.
5. For **Peer authentication**, select the method used to verify the certificate of a remote peer.
6. **Include standard CAs** is enabled by default. This allows peers with certificates that have been signed by standard Certificate Authorities (CAs) to authenticate.
7. Click to expand **Custom certificate authorities** to add the public certificates of custom CAs.
   a. For **Add CA certificate**, type the name of a custom CA and click ✚.
   b. Paste the public certificate for the custom CA in PEM format.
   c. Repeat for additional custom CA certificates.
8. Click to expand **Peer certificates** to add the public certificates of trusted peers.
   a. For **Add Peer certificate**, type the name of a trusted peer and click ✚.
   b. Paste the public certificate for the trusted peer in PEM format.
   c. Repeat for additional trusted peer certificates.
9. Enable **TelNet Login**, which requires a user to login via the TelNet connection before accessing a port.
10. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) Paste a TLS certificate and private key in PEM format:

```
(config)> auth serial identiy "cert-and-private-key"
(config)>
```

4. Set the method used to verify the certificate of a remote peer:

```
(config)> auth serial verify value
(config)>
```

   where *value* is either:
   - **ca**: Uses certificate authorities (CAs) to verify.
   - **peer**: Uses the remote peer's public certificate to verify.
5. By default, peers with certificates that have been signed by standard Certificate Authorities (CAs) are allowed to authenticate. To disable:

```
(config)> auth serial ca_standard false
(config)>
```

6. Add the public certificate for a custom certificate authority:

```
(config)> add auth serial ca_certs CA-cert-name "cert-and-private-key"
(config)>
```

where:

- *CA-cert-name* is the name of the certificate for the custom certificate authority.
- *cert-and-private-key* is the certificate and private key for the custom certificate authority.

Repeat for additional custom certificate authorities.

7. Require a user to login via the TelNet connection before accessing a port.

```
(config)> auth serial telnet_login?
(config)>
```

1. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

2. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Disable shell access

To prohibit access to the shell prompt for all authentication groups, disable the **Allow shell** parameter.. This does not prevent access to the Admin CLI.

**Note** If shell access is disabled, re-enabling it will erase the device's configuration and perform a factory reset.

## Web

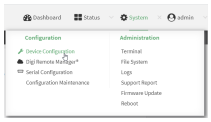
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

Remote Manager:

a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
b. Click the **Device ID**.
c. Click **Settings**.
d. Click to expand **Config**.

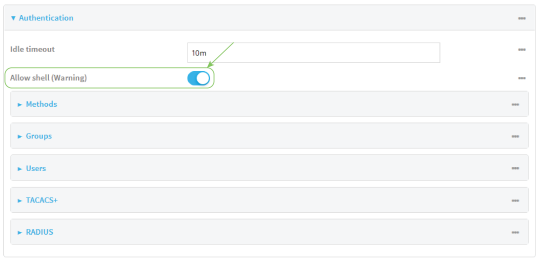
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Authentication**.
4. Click to disable **Allow shell**.




**Note** If shell access is disabled, re-enabling it will erase the device's configuration and perform a factory reset.

5. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set the **allow_shell** parameter to **false**:

```
(config)> auth allow_shell false
```

**Note** If shell access is disabled, re-enabling it will erase the device's configuration and perform a factory reset.

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Set the idle timeout for Connect EZ 16/32 users

To configure the amount of time that the user's active session can be inactive before it is automatically disconnected, set the **Idle timeout** parameter.

By default, the Idle timeout is set to 10 minutes.

## Web

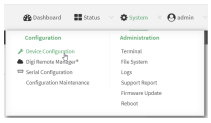
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

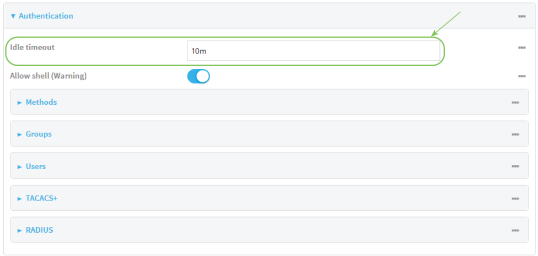
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Authentication**.
4. For **Idle timeout**, enter the amount of time that the active session can be idle before the user is automatically logged out.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

   For example, to set **Idle timeout** to ten minutes, enter **10m** or **600s**.

   
   
5. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> auth idle_timeout value
```

   where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

   For example, to set **idle_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)> auth idle_timeout  600s
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Example user configuration

## Example 1: Administrator user with local authentication

Goal: To create a user with administrator rights who is authenticated locally on the device.

### Web

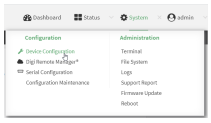
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

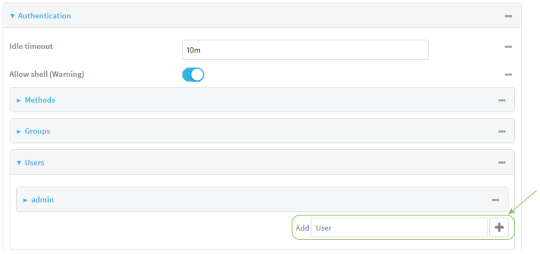
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

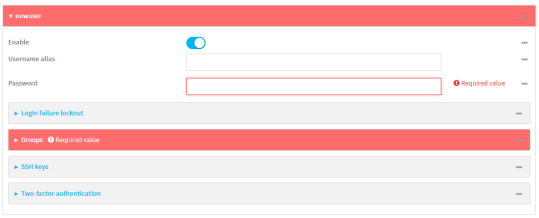
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Authentication** > **Users**.
4. In **Add User:** enter a name for the user and click ✚.

   The user configuration window is displayed.




5. Enter a **Password** for the user.
6. Assign the user to the **admin** group:
   a. Click **Groups**.
   b. For **Add Group**, click ✚.
   c. For **Group**, select the **admin** group.
   d. Verify that the **admin** group has full administrator rights:
      i. Click **Authentication** > **Groups**.
      ii. Click **admin**.
      iii. Verify that the admin group has **Admin access** enabled. If not, click **Admin access** to enable.
      iv. Verify that **Access level** is set to **Full access**. If not, select **Full access**.
   e. Verify that **Local users** is one of the configured authentication methods:
      i. Click **Authentication** > **Methods**.
      ii. Verify that **Local users** is one of the methods listed in the list. If not:
         i. For **Add Method**, click ✚.
         ii. For **Method**, select **Local users**.
7. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Verify that the **admin** group has full administrator rights:

```
(config)> show auth group admin acl
admin
       enable true
       level full
...
(config)>
```

If **admin** > **enable** is set to false:

```
(config)> auth group admin acl admin enable true
(config)>
```

If **admin** > **level** is set to read-only:

```
(config)> auth group admin acl admin level full
(config)>
```

4. Verify that **local** is one of the configured authentication methods:

```
(config)> show auth method
0 local
(config)>
```

If **local** is not listed:

```
(config)> add auth method end local
(config)>
```

5. Create the user. In this example, the user is being created with the username **adminuser**:

```
(config)> add auth user adminuser
(config auth user adminuser)>
```

6. Assign a password to the user:

```
(config auth user adminuser)> password pwd
(config auth user adminuser)>
```

7. Assign the user to the **admin** group:

```
(config auth user adminuser)> add group end admin
(config auth user adminuser)>
```

8. Save the configuration and apply the change.

```
(config auth user adminuser)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Example 2: RADIUS, TACACS+, and local authentication for one user

Goal: To create a user with administrator rights who is authenticated by using all three authentication methods.

In this example, when the user attempts to log in to the Connect EZ 16/32 device, user authentication will occur in the following order:

1. The user is authenticated by the RADIUS server. If the RADIUS server is unavailable,
2. The user is authenticated by the TACACS+ server. If both the RADIUS and TACACS+ servers are unavailable,
3. The user is authenticated by the Connect EZ 16/32 device using local authentication.

This example uses a FreeRadius 3.0 server running on ubuntu, and a TACACS+ server running on ubuntu. Server configuration may vary depending on the platforms or type of servers used in your environment.

### Web

1. Configure a user on the RADIUS server:
   a. On the ubuntu machine hosting the FreeRadius server, open the **/etc/freeradius/3.0/users** file:

   ```
   $ sudo gedit /etc/freeradius/3.0/users
   ```

   b. Add a RADIUS user to the **users** file:

   ```
   admin1 Cleartext-Password := "password1"
          Unix-FTP-Group-Names := "admin"
   ```

   In this example:
   - The user's username is **admin1**.
   - The user's password is **password1**.
   - The authentication group on the Connect EZ 16/32 device, **admin**, is identified in the **Unix-FTP-Group-Names** parameter.

   c. Save and close the **users** file.
2. Configure a user on the TACACS+ server:
   a. On the ubuntu machine hosting the TACACS+ server, open the **/etc/tacacs+/tac_plus.conf** file:

   ```
   $ sudo gedit /etc/tacacs+/tac_plus.conf
   ```

   b. Add a TACACS+ user to the **tac_plus.conf** file:

   ```
   user = admin1 {
          name ="Admin1 for TX64"
          pap = cleartext password1
          service = system {
                  groupname = admin
                  }
          }
   }
   ```

   In this example:
   - The user's username is **admin1**.
   - The user's password is **password1**.
   - The authentication group on the Connect EZ 16/32 device, **admin**, is identified in the **groupname** parameter.

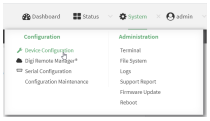
   c. Save and close the **tac_plus.conf** file.
3. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
4. Access the device configuration:

   Remote Manager:

a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
b. Click the **Device ID**.
c. Click **Settings**.
d. Click to expand **Config**.

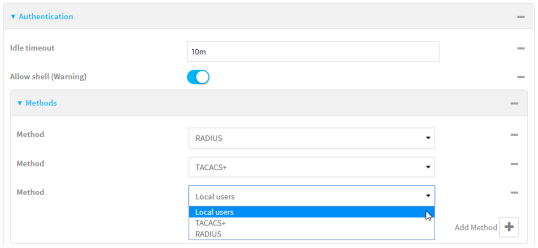
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

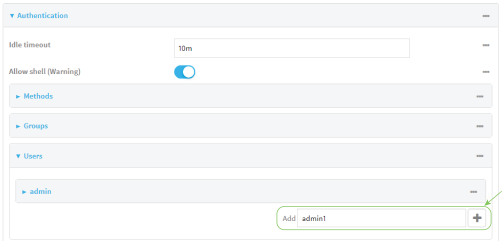


The **Configuration** window is displayed.

5. Configure the authentication methods:
   a. Click **Authentication** > **Methods**.
   b. For **Method**, select **RADIUS**.
   c. For **Add Method**, click ✚ to add a new method.
   d. For the new method, select **TACACS+**.
   e. Click ✚ to add another new method.
   f. For the new method, select **Local users**.




6. Create the local user:
   a. Click **Authentication** > **Users**.
   b. In **Add User:**, type **admin1** and click ✚.



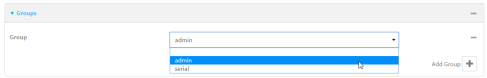

   c. For **password**, type **password1**.

d. Assign the user to the **admin** group:

i. Click **Groups**.

ii. For **Add Group**, click ✚.

iii. For **Group**, select the **admin** group.



a. Verify that the **admin** group has full administrator rights:

i. Click **Authentication** > **Groups**.

ii. Click **admin**.

iii. Verify that the admin group has **Admin access** enabled. If not, click **Admin access** to enable.

iv. Verify that **Access level** is set to **Full access**. If not, select **Full access**.

7. Click **Apply** to save the configuration and apply the change.

## Command line

1. Configure a user on the RADIUS server:

a. On the ubuntu machine hosting the FreeRadius server, open the **/etc/freeradius/3.0/users** file:

```
$ sudo gedit /etc/freeradius/3.0/users
```

b. Add a RADIUS user to the **users** file:

```
admin1 Cleartext-Password := "password1"
       Unix-FTP-Group-Names := "admin"
```

In this example:

- The user's username is **admin1**.
- The user's password is **password1**.
- The authentication group on the Connect EZ 16/32 device, **admin**, is identified in the **Unix-FTP-Group-Names** parameter.

c. Save and close the **users** file.

2. Configure a user on the TACACS+ server:

a. On the ubuntu machine hosting the TACACS+ server, open the **/etc/tacacs+/tac_plus.conf** file:

```
$ sudo gedit /etc/tacacs+/tac_plus.conf
```

b. Add a TACACS+ user to the **tac_plus.conf** file:

```
user = admin1 {
       name ="Admin1 for TX64"
       pap = cleartext password1
       service = system {
               groupname = admin
               }
       }
}
```

In this example:

- The user's username is **admin1**.
- The user's password is **password1**.
- The authentication group on the Connect EZ 16/32 device, **admin**, is identified in the **groupname** parameter.

c. Save and close the **tac_plus.conf** file.

3. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

4. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

5. Configure the authentication methods:

   a. Determine the current authentication method configuration:

```
(config)> show auth method
0 local
(config)>
```

   This output indicates that on this example system, only local authentication is configured.

   b. Add RADIUS authentication to the beginning of the list:

```
(config)> add auth method 0 radius
(config)>
```

   c. Add TACACS+ authentication second place in the list:

```
(config)> add auth method 1 tacacs+(config)>
```

   d. Verify that authentication will occur in the correct order:

```
(config)> show auth method
0 radius
1 tacacs+
```

```
2 local
(config)>
```

6. Verify that the **admin** group has full administrator rights:

```
(config)> show auth group admin acl
admin
       enable true
       level full
...
(config)>
```

If **admin** > **enable** is set to false:

```
(config)> auth group admin acl admin enable true
(config)>
```

If **admin** > **level** is set to read-only:

```
(config)> auth group admin acl admin level full
(config)>
```

7. Configure the local user:
   a. Create a local user with the username **admin1**:

```
(config)> add auth user admin1
(config auth user admin1)>
```

   b. Assign a password to the user:

```
(config auth user adminuser)> password password1
(config auth user adminuser)>
```

   c. Assign the user to the **admin** group:

```
(config auth user adminuser)> add group end admin
(config auth user adminuser)>
```

8. Save the configuration and apply the change.

```
(config auth user adminuser)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Firewall

This chapter contains the following topics:

Firewall configuration ..... 789
Port forwarding rules ..... 794
Packet filtering ..... 801
Configure custom firewall rules ..... 808
Configure Quality of Service options ..... 810
Web filtering ..... 819

# Firewall configuration

Firewall configuration includes the following configuration options:

- **Zones**: A zone is a firewall access group to which network interfaces can be added. You then use zones to configure packet filtering and access control lists for interfaces that are included in the zone. Preconfigured zones include:
  - **Any**: Matches any network interface, even if they are not assigned to this zone.
  - **Loopback**: Zone for interfaces that are used for communication between processes running on the device.
  - **Internal**: Used for interfaces connected to trusted networks. By default, the firewall will allow most access from this zone.
  - **External**: Used for interfaces to connect to untrusted zones, such as the internet. This zone has Network Address Translation (NAT) enabled by default. By default, the firewall will block most access from this zone.
  - **Edge**: Used for interfaces connected to trusted networks, where the device is a client on the edge of the network rather than a router or gateway.
  - **Setup**: Used for interfaces involved in the initial setup of the device. By default, the firewall will only allow this zone to access administration services.
  - **IPsec**: The default zone for IPsec tunnels.
  - **Dynamic routes**: Used for routes learned using routing services.
- **Port forwarding**: A list of rules that allow network connections to the Connect EZ 16/32 to be forwarded to other servers by translating the destination address.
- **Packet filtering**: A list of packet filtering rules that determine whether to accept or reject network connections that are forwarded through the Connect EZ 16/32.
- **Custom rules**: A script that is run to install advanced firewall rules beyond the scope/capabilities of the standard device configuration.
- **Quality Of Service**: Quality of Service (QOS) options for bandwidth allocation and policy-based traffic shaping and prioritizing.

## Create a custom firewall zone

In addition to the preconfigured zones, you can create your custom zones that can be used to configure packet filtering and access control lists for network interfaces.

To create a zone:

### Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

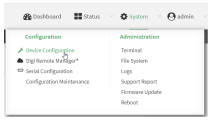
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

   b. Click the **Device ID**.

c. Click **Settings**.
d. Click to expand **Config**.

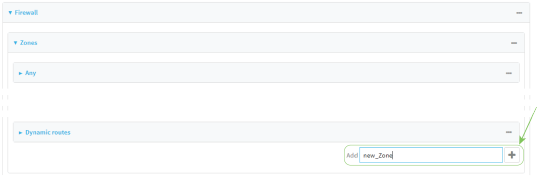
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

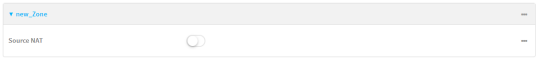


The **Configuration** window is displayed.

3. Click **Firewall** > **Zones**.
4. In **Add Zone**, enter a name for the zone and click ✚.



The firewall configuration window is displayed.



5. (Optional) If traffic on this zone will be forwarded from a private network to the internet, enable Network Address Translation (NAT).
6. Click **Apply** to save the configuration and apply the change.

See Configure the firewall zone for a network interface for information about how to configure network interfaces to use a zone.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add the new zone. For example, to add a zone named **my_zone**:

```
(config)> add firewall zone my_zone
(config firewall zone my_zone)>
```

4. (Optional) Enable Network Address Translation (NAT):

```
(config firewall zone my_zone)> src_nat true
(config firewall zone my_zone)>
```

5. Save the configuration and apply the change.

```
(config firewall zone my_zone)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

See Configure the firewall zone for a network interface for information about how to configure network interfaces to use a zone.

## Configure the firewall zone for a network interface

Firewall zones allow you to group network interfaces for the purpose of packet filtering and access control. There are several preconfigured firewall zones, and you can create custom zones as well. The firewall zone that a network interfaces uses is selected during interface configuration.

This example procedure uses an existing network interface named **ETH2** and changes the firewall zone from the default zone, **Internal**, to **External**.

### Web

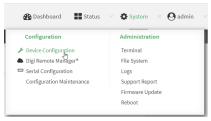
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

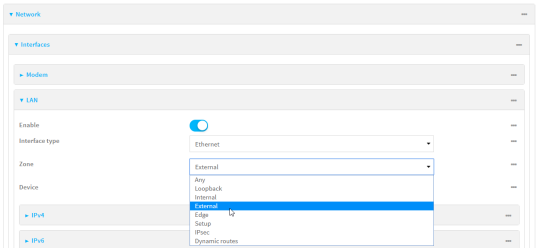
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Interfaces** > **ETH2**.

4. For **Zone**, select **External**.




5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> network interface eth2 zone my_zone
(config)>
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Delete a custom firewall zone

You cannot delete preconfigured firewall zones. To delete a custom firewall zone:

### Web

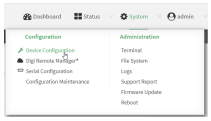
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
b. Click the **Device ID**.
c. Click **Settings**.
d. Click to expand **Config**.

Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Firewall** > **Zones**.
4. Click the menu icon (**...**) next to the appropriate custom firewall zone and select **Delete**.

5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Use the **del** command to delete a custom firewall rule. For example:

```
(config)> del firewall zone my_zone
```

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Port forwarding rules

Most computers are protected by a firewall that prevents users on a public network from accessing servers on the private network. To allow a computer on the Internet to connect to a specific server on a private network, set up one or more port forwarding rules. Port forwarding rules provide mapping instructions that direct incoming traffic to the proper device on a LAN.

## Configure port forwarding

### *Required configuration items*

- The network interface for the rule.

  Network connections will only be forwarded if their destination address matches the IP address of the selected network interface.
- The public-facing port number that network connections must use for their traffic to be forwarded.
- The IP address of the server to which traffic should be forwarded.
- The port or range of ports to which traffic should be forwarded.

### *Additional configuration items*

- A label for the port forwarding rule.
- The IP version (either IPv4 or IPv6) that incoming network connections must match.
- The protocols that incoming network connections must match.

- A white list of devices, based on either IP address or firewall zone, that are authorized to leverage this forwarding rule.

To configure a port forwarding rule:

## Web

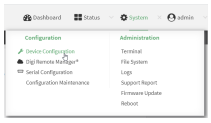
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

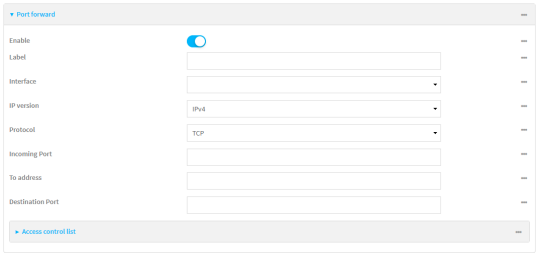
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Firewall** > **Port forwarding**.
4. For **Add port forward**, click ✚.

   The port forwarding rule configuration window is displayed.

   Port forwarding rules are enabled by default. To disable, toggle off **Enable**.
5. (Optional) Type a **Label** that will be used to identify the rule.

6. For **Interface**, select the network interface for the rule.

   Network connections will only be forwarded if their destination address matches the IP address of the selected network interface.
7. For **IP version**, select either **IPv4** or **IPv6**.

   Network connections will only be forwarded if they match the selected IP version.
8. For **Protocol**, select the type of internet protocol.

   Network connections will only be forwarded if they match the selected protocol.
9. For **Incoming port(s)**, type the public-facing port number that network connections must use for their traffic to be forwarded.
10. For **To Address**, type the IP address of the server to which traffic should be forwarded.
11. For **Destination Port(s)**, type the port number, comma-separated list of port numbers, or range of port numbers on the server to which traffic should be forwarded. For example, to forward traffic to ports one, three, and five through ten, enter: **1, 3, 5-10**.
12. (Optional) Click **Access control list** to create a white list of devices that are authorized to leverage this forwarding rule, based on either the IP address or firewall zone:
    - To white list IP addresses:
      a. Click **Addresses**.
      b. For **Add Address**, enter an IP address and click ✚.
      c. Repeat for each additional IP address that should be white listed.
    - To specify firewall zones for white listing:
      a. Click **Zones**.
      b. For **Add zone**, click ✚.
      c. For **Zone**, select the appropriate zone.
      d. Repeat for each additional zone.
13. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> add firewall dnat end
(config firewall dnat 0)>
```

Port forwarding rules are enabled by default. To disable the rule:

```
(config firewall dnat 0)> enable false
(config firewall dnat 0)>
```

4. Set the network interface for the rule.

```
(config firewall dnat 0)> interface
(config firewall dnat 0)>
```

Network connections will only be forwarded if their destination address matches the IP address of this network interface.

   a. Use the **?** to determine available interfaces:
   b. Set the interface. For example:

```
(config firewall dnat 0)> interface eth1
(config firewall dnat 0)>
```

5. Set the IP version. Allowed values are **ipv4** and **ipv6**. The default is **ipv4**.

```
(config firewall dnat 0)> ip_version ipv6
(config firewall dnat 0)>
```

6. Set the public-facing port number that network connections must use for their traffic to be forwarded.

```
(config firewall dnat 0)> port port
(config firewall dnat 0)>
```

7. Set the type of internet protocol .

```
(config firewall dnat 0)> protocol value
(config firewall dnat 0)>
```

Network connections will only be forwarded if they match the selected protocol. Allowed values are **custom**, **tcp**, **tcpudp**, or **upd**. The default is **tcp**.

8. Set the IP address of the server to which traffic should be forwarded:
   - For IPv4 addresses:

```
(config firewall dnat 0)> to_address ip-address
(config firewall dnat 0)>
```

   - For IPv6 addresses:

```
(config firewall dnat 0)> to_address6 ip-address
(config firewall dnat 0)>
```

9. Set the public-facing port number(s) that network connections must use for their traffic to be forwarded.

```
(config firewall dnat 0)> to_port value
(config firewall dnat 0)>
```

where *value* is the port number, comma-separated list of port numbers, or range of port numbers on the server to which traffic should be forwarded. For example, to forward traffic to ports one, three, and five through ten, enter **1, 3, 5-10**.

10. (Optional) To create a white list of devices that are authorized to leverage this forwarding rule, based on either the IP address or firewall zone, change to the acl node:

```
(config firewall dnat 0)> acl
(config firewall dnat 0 acl)>
```

- To white list an IP address:
  - For IPv4 addresses:

    ```
    (config firewall dnat 0 acl> add address end ip-address
    (config firewall dnat 0 acl)>
    ```

  - For IPv6 addresses:

    ```
    (config firewall dnat 0 acl> add address6 end ip-address
    (config firewall dnat 0 acl)>
    ```

  Repeat for each appropriate IP address.
- To specify the firewall zone for white listing:

  ```
  (config firewall dnat 0 acl)> add zone end zone
  ```

  Repeat for each appropriate zone.

  To view a list of available zones:

  ```
  (config firewall dnat 0 acl)> .. .. .. zone ?

  Zones: A list of groups of network interfaces that can be referred
  to by packet filtering rules
  and access control lists.

   Additional Configuration
   ------------------------------------------------------------------------
  -----------
    any
    dynamic_routes
    edge
    external
    internal
    ipsec
    loopback
    setup

  (config firewall dnat 0 acl)>
  ```

11. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

12. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Delete a port forwarding rule

To delete a port forwarding rule:

### Web

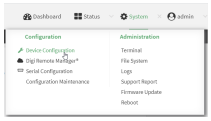
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Firewall** > **Port forwarding**.
4. Click the menu icon (**...**) next to the appropriate port forwarding rule and select **Delete**.

5. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Determine the index number of the port forwarding rule you want to delete:

```
(config)> show firewall dnat
0
        acl
                no address
                no zone
        enable true
        interface
        ip_version ipv4
        label IPv4 port forwarding rule
        port 10000
        protocol tcp
        to_address6 10.10.10.10
        to_port 10001

1
        acl
                no address6
                no zone
        enable false
        interface
        ip_version ipv6
        label IPv6 port forwarding rule
        port 10002
        protocol tcp
        to_address6 c097:4533:bd63:bb12:9a6f:5569:4b53:c29a
        to_port 10003
(config)>
```

4. To delete the rule, use the index number with the **del** command. For example:

```
(config)> del firewall dnat 1
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Packet filtering

By default, one preconfigured packet filtering rule, **Allow all outgoing traffic**, is enabled and monitors traffic going to and from the Connect EZ 16/32 device. The predefined settings are intended to block unauthorized inbound traffic while providing an unrestricted flow of outgoing data. You can modify the default packet filtering rule and create additional rules to define how the device accepts or rejects traffic that is forwarded through the device.

## Configure packet filtering

### *Required configuration items*

- The action that the packet filtering rule will perform, either **Accept**, **Reject**, or **Drop**.
- The source firewall zone: Packets originating from interfaces on this zone will be monitored by this rule.
- The destination firewall zone: Packets destined for interfaces on this zone will be accepted, rejected, or dropped by this rule.

### *Additional configuration requirements*

- A label for the rule.
- The IP version to be matched, either **IPv4**, **IPv6**, or **Any**.
- The protocol to be matched, one of:
  - **TCP**
  - **UDP**
  - **ICMP**
  - **ICMP6**
  - **Any**

To configure a packet filtering rule:

### Web

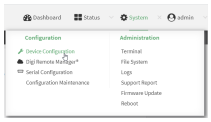
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

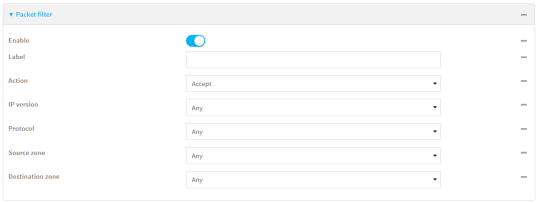


The **Configuration** window is displayed.

3. Click **Firewall** > **Packet filtering**.
   - To create a new packet filtering rule, for **Add packet filter**, click ✚.

   - To edit the default packet filtering rule or another existing packet filtering rule, click to expand the rule.

The packet filtering rule configuration window is displayed.



Packet filters are enabled by default. To disable, toggle off **Enable**.

4. (Optional) Type a **Label** that will be used to identify the rule.
5. For **Action**, select one of:
   - **Accept**: Allows matching network connections.
   - **Reject**: Blocks matching network connections, and sends an ICMP error if appropriate.
   - **Drop**: Blocks matching network connections, and does not send a reply.
6. Select the **IP version**.
7. Select the **Protocol**.
8. For **Source zone**, select the firewall zone that will be monitored by this rule for incoming connections from network interfaces that are a member of this zone.

   See Firewall configuration for more information about firewall zones.
9. For **Destination zone**, select the firewall zone. Packets destined for network interfaces that are members of this zone will either be accepted, rejected or dropped by this rule.

   See Firewall configuration for more information about firewall zones.
10. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

   To edit the default packet filtering rule or another existing packet filtering rule:

   a. Determine the index number of the appropriate packet filtering rule:

```
(config)> show firewall filter
0
    action accept
    dst_zone any
    enable true
    ip_version any
    label Allow all outgoing traffic
    protocol any
    src_zone internal
1
    action drop
    dst_zone internal
    enable true
    ip_version any
    label myfilter
    protocol any
    src_zone external
(config)>
```

   b. Select the appropriate rule by using its index number:

```
(config)> firewall filter 1
(config firewall filter 1)>
```

   To create a new packet filtering rule:

```
(config)> add firewall filter end
(config firewall filter 1)>
```

   Packet filtering rules are enabled by default. To disable the rule:

```
(config firewall filter 1)> enable false
(config firewall filter 1)>
```

3. (Optional) Set the label for the rule.

```
(config firewall filter 1)> label "My filter rule"
(config firewall filter 1)>
```

4. Set the action to be performed by the filter rule.

```
(config firewall filter 1)> action value
(config firewall filter 1)>
```

where *value* is one of:

- **accept**: Allows matching network connections.
- **reject**: Blocks matching network connections, and sends an ICMP error if appropriate.
- **drop**: Blocks matching network connections, and does not send a reply.

5. Set the firewall zone that will be monitored by this rule for incoming connections from network interfaces that are a member of this zone:

See Firewall configuration for more information about firewall zones.

```
(config firewall filter 1)> src_zone my_zone
(config firewall filter 1)>
```

6. Set the destination firewall zone. Packets destined for network interfaces that are members of this zone will either be accepted, rejected or dropped by this rule.

See Firewall configuration for more information about firewall zones.

```
(config firewall filter 1)> dst_zone my_zone
(config firewall filter 1)>
```

7. Set the IP version.

```
(config firewall filter 1)> ip_version value
(config firewall filter 1)>
```

where *value* is one of:

- **any**
- **ipv4**
- **ipv6**
- The default is **any**.

8. Set the protocol.

```
(config firewall filter 1)> protocol value
(config firewall filter 1)>
```

where value is one of:

- **any**
- **icmp**
- **icmpv6**
- **tcp**
- **upd**

The default is **any**.

9. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Enable or disable a packet filtering rule

To enable or disable a packet filtering rule:

### Web

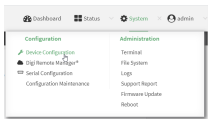
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

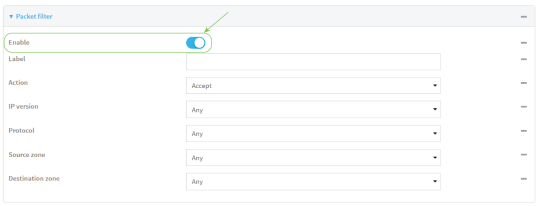
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Firewall** > **Packet filtering**.
4. Click the appropriate packet filtering rule.
5. Click **Enable** to toggle the rule between enabled and disabled.




6. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Determine the index number of the appropriate port forwarding rule:

```
(config)> show firewall filter
0
    action accept
    dst_zone any
    enable true
    ip_version any
    label Allow all outgoing traffic
    protocol any
    src_zone internal
1
    action drop
    dst_zone internal
    enable true
    ip_version any
    label My packet filter
    protocol any
    src_zone external
(config)>
```

4. To enable a packet filtering rule, use the index number with the **enable true** command. For example:

```
(config)> firewall filter 1 enable true
```

5. To disable a packet filtering rule, use the index number with the **enable false** command. For example:

```
(config)> firewall filter 1 enable false
```

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Delete a packet filtering rule

To delete a packet filtering rule:

## Web

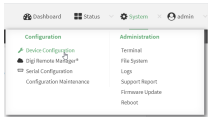
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Firewall** > **Packet filtering**.
4. Click the menu icon (**...**) next to the appropriate packet filtering rule and select **Delete**.

5. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Determine the index number of the packet filtering rule you want to delete:

```
(config)> show firewall filter
0
    action accept
```

```
    dst_zone any
    enable true
    ip_version any
    label Allow all outgoing traffic
    protocol any
    src_zone internal
1
    action drop
    dst_zone internal
    enable true
    ip_version any
    label My packet filter
    protocol any
    src_zone external
(config)>
```

4. To delete the rule, use the index number with the **del** command. For example:

```
(config)> del firewall filter 1
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Configure custom firewall rules

Custom firewall rules consist of a script of shell commands that can be used to install firewall rules, ipsets, and other system configuration. These commands are run whenever system configuration changes occur that might cause changes to the firewall.

To configure custom firewall rules:

## Web

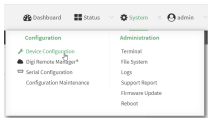
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Firewall** > **Custom rules**.

4. **Enable** the custom rules.
5. (Optional) Enable **Override** to override all preconfigured firewall behavior and rely solely on the custom firewall rules.
6. For **Rules**, type the shell command that will execute the custom firewall rules script.
7. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable custom firewall rules:

```
(config)> firewall custom enable true
(config)>
```

4. (Optional) Instruct the device to override all preconfigured firewall behavior and rely solely on the custom firewall rules:

```
(config)> firewall custom override true
(config)>
```

5. Set the shell command that will execute the custom firewall rules script:

```
(config)> firewall custom rules "shell-command"
(config)>
```

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Configure Quality of Service options

Quality of Service (QoS) options allow you to manage the traffic performance of various services, such as Voice over IP (VoIP), cloud computing, traffic shaping, traffic prioritizing, and bandwidth allocation. When configuring QOS, you can only control the queue for outgoing packets on each interface (egress packets), not what is received on the interface (packet ingress).

A QoS *binding* contains the policies and rules that apply to packets exiting the Connect EZ 16/32 device on the binding's interface. By default, the Connect EZ 16/32 device has two preconfigured QoS bindings, **Outbound** and **Inbound**. These bindings are an example configuration designed for a typical VoIP site:

- **Outbound** provides an example of matching packets as they are routed from the device onto the WAN interface.
- **Inbound** provides an example of matching packets as they are routed from the device onto a LAN interface.

These example bindings are disabled by default.

## Enable the preconfigured bindings

### Web

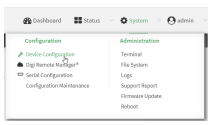
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Firewall** > **Quality of Service**.
4. Click to expand either **Outbound** or **Inbound**.
5. **Enable** the binding.
6. Select an **Interface**.
7. Examine the remaining default settings and modify as appropriate for your network.
8. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable one of the preconfiged bindings:
   - To enable the Outbound binding:

```
(config)> firewall qos 0 enable true
(config)>
```

   - To enable the Inbound binding:

```
(config)> firewall qos 1 enable true
(config)>
```

4. Set the interface for the binding. Use the index number of the binding; for example, to set the interface for the Outbound binding:
   a. Use the **?** to determine available interfaces:
   b. Set the interface. For example:

```
(config)> firewall qos 0 interface /network/interface/eth1
(config)>
```

5. Examine the remaining default settings and modify as appropriate for your network.
6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### Create a new binding

#### Web

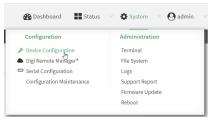
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

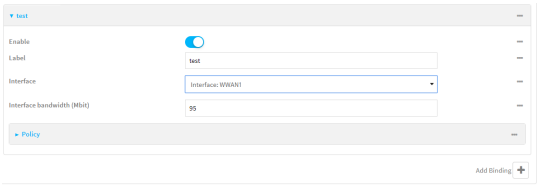
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Firewall** > **Quality of Service**.
4. For **Add Binding**, click ✚.

   The quality of service binding configuration window is displayed.

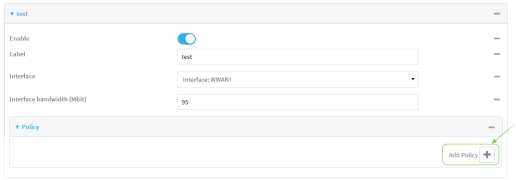
5. **Enable** the binding.
6. (Optional) Type a **Label** for the binding.
7. Select an **Interface** to queue egress packets on. The binding will only match traffic that is being sent out on this interface.
8. (Optional) For **Interface bandwidth (Mbit)**, set the maximum egress bandwidth of the interface, in megabits, allocated to this binding. Typically, this should be 95% of the available bandwidth. Allowed value is any integer between **1** and **1000**.

9. Create a policy for the binding:

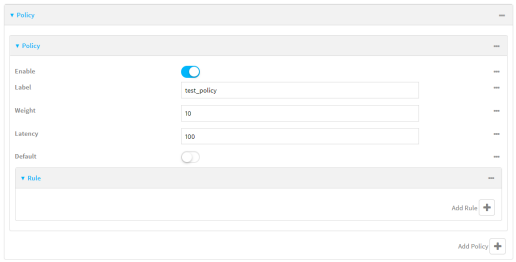
   At least one policy is required for each binding. Each policy can contain up to 30 rules.

   a. Click to expand **Policy**.

   b. For **Add Policy**, click ✚.




   The QoS binding policy configuration window is displayed.




   New QoS binding policies are enabled by default. To disable, toggle off **Enable**.

   c. (Optional) Type a **Label** for the binding policy.

   d. For **Weight**, type a value for the amount of available bandwidth allocated to the policy, relative to other policies for this binding.

   The larger the weight, with respect to the other policy weights, the larger portion of the maximum bandwidth is available for this policy. For example, if a binding contains three policies, and each policy contains a weight of 10, each policy will be allocated one third of the total interface bandwidth.

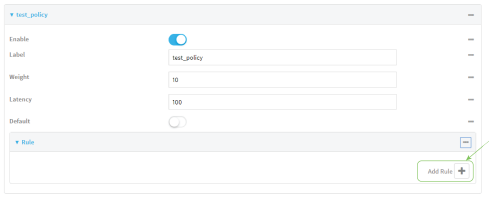
   e. For **Latency**, type the maximum delay before the transmission of packets. A lower latency means that the packets will be scheduled more quickly for transmission.

   f. Select **Default** to identify this policy as a fall-back policy. The fall-back policy will be used for traffic that is not matched by any other policy. If there is no default policy associated with this binding, packets that do not match any policy rules will be dropped.

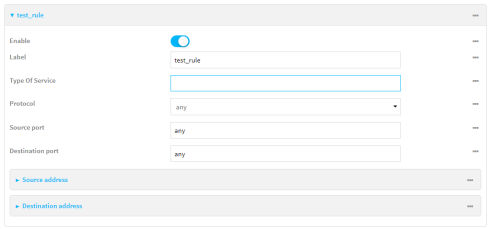
   g. If **Default** is disabled, you must configure at least one rule:

      i. Click to expand **Rule**.

      ii. For **Add Rule**, click ✚.




      The QoS binding policy rule configuration window is displayed.




New QoS binding policy rules are enabled by default. To disable, toggle off **Enable**.

iii. (Optional) Type a **Label** for the binding policy rule.

iv. For **Type Of Service**, type the value of the Type of Service (ToS) packet header that defines packet priority. If unspecified, this field is ignored.

See https://www.tucny.com/Home/dscp-tos for a list of common TOS values.

v. For **Protocol**, select the IP protocol matching criteria for this rule.

vi. For **Source port**, type the port, or **any**, as a source traffic matching criteria.

vii. For **Destination port**, type the port, or **any**, as a destination traffic matching criteria.

viii. Click to expand **Source address** and select the **Type**:

- **Any**: Source traffic from any address will be matched.
- **Interface**: Only traffic from the selected **Interface** will be matched.
- **IPv4 address**: Only traffic from the IP address typed in **IPv4 address** will be matched. Use the format ***IPv4_address*[/*netmask*]**, or use **any** to match any IPv4 address.
- **IPv6 address**: Only traffic from the IP address typed in **IPv6 address** will be matched. Use the format ***IPv6_address*[/*prefix_length*]**, or use **any** to match any IPv6 address.
- **MAC address**: Only traffic from the MAC address typed in **MAC address** will be matched.

ix. Click to expand **Destination address** and select the **Type**:

- **Any**: Traffic destined for anywhere will be matched.
- **Interface**: Only traffic destined for the selected **Interface** will be matched.
- **IPv4 address**: Only traffic destined for the IP address typed in **IPv4 address** will be matched. Use the format ***IPv4_address*[/*netmask*]**, or use **any** to match any IPv4 address.
- **IPv6 address**: Only traffic destined for the IP address typed in **IPv6 address** will be matched. Use the format ***IPv6_address*[/*prefix_length*]**, or use **any** to match any IPv6 address.

Repeat to add a new rule. Up to 30 rules can be configured.

10. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a binding:

```
(config)> add firewall qos end
(config firewall qos 2)>
```

   New binding are enabled by default. To disable:

```
(config firewall qos 2)> enable false
(config firewall qos 2)>
```

4. (Optional) Set a label for the new binding:

```
(config firewall qos 2)> label my_binding
(config firewall qos 2)>
```

5. Set the interface to queue egress packets on. The binding will only match traffic that is being sent out on this interface:
   a. Use the **?** to determine available interfaces:
   b. Set the interface. For example:

```
(config firewall qos 2)> interface /network/interface/eth1
(config firewall qos 2)>
```

6. (Optional) Set the maximum egress bandwidth of the interface, in megabits, allocated to this binding.

```
(config firewall qos 2)> bandwidth int
(config firewall qos 2)>
```

   where *int* is an integer between **1** and **1000**. Typically, this should be 95% of the available bandwidth. The default is **95**.
7. Create a policy for the binding:

   At least one policy is required for each binding. Each policy can contain up to 30 rules.
   a. Change to the policy node of the configuration:

```
(config firewall qos 2)> policy
(config firewall qos 2 policy)>
```

b. Add a policy:

```
(config firewall qos 2 policy)> add end
(config firewall qos 2 policy 0)>
```

New QoS binding policies are enabled by default. To disable:

```
(config firewall qos 2 policy 0)> enable false
(config firewall qos 2 policy 0)>
```

c. (Optional) Set a label for the new binding policy:

```
(config firewall qos 2 policy 0)> label my_binding_policy
(config firewall qos 2 policy 0)>
```

d. Set a value for the amount of available bandwidth allocated to the policy, relative to other policies for this binding.

The larger the weight, with respect to the other policy weights, the larger portion of the maximum bandwidth is available for this policy. For example, if a binding contains three policies, and each policy contains a weight of 10, each policy will be allocated one third of the total interface bandwidth.

```
(config firewall qos 2 policy 0)> weight int
(config firewall qos 2 policy 0)>
```

where *int* is any integer between **1** and **65535**. The default is **10**.

e. Set the maximum delay before the transmission of packets. A lower number means that the packets will be scheduled more quickly for transmission.

```
(config firewall qos 2 policy 0)> latency int
(config firewall qos 2 policy 0)>
```

where *int* is any integer, **1** or greater. The default is **100**.

f. To identify this policy as a fall-back policy:

```
(config firewall qos 2 policy 0)> default true
(config firewall qos 2 policy 0)>
```

The fall-back policy will be used for traffic that is not matched by any other policy. If there is no default policy associated with this binding, packets that do not match any policy rules will be dropped. If the policy is not a fall-back policy, you must configure at least one rule:

i. Change to the rule node of the configuration:

```
(config firewall qos 2 policy 0)> rule
(config firewall qos 2 policy 0 rule)>
```

ii. Add a rule:

```
(config firewall qos 2 policy 0 rule)> add end
(config firewall qos 2 policy 0 rule 0)>
```

New QoS binding policy rules are enabled by default. To disable:

```
(config firewall qos 2 policy 0 rule 0)> enable false
(config firewall qos 2 policy 0 rule 0)>
```

iii. (Optional) Set a label for the new binding policy rule:

```
(config firewall qos 2 policy 0 rule 0)> label my_binding_policy_
rule
(config firewall qos 2 policy 0 rule 0)>
```

iv. Set the value of the Type of Service (ToS) packet header that defines packet priority. If unspecified, this field is ignored.

```
(config firewall qos 2 policy 0 rule 0)> tos value
(config firewall qos 2 policy 0 rule 0)>
```

where value is a hexadecimal number. See https://www.tucny.com/Home/dscp-tos for a list of common TOS values.

v. Set the IP protocol matching criteria for this rule:

```
(config firewall qos 2 policy 0 rule 0)> protocol value
(config firewall qos 2 policy 0 rule 0)>
```

where *value* is one of **tcp**, **udp**, or **any**.

vi. Set the source port to define a source traffic matching criteria:

```
(config firewall qos 2 policy 0 rule 0)> srcport value
(config firewall qos 2 policy 0 rule 0)>
```

where *value* is the IP port number, a range of port numbers using the format *IP_port-IP_port*, or **any**.

vii. Set the destination port to define a destination matching criteria:

```
(config firewall qos 2 policy 0 rule 0)> dstport value
(config firewall qos 2 policy 0 rule 0)>
```

where *value* is the IP port number, a range of port numbers using the format *IP_port-IP_port*, or **any**.

viii. Set the source address type:

```
(config network qos 2 policy 0 rule 0)> src type value
(config network qos 2 policy 0 rule 0)>
```

where *value* is one of:

- **any**: Source traffic from any address will be matched.

  See Firewall configuration for more information about firewall zones.
- **interface**: Only traffic from the selected interface will be matched. Set the interface:

i. Use the **?** to determine available interfaces:

ii. Set the interface. For example:

```
(config network qos 2 policy 0 rule 0)> src interface
/network/interface/eth1
(config network qos 2 policy 0 rule 0)>
```

- **address**: Only traffic from the IP address typed in **IPv4 address** will be matched. Set the address that will be matched:

```
(config network qos 2 policy 0 rule 0)> src address value
(config network qos 2 policy 0 rule 0)>
```

where value uses the format ***IPv4_address*[*/netmask*]**, or **any** to match any IPv4 address.

- **address6**: Only traffic from the IP address typed in **IPv6 address** will be matched. Set the address that will be matched:

```
(config network qos 2 policy 0 rule 0)> src address6 value
(config network qos 2 policy 0 rule 0)>
```

where value uses the format ***IPv6_address*[*/prefix_length*]**, or **any** to match any IPv6 address.

- **mac**: Only traffic from the MAC address typed in **MAC address** will be matched. Set the MAC address to be matched:

```
(config network qos 2 policy 0 rule 0)> src mac MAC_address
(config network qos 2 policy 0 rule 0)>
```

ix. Set the destination address type:

```
(config network qos 2 policy 0 rule 0)> dst type value
(config network qos 2 policy 0 rule 0)>
```

where *value* is one of:

- **any**: Traffic destined for anywhere will be matched.

  See Firewall configuration for more information about firewall zones.

- **interface**: Only traffic destined for the selected **Interface** will be matched. Set the interface:

  i. Use the **?** to determine available interfaces:

  ii. Set the interface. For example:

```
(config network qos 2 policy 0 rule 0)> dst interface
/network/interface/eth1
(config network qos 2 policy 0 rule 0)>
```

- **address**: Only traffic destined for the IP address typed in **IPv4 address** will be matched. Set the address that will be matched:

```
(config network qos 2 policy 0 rule 0)> src address value
(config network qos 2 policy 0 rule 0)>
```

where value uses the format ***IPv4_address*[/*netmask*]**, or **any** to match any IPv4 address.

- **address6**: Only traffic destined for the IP address typed in **IPv6 address** will be matched. Set the address that will be matched:

```
(config network qos 2 policy 0 rule 0)> src address6 value
(config network qos 2 policy 0 rule 0)>
```

where value uses the format ***IPv6_address*[/*prefix_length*]**, or **any** to match any IPv6 address.

Repeat to add a new rule. Up to 30 rules can be configured.

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Web filtering

Web filtering allows you to control access to services that can be accessed through the Connect EZ 16/32 device by forwarding all Domain Name System (DNS) traffic to a web filtering service. This allows the network security administrator to configure a set of policies with the web filtering service that are applied to all routing devices with web filtering enabled. For example, a policy may allow or deny access to a specific service or type of service such as social media, gaming, and so on.

Your Connect EZ 16/32 device supports two methods for configuring web filtering:

- Cisco Umbrella (formally known as OpenDNS).
- Manual DNS server entry.

## Configure web filtering with Cisco Umbrella

### Required configuration items

- Enable web filtering.
- A Cisco Umbrella account.

  See https://umbrella.cisco.com for information about how to create a Cisco Umbrella account. A 14 day trial account is available.
- A customer-specific API token.

### Task one: Generate a Cisco Umbrella API token

1. Log into the Cisco Umbrella Dashboard (https://dashboard.umbrella.com).
2. On the menu, select **Admin** > **API Keys**.

   The **API Keys** page displays.
3. Click ⊕ (**Create**).
4. Select **Legacy Network Devices**.
5. Click **Create**.
6. Copy the token.

### Task two: Configure web filtering

#### Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

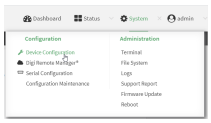
   b. Click the **Device ID**.

   c. Click **Settings**.

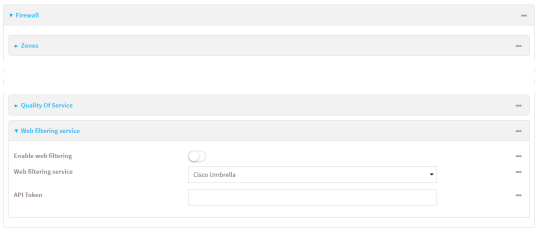
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Firewall** > **Web filtering service**.

   
4. Click **Enable web filtering** to enable.
5. For **Web filtering service**, select **Cisco Umbrella**.
6. Paste the **API token** that was generated in Task one: Generate a Cisco Umbrella API token.

7. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable web filtering:

```
(config)> firewall web-filter enable true
(config)>
```

4. Set the web filter service type to **umbrella**:

```
(config)> firewall web-filter service umbrella
(config)>
```

5. Set umbrella_token to the API token generated in Task one: Generate a Cisco Umbrella API token:

```
(config)> firewall web-filter umbrella_token token
(config)>
```

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## *Clear the Cisco Umbrella device ID*

If the Cisco Umbrella device ID being used by your Connect EZ 16/32 is invalid, you can clear the device ID.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, use the rm command to delete the **web-filter-id** file, and confirm the deletion:

```
> rm /etc/config/web-filter-id
rm: remove '/etc/config/web-filter-id'? yes
>
```

3. Restart the web filtering service:

```
> config firewall web-filter enable false
> config firewall web-filter enable true
>
```

## Configure web filtering with manual DNS servers

**Required configuration items**

- Enable web filtering.
- The IP address of one or more DNS servers. Cisco provides two open DNS servers for web filtering:
  - 208.67.222.222
  - 208.67.220.220

> **Note** These two IP addresses do not work with the OpenDNS option. See https://www.opendns.com/setupguide/ for more information about using Cisco DNS servers for web filtering.

To configure web filtering with manual DNS servers:

### Web

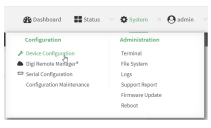
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

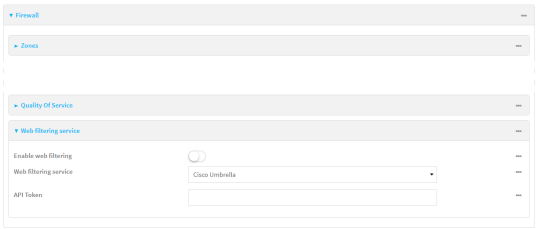
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

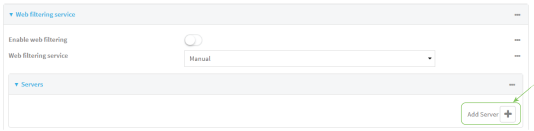
   

   The **Configuration** window is displayed.

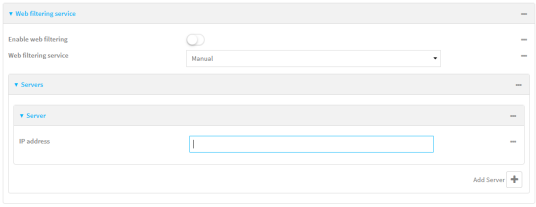
3. Click **Firewall** > **Web filtering service**.




4. Click **Enable web filtering** to enable.
5. For **Web filtering service**, select **Manual**.
6. Click to expand **Servers**.
7. Click **+** to add a server.




8. For **IP address**, enter the IP address of the DNS server.




9. (Optional) Repeat for additional DNS servers.
10. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable web filtering:

```
(config)> firewall web-filter enable true
(config)>
```

4. Set the web filter service type to **manual**:

```
(config)> firewall web-filter service manual
(config)>
```

5. Add a DNS server:

```
(config)> add firewall web-filter server end
(config firewall web-filter server 0)>
```

6. Set the DNS server's IP address:

```
(config firewall web-filter server 0)> ip ip_address
(config firewall web-filter server 0)>
```

7. (Optional) Repeat for additional DNS servers.

   For example, to configure manual web-filtering using Cisco's open DNS servers:

   a. Enable web filtering:

```
(config)> firewall web-filter enable true
(config)>
```

   b. Set the web filter service type to **manual**:

```
(config)> firewall web-filter service manual
(config)>
```

   c. Add the first DNS server:

      i. Add the server:

```
(config)> add firewall web-filter server end
(config firewall web-filter server 0)>
```

      ii. Set the server's IP address:

```
(config firewall web-filter server 0)> ip 208.67.222.220
(config firewall web-filter server 0)>
```

   d. Add the second DNS server:

      i. Move back one node in the configuration tree:

```
(config firewall web-filter server 0)> ..
(config firewall web-filter server)>
```

      ii. Add the server:

```
(config firewall web-filter server)> add end
(config firewall web-filter server 1)>
```

iii. Set the server's IP address:

```
(config firewall web-filter server 1)> ip 208.67.222.222
(config firewall web-filter server 0)>
```

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Verify your web filtering configuration

If your web filtering implementation has the service set to Cisco Umbrella, or if it is configured to use manual DNS servers and uses the Cisco open DNS servers, you can verify the web filtering implementation by using the Cisco test site www.internetbadguys.com.

To verify the implementation:

### Web

This procedure assumes you have already configured web filtering to use either Cisco Umbrella or the Cisco open DNS servers.

- See Configure web filtering with Cisco Umbrella for information about configuring web filtering with Cisco Umbrella.
- See Configure web filtering with manual DNS servers for information about configuring web filtering to use Cisco open DNS servers.

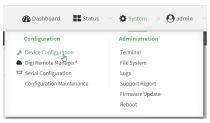
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

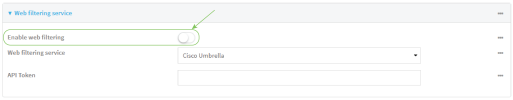
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Disable web filtering:
   a. Click **Firewall** > **Web filtering service**.
   b. Click **Enable web filtering** to disable.



   c. Click **Apply** to save the configuration and apply the change.
4. From a new tab in your browser, attempt to connect to the Cisco test URL http://www.internetbadguys.com.

   The connection should be successful.
5. Return to the Connect EZ 16/32 WebUI and enable web filtering:
   a. Click **Firewall** > **Web filtering service**.
   b. Click **Enable web filtering** to enable.
   c. Click **Apply** to save the configuration and apply the change.
6. From your browser, attempt to connect to http://www.internetbadguys.com again.

   The connection attempt should fail with the message, "This site is blocked due to a phishing threat."

## Command line

This procedure assumes you have already configured web filtering to use either Cisco Umbrella or the Cisco open DNS servers.

- See Configure web filtering with Cisco Umbrella for information about configuring web filtering with Cisco Umbrella.
- See Configure web filtering with manual DNS servers for information about configuring web filtering to use Cisco open DNS servers.

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Disable web filtering:

```
> config firewall web-filter enable false
>
```

3. Attempt to connect to the Cisco test URL http://www.internetbadguys.com by using either a web browser or the **curl** command from a Linux shell:

```
$ curl -I http://www.internetbadguys.com
HTTP/1.1 200 OK
Server: Apache
Content-Type: text/html; charset=UTF-8
Accept-Ranges: bytes
Date: Thu, Jan 11, 2024 12:10:00
```

```
X-Varnish: 4201397492
Age: 0
Via: 1.1 varnish
Connection: keep-alive

$
```

You should receive an "HTTP/1.1 200 OK" message, as highlighted above.

4. Return to the Admin CLI and enable web filtering:

```
> config firewall web-filter enable true
>
```

5. Attempt to connect to http://www.internetbadguys.com again:

```
$ curl -I www.internetbadguys.com
HTTP/1.1 403 Forbidden
Server: openresty/1.9.7.3
Date: Thu, Jan 11, 2024 12:10:00
Content-Type: text/html
Connection: keep-alive

$
```

You should receive an "HTTP/1.1 403 Forbidden" message, as highlighted above.

## Show web filter service information

To view information about the web filter service:

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, use the show web-filtercommand to view information about the web-filter service:

```
> show web-filter

 Enabled    : true
 Service    : umbrella
 Device ID  : 0004b5s63f5e2de7aa

>
```

If the device is configured to use Cisco Umbrella for web filtering, a device ID is displayed. The device ID is a unique ID assigned to the device by Cisco Umbrella. If there is a problem with the device ID, you can clear the ID. See Clear the Cisco Umbrella device ID for instructions.

# Containers

The Connect EZ 16/32 device includes support for LXC Linux containers. LXC containers are a lightweight, operating system level method of virtualization that allows you to run one or more isolated Linux instances on a the same host using the host's Linux kernal.

**Note** Container support must be enabled in Digi Remote Manager. Contact your Digi sales representative for information.

This chapter contains the following topics:


Use Digi Remote Manager to deploy and run containers ..... 829
Upload a new LXC container ..... 833
Configure a container ..... 834
Starting and stopping the container ..... 839
View the status of containers ..... 840
Schedule a script to run in the container ..... 842
Create a custom container ..... 844

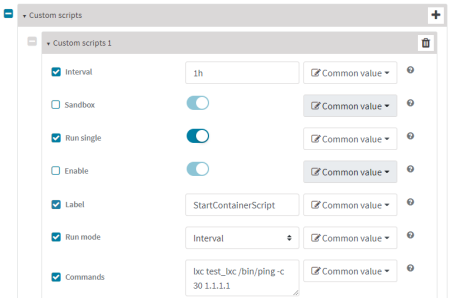
# Use Digi Remote Manager to deploy and run containers

**Note** Container support must be enabled in Digi Remote Manager. Contact your Digi sales representative for information.

1. In Remote Manager, create a Configuration template. See the Remote Manager User Guide for instructions.
   a. For the **Settings** step:
      - Click **Import from device** and import settings from an appropriate device.
      - Configure a script to run the container:
        i. Click **System**.
        ii. Click **Scheduled tasks** > **Custom scripts**.
        iii. Click ✚ to add a custom script.
        iv. Click the **Label** checkbox and type an identifiable label for the script, for example, **StartContainerScript**.
        v. To ensure that the script is always running:
           i. Click the **Run mode** checkbox and select **Interval**.
           ii. Click the **Interval** checkbox and enter a very short interval (for example, one minute).
           iii. Click the **Run single** checkbox, and toggle on to enable.

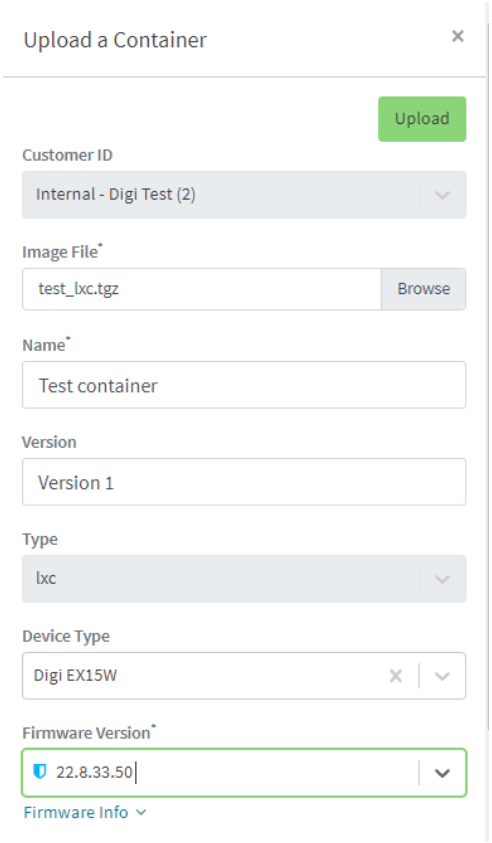
           This will configure the device to regularly check if the script is running, but only run if it is currently not running.
        vi. For **Commands**, type the command to run the script. The command will vary depending on how you want to run the script, and what application you want to run inside the script. For example, to run the ping command inside a container, the command would be:

```
lxc container_name /bin/ping -c 30 1.1.1.1
```




   b. For the **Containers** step:
      i. Click ✚ to add a container to the configuration.

      If no containers have been uploaded, or if Click to upload a container file.




i. Click **Browse** and select the container file.
ii. Type the **Name** of the container.

    The **Name** entered here must be the same name as the container .tgz file. This is absolutely necessary, otherwise the container file will not be properly configured on the local devices.
iii. (Optional) Include a version number for the container.
iv. (Optional) Select the **Device Type** and **Firmware Version** that applies to the container.

    If set, these options will limit the container to only be included in Configuration templates that match the specified device type and firmware version. If these are left blank, the container can be included in any Configuration template.
v. Click **Upload**.
vi. Repeat to upload additional containers.

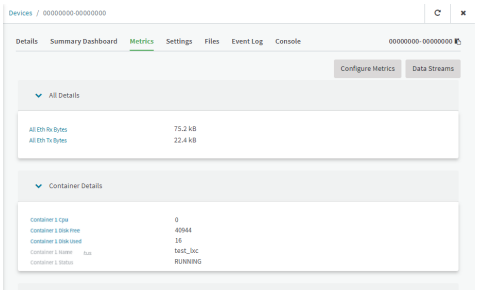
ii. Select one or more containers to add to the configuration.
iii. Click **Done**.
iv. Click **Save**.
v. Click **Continue**.

c. For the **Automation** step:

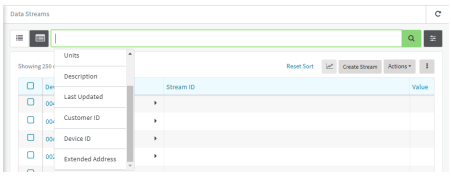
i. Click to toggle on **Enable Scanning**.

ii. Click to toggle on **Remediate**.

2. Run a manual configuration scan to apply the container and configuration settings to all applicable devices.
3. Verify that the container is running on a device:
   - To verify by using device metrics:
     a. From the Remote Manager main menu, click **Management** > **Devices**.
     b. Click the **Device ID** to open the device's **Details** page..
     c. Click **Metrics**.
     d. Information about configured containers is located under the **Container Details** heading.

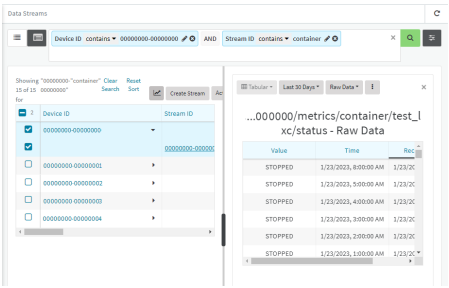



   - To verify by using the **Data streams** page:
     a. From the Remote Manager main menu, click **Management** > **Data Streams**.
     b. Locate the container's data stream:
        i. Click to search using advance filtering.
        ii. Click in the search text bar and select **Device ID** from the menu.

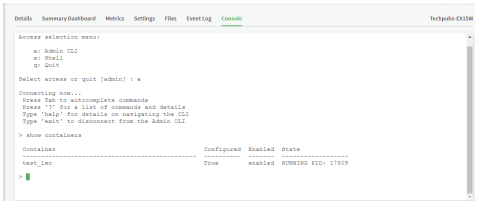



        iii. Type the device ID and press the Enter key.
        iv. Click in the search text bar again and select **Stream ID** from the menu.
        v. Type container and press the Enter key.

vi. Click the **Stream ID** to view container status.




- To verify by using the **show containers** command on the local device:
  a. From the Remote Manager main menu, click **Management** > **Devices**.
  b. Select the device.
  c. From the **Actions** menu, select **Open Console**.
  d. At the prompt, type **show containers**.



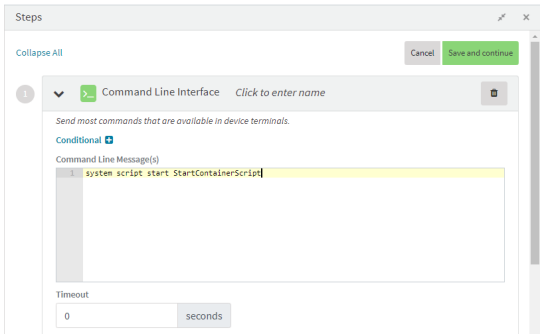

## Use an automation to start the container

You can also use an automation to start a container:

1. Follow the steps in the previous procedure, except:
   - For **Run mode**, select **Manual**.
   - Do not set **Interval** or **Run single**.
2. Create an automation that uses a Command Line Interface step.

   For the **Command Line Message**, use the system script start command, using the label provided for the script in the previous procedure:

```
system script start StartContainerScript
```




Once the automation has been created, you can:

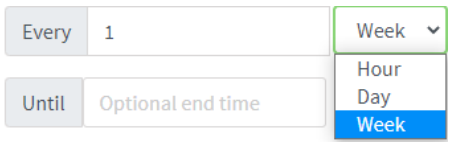
- Run the automation manually.
- Include the automation in a Configuration template as a post-remediation or post-scan step.

  When creating or editing a Configuration template, at the **Automation** page:

  1. For **Post Remediation Options**, click **Run Automation** and select the automation.
  2. For **On Successful Scan Options**, click **Run Automation** and select the automation.
- Include a trigger for the automation.

  When creating or editing an automation, at the **Triggers** page:

  1. Click to enable **Triggered** to configure the automation to be triggered, either on a schedule or by device activity.
     a. To configure the script to be run on a schedule:
        i. Click to enable **By Schedule**.
        ii. Click **Start Time**.
        iii. From the calendar provided, select the date and time that the script should be started for the first time.
        iv. By default, the script will run only once. Click to enable **Repeat** to configure the script to run on a regular basis:




        i. Type or select the number of times, and select the time period.
        ii. (Optional) Click **Until** to select a date and time when the automation schedule will stop repeating.

     b. To configure the automation to be triggered by device activity, click to enable one or more of the following:
        - **Run when a device enters the target scope**
        - **Run when a device in the target scope enters a maintenance window**:
        - **Run when a device in the target scope leaves debug mode**

        **Target scope** refers to a device that either:
        - Is member of a group that was selected on the **Target** page.
        - Has a tag that was selected on the **Target** page.
        - Is one of the devices included on the **Target** page.

# Upload a new LXC container

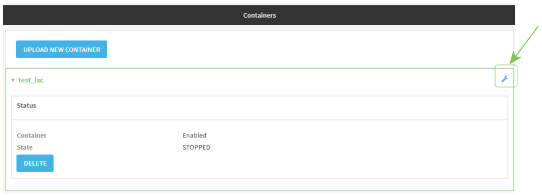
### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. From the main menu, click **Status**. Under **Services**, click **Containers**.
2. Click **Upload New Container**.

3. From your local file system, select the container file in *.tgz format.

   You can download a simple example container file, test_lxc.tgz, from the Digi website.
4. **Create Configuration** is selected by default. This will create a configuration on the device for the container when it is installed. If deselected, you will need to create the configuration manually.
5. Click **Apply**.
6. If **Create Configuration** was deselected when the container was created, click to go to the container configuration.




See Configure a container for further information about configuring the container.

# Configure a container

### *Required configuration items*

- The following configuration options are completed automatically if **Create Configuration** was selected when the container was created. See Upload a new LXC container for details:
  - Name of the container.
  - Enable the container.
  - Whether or not the container should use the device's system libraries.
- Determine whether or not the device should including virtual networking capabilities.

### *Additional configuration items*

- If virtual networking is enabled:
  - The bridge to be used to provide network connectivity.
  - A static IP address for the container.
  - The network gateway.
- Serial ports on the device that the container will have access to.

## Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

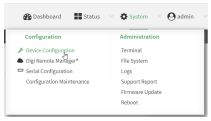
   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

b. Click the **Device ID**.
c. Click **Settings**.
d. Click to expand **Config**.

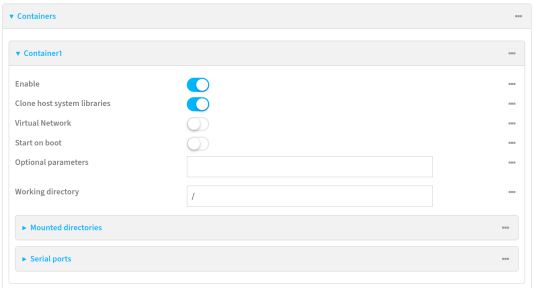
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **System** > **Containers**.
4. For **Add Container**, type the name of the container and click ✚.
   The Container configuration window is displayed.




   New containers are enabled by default. To disable, toggle off **Enable**.
5. **Clone host system libraries** is enabled by default. This allows the container to use the device's system libraries.
6. Enable **Virtual Network** if the container should have network access:
   a. Select a **Network Bridge Device** that will provide access to the container.
   b. (Optional) Enter a static **IP Address** and netmask for the container. This must be a valid IP address for the bridge, or, if left blank, a DHCP server can assign the container an IP address.
   c. (Optional) For **Gateway**, type the IP address of the network gateway.
7. Enable **Start on boot** to configure the container to start when the system boots.
   a. For **Restart timeout**, set the amount of time to wait before restarting the container, if the container ever stops. The default timeout of **0s** means that if the container stops, it will not be restarted.

      Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

      For example, to set **Restart timeout** to ten minutes, enter **10m** or **600s**.
8. (Optional) Type any **Optional parameters** for the container. Parameters are in the format accepted by the lxc utility.

9. (Optional) Type a **Working directory** to configure an initial working directory for the container. The directory is an absolute path within the container and must begin with "/". The default is **/**.
10. (Optional) Click to expand **Mounted directories** to configure system directories that will be mounted inside the container. Any mounted directories need to be accessible to a non-privileged user.
    a. For **Add Directory**, click ✚.
    b. For **Directory**, type the pathname of the directory to be mounted. The leading slash should be removed, so for example to mount the /opt directory, type **opt**.
11. (Optional) Click to expand **Serial ports** to assign serial ports that the container will have access to.
    a. For **Add Port**, click ✚.
    b. For **Port**, select the serial port.
12. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new container:

```
(config)> add system container name
(config system container name)>
```

   where *name* is the

   New access points are enabled by default.
4. New containers are enabled by default. To disable:

```
(config system container name)> enable false
(config system container name)>
```

5. By default, the container will use the device's system libraries. To disable:

```
(config system container name)> dal false
(config system container name)>
```

6. If the device will use virtual networking:
   a. Enable virtual networking:

```
(config system container name)> network true
(config system container name)>
```

b. Set the network bridge device that will be used to provide network access:

i. Use the **?** to determine the available bridges:

```
(config system container name)> bridge ?

Network Bridge Device: Containers require a bridge to access the
network. Choose
which bridge to connect the container to.
Format:
  hotspot_bridge
  lan1
Current value:

(config system container name)>
```

ii. Set the bridge:

```
(config system container name)> bridge lan1
(config system container name)>
```

c. (Optional) Set the IP address and netmask for the container:

```
(config system container name)> address IP_address/netmask
(config system container name)>
```

d. (Optional) Set the IP address of the network gateway:

```
(config system container name)> gateway IP_address
(config system container name)>
```

7. To configure the container to start when the device boots:

```
(config system container name)> start_on_boot true
(config system container name)>
```

a. Set the amount of time to wait before restarting the container, if the container ever stops:

```
(config system container name)> restart_timeout value
(config system container name)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **restart_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config system container name)> restart_timeout 600s
(config system container name)>
```

The default timeout of **0s** means that if the container stops, it will not be restarted.

8. Type any optional parameters for the container:

```
(config system container name)> args parameters
(config system container name)>
```

   Parameters are in the format accepted by the lxc utility.

9. (Optional) Set an initial working directory for the container.

```
(config system container name)> workdir /value
(config system container name)>
```

   The directory is an absolute path within the container and must begin with "/". The default is **/**.

10. (Optional) Set any system directories that should be mounted inside the container. Any mounted directories need to be accessible to a non-privileged user.
    a. Add a system directory to be mounted:

```
(config system container name)> system_dirs directory
(config system container name)>
```

       where *directory* is the pathname of the directory to be mounted. The leading slash should be removed, so for example to mount the /opt directory, type **opt**.

    b. Repeat for additional directories.

11. For **Add Directory**, click ✚.
    a. For **Directory**, type the pathname of the directory to be mounted. The leading slash should be removed, so for example to mount the /opt directory, type **opt**.

12. (Optional) Assign serial ports that the container will have access to:
    a. Determine available serial ports:

```
(config system container name)> ... serial

Serial

 Additional Configuration
 ------------------------------------------------------------------------
----------
 port1                      Port 1
 ...

(config system container name)>
```

    b. Add the port:

```
(config system container name)> add ports end port1
(config system container name)>
```

13. Save the configuration and apply the change.

```
(config network wireless client new_client)> save
Configuration saved.
>
```

14. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Starting and stopping the container

Container commands are not available from the Admin CLI. See Authentication groups for information about configuring authentication groups that include shell access.

**Note** Container support must be enabled in Digi Remote Manager. Contact your Digi sales representative for information.

## Starting the container

There are two methods to start containers:

- Non-persistent: Changes made to the container file system will be lost when the container is stopped.
- Persistent: Changes made to the container file system when not be lost when the container is stopped.

### *Starting a container in non-persistent mode*

To start the container in non-persistent mode:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, type:

   ```
   # lxc container_name
   lxc #
   ```

   where *container_name* is the name of the container as configured on the device. For example:

   ```
   # lxc test_lxc
   lxc #
   ```

This will start the container by using **/bin/sh -l,** which runs the shell and loads the shell profile. The default shell profile includes an **lxc #** prompt.

### *Starting a container in persistent mode*

To start the container in persistent mode, include the **-p** option at the command line. For example:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, type:

```
# lxc test_lxc -p
lxc #
```

This will start the container by using **/bin/sh -l,** which runs the shell and loads the shell profile. The default shell profile includes an **lxc #** prompt.

### *Starting a container by including an executable*

You can supply an executable to run when you start the container, along with any parameters. If you don't supply a parameter, the default behavior is to run the executable by using **/bin/sh -l,** which runs the shell and loads the shell profile. This is useful when you use the **Clone DAL** option when uploading the container, which includes the device's system libraries. In this case, the command without any additional parameters will use the device's shell. See Upload a new LXC container for more information.

## Stopping the container

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the lxc shell prompt, type:

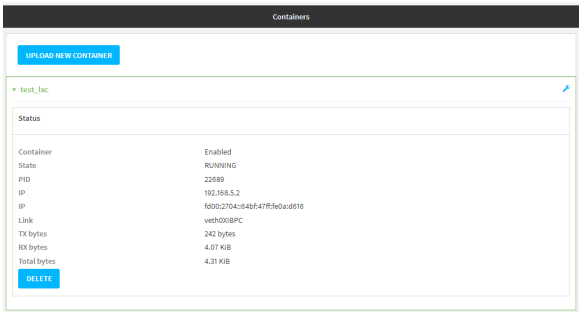
```
lxc # exit
#
```

# View the status of containers

### Web

1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. From the main menu, click **Status**. Under **Services**, click **Containers**.

The **Containers** status page displays.




## Command line

### Show status of all containers

Use the show containers command with no additional arguments to show the status of all containers on the system:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the prompt, type:

```
> show containers

 Container  Configured  Enabled  State
 ---------  ----------  -------  -----------------
 mytest1    True        enabled  STOPPED
 test_lxc   True        enabled  RUNNING PID 19327
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### Show status of a specific container

Use the show containers container *name* command to show the status of the specified container:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the prompt, type:

```
> show containers container test_lxc

 Container  Configured  Enabled  State
 ---------  ----------  -------  -----------------
```

```
 test_lxc   True        enabled  RUNNING PID 19327

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Schedule a script to run in the container

This simple example will:

1. Start the container in non-persistent mode.
2. Execute a ping command every ten seconds from inside the container.

## Web

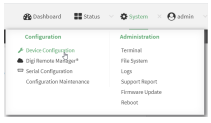
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

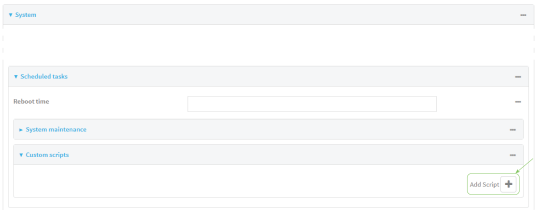
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

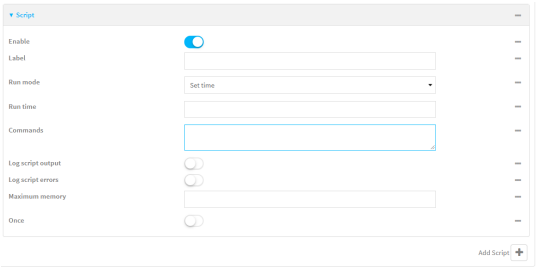
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **System** > **Scheduled tasks** > **Custom scripts**.
4. For **Add Script**, click ✚.



The script configuration window is displayed.




5. (Optional) For **Label**, type **container_script**.
6. For **Run mode**, select **Interval**.
7. For **Interval**, type **10s**.
8. For **Commands**, type the following:

```
lxc container_name /bin/ping -c 1 IP_address
```

For example:

```
lxc test_lxc /bin/ping -c 1 192.168.1.146
```

9. Click to disable **Sandbox**. Sandbox restrictions are not necessary when a container is used.
10. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a script:

```
(config)> add system schedule script end
(config system schedule script 0)>
```

4. Provide a label for the script, for example:

```
(config system schedule script 0)> label test_lxc
(config system schedule script 0)>
```

5. Set the mode to interval:

```
(config system schedule script 0)> when interval
(config system schedule script 0)>
```

6. Set the interval to ten seconds:

```
(config system schedule script 0)> on_interval 10s
(config system schedule script 0)>
```

7. Set the commands that will execute the script:

```
(config system schedule script 0)> commands "lxc script_name /bin/ping -c
1 IP_address"
(config system schedule script 0)>
```

For example:

```
(config system schedule script 0)> commands "lxc test_lxc /bin/ping -c 1
192.168.1.146"
(config system schedule script 0)>
```

8. Disable the **sandbox**. Sandbox restrictions are not necessary when a container is used.

```
(config system schedule script 0)> sandbox false
(config system schedule script 0)>
```

9. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Create a custom container

This example creates a simple custom container that contains a python script in the /etc directory.

In this example, we will use a simple container file named test_lxc.tgz. You can download test_lxc.tgz from the Digi website.

At the command line of a Linux host, we will unpack the file, add a simple python script, and create a new container file that includes the python script.

## Create the custom container file

1. At the command line of a Linux host, unpack the test_lxc.tgz file:

```
$ tar -xfv test_lxc.tgz
rootfs/
rootfs/usr/
rootfs/etc/
rootfs/etc/group
rootfs/etc/profile
rootfs/etc/passwd
```

```
rootfs/tmp/
$
```

2. Change to the rootfs/etc directory:

```
$ cd rootfs/etc
$
```

3. Create a file named test.py with the following contents:

```
print("Hello world.\n")
```

4. Change directories to leave the container file structure:

```
$ cd ../..
```

5. Change user and group permissions on all files in the container file structure:

```
$ sudo chown -R 165536 rootfs
$ sudo chgrp -R 165536 rootfs
```

6. Tar and zip the directory structure to create a new container file:

```
$ sudo tar -czvf python_lxc.tgz rootfs
```

If using macOS, include the --disable-copyfile option with this command:

```
$ sudo tar --disable-copyfile -czvf python_lxc.tgz rootfs
```

## Test the custom container file

1. Add the new container to your Connect EZ 16/32 device:

   Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

   a. From the main menu, click **Status**. Under **Services**, click **Containers**.
   b. Click **Upload New Container**.
   c. From your local file system, select the container file.

      You can download a simple example container file, test_lxc.tgz, from the Digi website.
   d. **Create Configuration** is selected by default. This will create a configuration on the device for the container when it is installed. If deselected, you will need to create the configuration manually.
   e. Click **Apply**.

2. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

3. At the shell prompt, type:

```
# lxc python_lxc
lxc #
```

4. Execute the python command:

```
lxc # python /etc/test.py
Hello world.
lxc #
```

# Containers

The Connect EZ 16/32 device includes support for LXC Linux containers. LXC containers are a lightweight, operating system level method of virtualization that allows you to run one or more isolated Linux instances on a the same host using the host's Linux kernal.

**Note** Container support must be enabled in Digi Remote Manager. Contact your Digi sales representative for information.

This chapter contains the following topics:


Use Digi Remote Manager to deploy and run containers ..... 848
Upload a new LXC container ..... 852
Configure a container ..... 853
Starting and stopping the container ..... 858
View the status of containers ..... 859
Schedule a script to run in the container ..... 861
Create a custom container ..... 863

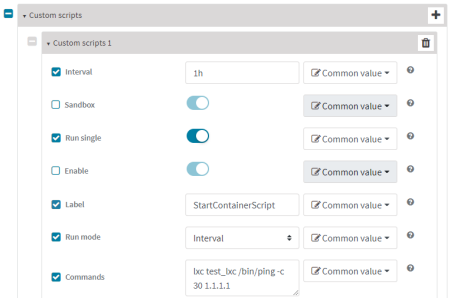
# Use Digi Remote Manager to deploy and run containers

**Note** Container support must be enabled in Digi Remote Manager. Contact your Digi sales representative for information.

1. In Remote Manager, create a Configuration template. See the Remote Manager User Guide for instructions.
   a. For the **Settings** step:
      - Click **Import from device** and import settings from an appropriate device.
      - Configure a script to run the container:
        i. Click **System**.
        ii. Click **Scheduled tasks** > **Custom scripts**.
        iii. Click ✚ to add a custom script.
        iv. Click the **Label** checkbox and type an identifiable label for the script, for example, **StartContainerScript**.
        v. To ensure that the script is always running:
           i. Click the **Run mode** checkbox and select **Interval**.
           ii. Click the **Interval** checkbox and enter a very short interval (for example, one minute).
           iii. Click the **Run single** checkbox, and toggle on to enable.

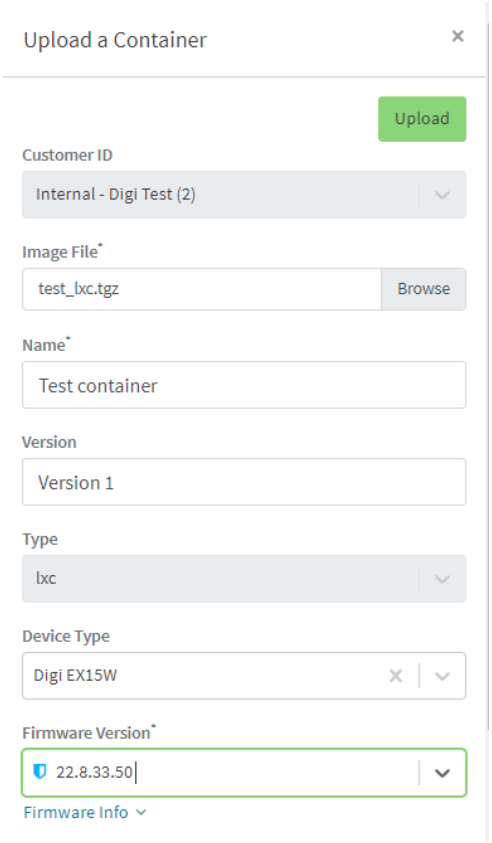
           This will configure the device to regularly check if the script is running, but only run if it is currently not running.
        vi. For **Commands**, type the command to run the script. The command will vary depending on how you want to run the script, and what application you want to run inside the script. For example, to run the ping command inside a container, the command would be:

```
lxc container_name /bin/ping -c 30 1.1.1.1
```




   b. For the **Containers** step:
      i. Click ✚ to add a container to the configuration.

      If no containers have been uploaded, or if Click ⬆ to upload a container file.




i. Click **Browse** and select the container file.
ii. Type the **Name** of the container.

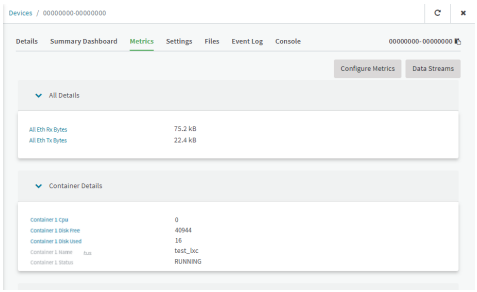
    The **Name** entered here must be the same name as the container .tgz file. This is absolutely necessary, otherwise the container file will not be properly configured on the local devices.
iii. (Optional) Include a version number for the container.
iv. (Optional) Select the **Device Type** and **Firmware Version** that applies to the container.

    If set, these options will limit the container to only be included in Configuration templates that match the specified device type and firmware version. If these are left blank, the container can be included in any Configuration template.
v. Click **Upload**.
vi. Repeat to upload additional containers.

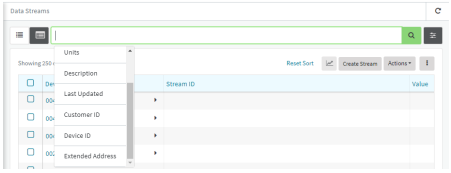
ii. Select one or more containers to add to the configuration.
iii. Click **Done**.
iv. Click **Save**.
v. Click **Continue**.

c. For the **Automation** step:
   i. Click to toggle on **Enable Scanning**.
   ii. Click to toggle on **Remediate**.

2. Run a manual configuration scan to apply the container and configuration settings to all applicable devices.
3. Verify that the container is running on a device:
   - To verify by using device metrics:
     a. From the Remote Manager main menu, click **Management** > **Devices**.
     b. Click the **Device ID** to open the device's **Details** page..
     c. Click **Metrics**.
     d. Information about configured containers is located under the **Container Details** heading.

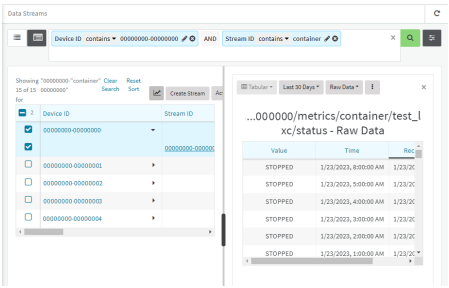



   - To verify by using the **Data streams** page:
     a. From the Remote Manager main menu, click **Management** > **Data Streams**.
     b. Locate the container's data stream:
        i. Click to search using advance filtering.
        ii. Click in the search text bar and select **Device ID** from the menu.

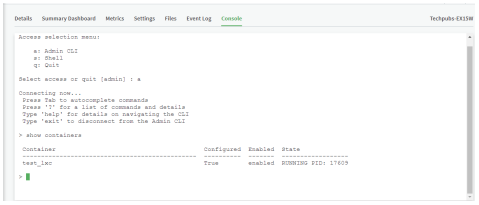



        iii. Type the device ID and press the Enter key.
        iv. Click in the search text bar again and select **Stream ID** from the menu.
        v. Type container and press the Enter key.

vi. Click the **Stream ID** to view container status.




- To verify by using the **show containers** command on the local device:
  a. From the Remote Manager main menu, click **Management** > **Devices**.
  b. Select the device.
  c. From the **Actions** menu, select **Open Console**.
  d. At the prompt, type **show containers**.



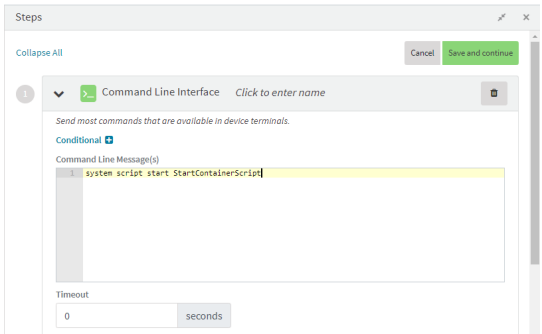

## Use an automation to start the container

You can also use an automation to start a container:

1. Follow the steps in the previous procedure, except:
   - For **Run mode**, select **Manual**.
   - Do not set **Interval** or **Run single**.
2. Create an automation that uses a Command Line Interface step.

   For the **Command Line Message**, use the system script start command, using the label provided for the script in the previous procedure:

```
system script start StartContainerScript
```




Once the automation has been created, you can:

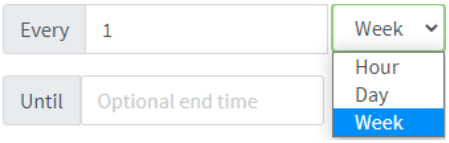
- Run the automation manually.
- Include the automation in a Configuration template as a post-remediation or post-scan step.

  When creating or editing a Configuration template, at the **Automation** page:

  1. For **Post Remediation Options**, click **Run Automation** and select the automation.
  2. For **On Successful Scan Options**, click **Run Automation** and select the automation.
- Include a trigger for the automation.

  When creating or editing an automation, at the **Triggers** page:

  1. Click to enable **Triggered** to configure the automation to be triggered, either on a schedule or by device activity.
     a. To configure the script to be run on a schedule:
        i. Click to enable **By Schedule**.
        ii. Click **Start Time**.
        iii. From the calendar provided, select the date and time that the script should be started for the first time.
        iv. By default, the script will run only once. Click to enable **Repeat** to configure the script to run on a regular basis:




        i. Type or select the number of times, and select the time period.
        ii. (Optional) Click **Until** to select a date and time when the automation schedule will stop repeating.

     b. To configure the automation to be triggered by device activity, click to enable one or more of the following:
        - **Run when a device enters the target scope**
        - **Run when a device in the target scope enters a maintenance window**:
        - **Run when a device in the target scope leaves debug mode**

        **Target scope** refers to a device that either:
        - Is member of a group that was selected on the **Target** page.
        - Has a tag that was selected on the **Target** page.
        - Is one of the devices included on the **Target** page.

# Upload a new LXC container

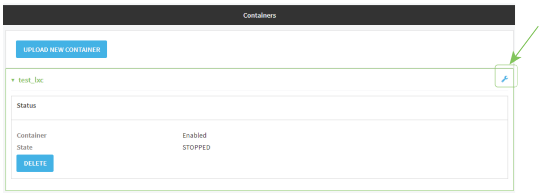
### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. From the main menu, click **Status**. Under **Services**, click **Containers**.
2. Click **Upload New Container**.

3. From your local file system, select the container file in *.tgz format.

   You can download a simple example container file, test_lxc.tgz, from the Digi website.
4. **Create Configuration** is selected by default. This will create a configuration on the device for the container when it is installed. If deselected, you will need to create the configuration manually.
5. Click **Apply**.
6. If **Create Configuration** was deselected when the container was created, click to go to the container configuration.




See Configure a container for further information about configuring the container.

# Configure a container

### *Required configuration items*

- The following configuration options are completed automatically if **Create Configuration** was selected when the container was created. See Upload a new LXC container for details:
  - Name of the container.
  - Enable the container.
  - Whether or not the container should use the device's system libraries.
- Determine whether or not the device should including virtual networking capabilities.

### *Additional configuration items*

- If virtual networking is enabled:
  - The bridge to be used to provide network connectivity.
  - A static IP address for the container.
  - The network gateway.
- Serial ports on the device that the container will have access to.

## Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

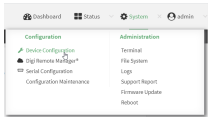
   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

b. Click the **Device ID**.
c. Click **Settings**.
d. Click to expand **Config**.

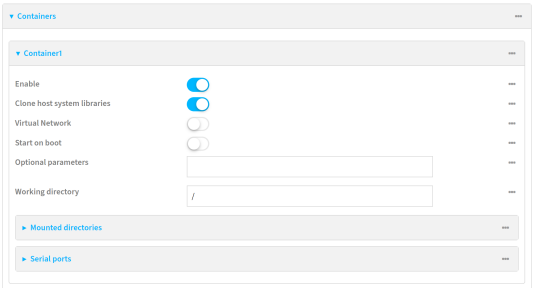
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **System** > **Containers**.
4. For **Add Container**, type the name of the container and click ✚.
   The Container configuration window is displayed.




   New containers are enabled by default. To disable, toggle off **Enable**.
5. **Clone host system libraries** is enabled by default. This allows the container to use the device's system libraries.
6. Enable **Virtual Network** if the container should have network access:
   a. Select a **Network Bridge Device** that will provide access to the container.
   b. (Optional) Enter a static **IP Address** and netmask for the container. This must be a valid IP address for the bridge, or, if left blank, a DHCP server can assign the container an IP address.
   c. (Optional) For **Gateway**, type the IP address of the network gateway.
7. Enable **Start on boot** to configure the container to start when the system boots.
   a. For **Restart timeout**, set the amount of time to wait before restarting the container, if the container ever stops. The default timeout of **0s** means that if the container stops, it will not be restarted.

      Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

      For example, to set **Restart timeout** to ten minutes, enter **10m** or **600s**.
8. (Optional) Type any **Optional parameters** for the container. Parameters are in the format accepted by the lxc utility.

9. (Optional) Type a **Working directory** to configure an initial working directory for the container. The directory is an absolute path within the container and must begin with "/". The default is **/**.
10. (Optional) Click to expand **Mounted directories** to configure system directories that will be mounted inside the container. Any mounted directories need to be accessible to a non-privileged user.
    a. For **Add Directory**, click ✚.
    b. For **Directory**, type the pathname of the directory to be mounted. The leading slash should be removed, so for example to mount the /opt directory, type **opt**.
11. (Optional) Click to expand **Serial ports** to assign serial ports that the container will have access to.
    a. For **Add Port**, click ✚.
    b. For **Port**, select the serial port.
12. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Create a new container:

```
(config)> add system container name
(config system container name)>
```

   where *name* is the

   New access points are enabled by default.
4. New containers are enabled by default. To disable:

```
(config system container name)> enable false
(config system container name)>
```

5. By default, the container will use the device's system libraries. To disable:

```
(config system container name)> dal false
(config system container name)>
```

6. If the device will use virtual networking:
   a. Enable virtual networking:

```
(config system container name)> network true
(config system container name)>
```

b. Set the network bridge device that will be used to provide network access:

i. Use the **?** to determine the available bridges:

```
(config system container name)> bridge ?

Network Bridge Device: Containers require a bridge to access the
network. Choose
which bridge to connect the container to.
Format:
  hotspot_bridge
  lan1
Current value:

(config system container name)>
```

ii. Set the bridge:

```
(config system container name)> bridge lan1
(config system container name)>
```

c. (Optional) Set the IP address and netmask for the container:

```
(config system container name)> address IP_address/netmask
(config system container name)>
```

d. (Optional) Set the IP address of the network gateway:

```
(config system container name)> gateway IP_address
(config system container name)>
```

7. To configure the container to start when the device boots:

```
(config system container name)> start_on_boot true
(config system container name)>
```

a. Set the amount of time to wait before restarting the container, if the container ever stops:

```
(config system container name)> restart_timeout value
(config system container name)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **restart_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config system container name)> restart_timeout 600s
(config system container name)>
```

The default timeout of **0s** means that if the container stops, it will not be restarted.

8. Type any optional parameters for the container:

```
(config system container name)> args parameters
(config system container name)>
```

   Parameters are in the format accepted by the lxc utility.

9. (Optional) Set an initial working directory for the container.

```
(config system container name)> workdir /value
(config system container name)>
```

   The directory is an absolute path within the container and must begin with "/". The default is **/**.

10. (Optional) Set any system directories that should be mounted inside the container. Any mounted directories need to be accessible to a non-privileged user.
    a. Add a system directory to be mounted:

```
(config system container name)> system_dirs directory
(config system container name)>
```

       where *directory* is the pathname of the directory to be mounted. The leading slash should be removed, so for example to mount the /opt directory, type **opt**.

    b. Repeat for additional directories.

11. For **Add Directory**, click ✚.
    a. For **Directory**, type the pathname of the directory to be mounted. The leading slash should be removed, so for example to mount the /opt directory, type **opt**.

12. (Optional) Assign serial ports that the container will have access to:
    a. Determine available serial ports:

```
(config system container name)> ... serial

Serial

 Additional Configuration
 ------------------------------------------------------------------------
----------
 port1                      Port 1
 ...

(config system container name)>
```

    b. Add the port:

```
(config system container name)> add ports end port1
(config system container name)>
```

13. Save the configuration and apply the change.

```
(config network wireless client new_client)> save
Configuration saved.
>
```

14. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Starting and stopping the container

Container commands are not available from the Admin CLI. See Authentication groups for information about configuring authentication groups that include shell access.

**Note** Container support must be enabled in Digi Remote Manager. Contact your Digi sales representative for information.

## Starting the container

There are two methods to start containers:

- Non-persistent: Changes made to the container file system will be lost when the container is stopped.
- Persistent: Changes made to the container file system when not be lost when the container is stopped.

### *Starting a container in non-persistent mode*

To start the container in non-persistent mode:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

2. At the shell prompt, type:

   ```
   # lxc container_name
   lxc #
   ```

   where *container_name* is the name of the container as configured on the device. For example:

   ```
   # lxc test_lxc
   lxc #
   ```

This will start the container by using **/bin/sh -l,** which runs the shell and loads the shell profile. The default shell profile includes an **lxc #** prompt.

### *Starting a container in persistent mode*

To start the container in persistent mode, include the **-p** option at the command line. For example:

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the shell prompt, type:

```
# lxc test_lxc -p
lxc #
```

This will start the container by using **/bin/sh -l,** which runs the shell and loads the shell profile. The default shell profile includes an **lxc #** prompt.

### *Starting a container by including an executable*

You can supply an executable to run when you start the container, along with any parameters. If you don't supply a parameter, the default behavior is to run the executable by using **/bin/sh -l,** which runs the shell and loads the shell profile. This is useful when you use the **Clone DAL** option when uploading the container, which includes the device's system libraries. In this case, the command without any additional parameters will use the device's shell. See Upload a new LXC container for more information.

## Stopping the container

1. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.
2. At the lxc shell prompt, type:

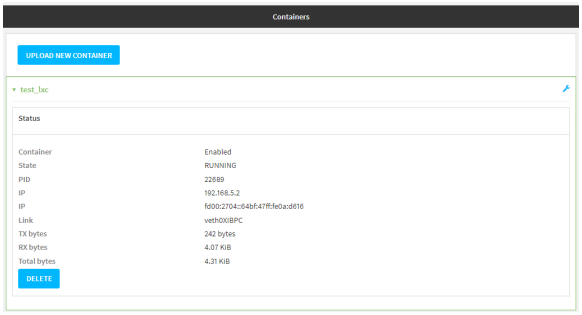
```
lxc # exit
#
```

# View the status of containers

### Web

1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. From the main menu, click **Status**. Under **Services**, click **Containers**.

The **Containers** status page displays.




## Command line

### Show status of all containers

Use the show containers command with no additional arguments to show the status of all containers on the system:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the prompt, type:

```
> show containers

 Container  Configured  Enabled  State
 ---------  ----------  -------  -----------------
 mytest1    True        enabled  STOPPED
 test_lxc   True        enabled  RUNNING PID 19327
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### Show status of a specific container

Use the show containers container *name* command to show the status of the specified container:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the prompt, type:

```
> show containers container test_lxc

 Container  Configured  Enabled  State
 ---------  ----------  -------  -----------------
```

```
 test_lxc   True        enabled  RUNNING PID 19327

>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Schedule a script to run in the container

This simple example will:

1. Start the container in non-persistent mode.
2. Execute a ping command every ten seconds from inside the container.

## Web

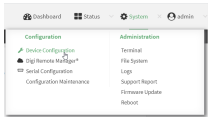
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

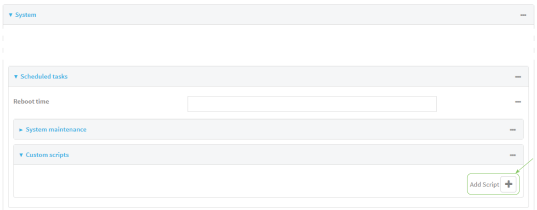
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

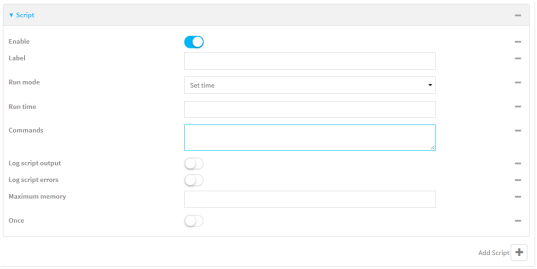
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **System** > **Scheduled tasks** > **Custom scripts**.
4. For **Add Script**, click ✚.



The script configuration window is displayed.




5. (Optional) For **Label**, type **container_script**.
6. For **Run mode**, select **Interval**.
7. For **Interval**, type **10s**.
8. For **Commands**, type the following:

```
lxc container_name /bin/ping -c 1 IP_address
```

For example:

```
lxc test_lxc /bin/ping -c 1 192.168.1.146
```

9. Click to disable **Sandbox**. Sandbox restrictions are not necessary when a container is used.
10. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a script:

```
(config)> add system schedule script end
(config system schedule script 0)>
```

4. Provide a label for the script, for example:

```
(config system schedule script 0)> label test_lxc
(config system schedule script 0)>
```

5. Set the mode to interval:

```
(config system schedule script 0)> when interval
(config system schedule script 0)>
```

6. Set the interval to ten seconds:

```
(config system schedule script 0)> on_interval 10s
(config system schedule script 0)>
```

7. Set the commands that will execute the script:

```
(config system schedule script 0)> commands "lxc script_name /bin/ping -c
1 IP_address"
(config system schedule script 0)>
```

For example:

```
(config system schedule script 0)> commands "lxc test_lxc /bin/ping -c 1
192.168.1.146"
(config system schedule script 0)>
```

8. Disable the **sandbox**. Sandbox restrictions are not necessary when a container is used.

```
(config system schedule script 0)> sandbox false
(config system schedule script 0)>
```

9. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Create a custom container

This example creates a simple custom container that contains a python script in the /etc directory.

In this example, we will use a simple container file named test_lxc.tgz. You can download test_lxc.tgz from the Digi website.

At the command line of a Linux host, we will unpack the file, add a simple python script, and create a new container file that includes the python script.

## Create the custom container file

1. At the command line of a Linux host, unpack the test_lxc.tgz file:

```
$ tar -xfv test_lxc.tgz
rootfs/
rootfs/usr/
rootfs/etc/
rootfs/etc/group
rootfs/etc/profile
rootfs/etc/passwd
```

```
rootfs/tmp/
$
```

2. Change to the rootfs/etc directory:

```
$ cd rootfs/etc
$
```

3. Create a file named test.py with the following contents:

```
print("Hello world.\n")
```

4. Change directories to leave the container file structure:

```
$ cd ../..
```

5. Change user and group permissions on all files in the container file structure:

```
$ sudo chown -R 165536 rootfs
$ sudo chgrp -R 165536 rootfs
```

6. Tar and zip the directory structure to create a new container file:

```
$ sudo tar -czvf python_lxc.tgz rootfs
```

If using macOS, include the --disable-copyfile option with this command:

```
$ sudo tar --disable-copyfile -czvf python_lxc.tgz rootfs
```

## Test the custom container file

1. Add the new container to your Connect EZ 16/32 device:

   Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

   a. From the main menu, click **Status**. Under **Services**, click **Containers**.
   b. Click **Upload New Container**.
   c. From your local file system, select the container file.

      You can download a simple example container file, test_lxc.tgz, from the Digi website.
   d. **Create Configuration** is selected by default. This will create a configuration on the device for the container when it is installed. If deselected, you will need to create the configuration manually.
   e. Click **Apply**.

2. Select a device in Remote Manager that is configured to allow shell access to the admin user, and click **Actions** > **Open Console**. Alternatively, log into the Connect EZ 16/32 local command line as a user with shell access.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **shell** to access the device shell.

3. At the shell prompt, type:

```
# lxc python_lxc
lxc #
```

4. Execute the python command:

```
lxc # python /etc/test.py
Hello world.
lxc #
```

# System administration

This chapter contains the following topics:


Review device status ..... 867
Configure system information ..... 868
Update system firmware ..... 870
Upgrade cellular modem firmware ..... 876
External storage ..... 880
Reboot your Connect EZ 16/32 device ..... 883
Erase device configuration and reset to factory defaults ..... 885
Locate the device by using the Find Me feature ..... 891
Enable FIPS mode ..... 892
Configuration files ..... 895
Schedule system maintenance tasks ..... 900
Disable device encryption ..... 905
Configure the speed of your Ethernet ports ..... 908
Watchdog service ..... 910
Configure the Watchdog service ..... 910
View Watchdog metrics ..... 913

# Review device status

You can review the system of your device from either the **Status** page of the Web interface, or from the command line:

## Web

To display system information:

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the main menu, click **Status**.

   A secondary menu appears, along with a status panel.
2. On the secondary menu, click to display the details panel for the status you want to view.

## Command line

To display system information, use the show system command.

- Show basic system information:
  1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

     Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
  2. Enter **show system** at the prompt:

```
> show system

  Model                    : Digi Connect EZ 16/32
  Serial Number            : Connect EZ 16/32xxxxxxxxyyyyxx
  SKU                      : Connect EZ 16/32
  Hostname                 : Connect EZ 16/32
  MAC Address              : DF:DD:E2:AE:21:18

  Hardware Version         : 50001947-01 1P
  Firmware Version         : 25.2
  Alt. Firmware Version    : 25.2
  Alt. Firmware Build Date : Fri, Jan 12, 2024 12:10:00
  Bootloader Version       : 19.7.23.0-15f936e0ed

  Current Time             : Thu, Jan 11, 2024 12:10:00 +0000
  CPU                      : 1.4%
  Uptime                   : 6 days, 6 hours, 21 minutes, 57 seconds
(541317s)
  Temperature              : 40C
  Location                 :
```

```
  Contact                 :


>
```

- Show more detailed system information:
  1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

     Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
  2. Enter **show system verbose** at the prompt:

```
> show system verbose

  Model                   : Digi Connect EZ 16/32
  Serial Number           : Connect EZ 16/32xxxxxxxxyyyyxx
  SKU                     : Connect EZ 16/32
  Hostname                : Connect EZ 16/32
  MAC Address             : DF:DD:E2:AE:21:18

  Hardware Version        : 50001947-01 1P
  Firmware Version        : 25.2
  Alt. Firmware Version   : 25.2
  Alt. Firmware Build Date : Fri, Jan 12, 2024 12:10:00
  Bootloader Version      : 19.7.23.0-15f936e0ed
  Schema Version          : 715

  Timezone                : UTC
  Current Time            : Thu, Jan 11, 2024 12:10:00 +0000
  CPU                     : 1.4%
  Uptime                  : 6 days, 6 hours, 21 minutes, 57 seconds
(541317s)
  Load Average            : 0.01, 0.03, 0.02
  RAM Usage               : 119.554MB/1878.984MB(6%)
  Temperature             : 40C
  Location                :
  Contact                 :
  Disk
  ----
  Disk /etc/config Usage  : 18.421MB/4546.371MB(0%)
  Disk /var/log_mnt Usage : 0.104MB/14.868MB(1%)
  Disk /opt Usage         : 215.739MB/458.328MB(50%)
  Disk /tmp Usage         : 0.003MB/120.0MB(0%)
  Disk /var Usage         : 0.816MB/32.0MB(3%)

>
```

# Configure system information

You can configure information related to your Connect EZ 16/32 device, such as providing a name and location for the device.

### Configuration items

- A name for the device.
- The name of a contact for the device.
- The location of the device.
- A description of the device.
- A banner that will be displayed when users access terminal services on the device.

To enter system information:

## Web

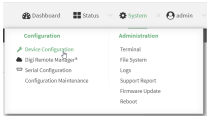
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **System**.
4. For **Name**, type a name for the device. This name will appear in log messages and at the command prompt.
5. For **Contact**, type the name of a contact for the device.
6. For **Location**, type the location of the device.
7. For **Banner**, type a banner message that will be displayed when users log into terminal services on the device.
8. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set a name for the device. This name will appear in log messages and at the command prompt.

```
(config)> system name 192.168.3.1
192.168.3.1(config)>
```

4. Set the contact for the device:

```
192.168.3.1(config)> system contact "Jane User"
192.168.3.1(config)>
```

5. Set the location for the device:

```
192.168.3.1(config)> system location "9350 Excelsior Blvd., Suite 700,
Hopkins, MN"
192.168.3.1(config)>
```

6. Set the banner for the device. This is displayed when users access terminal services on the device.

```
192.168.3.1(config)> system banner "Welcome to the Digi Connect EZ
16/32."
192.168.3.1(config)>
```

7. Save the configuration and apply the change.

```
192.168.3.1(config)> save
Configuration saved.
192.168.3.1>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Update system firmware

The Connect EZ 16/32 operating system firmware images consist of a single file with the following naming convention:

***platform-version*.bin**

For example, **Connect EZ 16/32-25.2.54.xxx**

## Manage firmware updates using Digi Remote Manager

If you have a network of many devices, you can use Digi Remote Manager **Profiles** to manage firmware updates. Profiles ensure all your devices are running the correct firmware version and that

all newly installed devices are updated to that same version. For more information, see the **Profiles** section of the *Digi Remote Manager User Guide*.

## Python and DAL OS firmware updates

Make sure to check the Python version you are using and that it is compatible with the DAL OS firmware version to which you want to upgrade. You may need to update any Python scripts you have so they are compatible with the Python running on the DAL OS firmware version you choose. See Python versions and corresponding DAL OS firmware versions.

## Certificate management for firmware images

The system firmware files are signed to ensure that only Digi-approved firmware load onto the device. The Connect EZ 16/32 device validates the system firmware image as part of the update process and only successfully updates if the system firmware image can be authenticated.

## Downgrading

Downgrading to an earlier release of the firmware may result in the device configuration being erased.

### *Downgrading from firmware version 22.2.9.x*

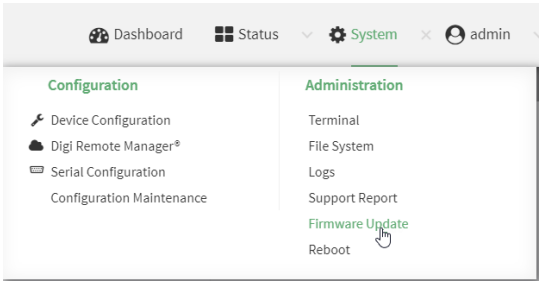
Beginning with firmware version 22.2.9.x, the Connect EZ 16/32 device uses certificate-based communication for enhanced security when connecting to Digi Remote Manager. If you downgrade your firmware from version 22.2.9.x to version 21.11.x or previous, your device will no longer be able to communicate with Remote Manager.

To remedy this issue, select the device in Remote Manager and select **Actions** > **Reset Device Certificate**.

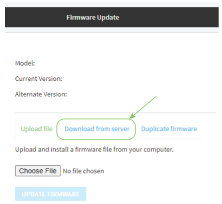
## Update firmware over the air (OTA) from the Digi firmware server

### Web

1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. On the main menu, click **System**. Under **Administration**, click **Firmware Update**.




3. Click **Download from server**.




4. For **Version:**, select the appropriate version of the device firmware.
5. Click **Update Firmware**.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. >Use the **system firmware ota check** command to determine if new modem firmware is available on the Digi firmware repository.

```
> system firmware ota check
Current firmware version is 23.9.74.0
Checking for latest Connect EZ 16/32 firmware...
Newest firmware version available to download is '25.2'
Device firmware update from '23.9.74.0' to '25.2' is needed
>
```

3. Use the **modem firmware ota list** command to list available firmware on the Digi firmware repository.

```
> system firmware ota list
23.9.74.0
25.2
>
```

4. Perform an OTA firmware update:
   - To perform an OTA firmware update by using the most recent available firmware from the Digi firmware repository:
     a. Update the firmware:

```
> system firmware ota update
Downloading firmware version '25.2'...
Downloaded firmware /tmp/cli_firmware.bin remaining
Applying firmware version '25.2'...
41388K
netflash: got "/tmp/cli_firmware.bin", length=42381373
netflash: authentication successful
netflash: vendor and product names are verified.
netflash: programming FLASH device /dev/flash/image1
41408K 100%
```

```
Firmware update completed, reboot device
>
```

b. Reboot the device:

```
> reboot
>
```

- To perform an OTA firmware update by using a specific version from the Digi firmware repository, use the **version** parameter to identify the appropriate firmware version as determined by using **system firmware ota list** command. For example:

a. Update the firmware:

```
> system firmware ota update version 25.2
Downloading firmware version '25.2'...
Downloaded firmware /tmp/cli_firmware.bin remaining
Applying firmware version '25.2'...
41388K
netflash: got "/tmp/cli_firmware.bin", length=42381373
netflash: authentication successful
netflash: vendor and product names are verified.
netflash: programming FLASH device /dev/flash/image1
41408K 100%
Firmware update completed, reboot device
>
```

b. Reboot the device:

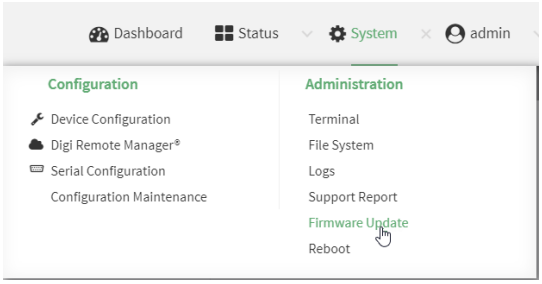
```
> reboot
>
```

## Update firmware from a local file

### Web

1. Download the Connect EZ 16/32 operating system firmware from the Digi Support FTP site to your local machine.

   Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. On the main menu, click **System**. Under **Administration**, click **Firmware Update**.




3. Click **Choose file**.

4. Browse to the location of the firmware on your local file system and select the file.
5. Click **Update Firmware**.

### Command line

1. Download the Connect EZ 16/32 operating system firmware from the Digi Support FTP site to your local machine.
2. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
3. Load the firmware image onto the device. We recommend using the /tmp directory.

```
> scp host hostname-or-ip user username remote remote-path local local-
path to local
```

   where:

   - *hostname-or-ip* is the hostname or IP address of the remote host.
   - *username* is the name of the user on the remote host.
   - *remote-path* is the path and filename of the file on the remote host that will be copied to the Connect EZ 16/32 device.
   - *local-path* is the location on the Connect EZ 16/32 device where the copied file will be placed.

   For example:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/Connect EZ
16/32-25.2.bin local /tmp/ to local
admin@192.168.4.1's password: adminpwd
Connect EZ 16/32-25.2.bin                          100%    36MB    11.1MB/s        00:03
>
```

4. Verify that the firmware file has been successfully uploaded to the device:

```
> ls /tmp
-rw-r--r--    1 root     root      37511229 May 16 20:10 Connect EZ
16/32-25.2.bin
-rw-r--r--    1 root     root          2580 May 16 16:44 blank.json
...
>
```

5. Update the firmware by entering the system firmware update command, specifying the path and file name to the firmware file:

```
> system firmware update file /tmp/Connect EZ 16/32-25.2.bin
36632K
netflash: got "/tmp/Connect EZ 16/32-25.2.bin", length=37511229
netflash: authentication successful
netflash: programming FLASH device /dev/flash/image
36633K 100%
```

```
Firmware update completed, reboot device
>
```

6. Reboot the device to run the new firmware image using the reboot command.

```
> reboot
Rebooting system
>
```

7. Once the device has rebooted, log into the Connect EZ 16/32's command line as a user with Admin access and verify the running firmware version by entering the show system command.

```
> show system

 Hostname                : Connect EZ 16/32
 FW Version              : 25.2
 MAC                     : 0040FF800120
 Model                   : Digi Connect EZ 16/32
 Current Time            : Thu, Jan 11, 2024 12:10:00 +0000
 Uptime                  : 42 seconds (42s)

>
```

## Dual boot behavior

By default, the Connect EZ 16/32 device stores two copies of firmware in two flash memory banks:

- The current firmware version that is used to boot the device.
- A copy of the firmware that was in use prior to your most recent firmware update.

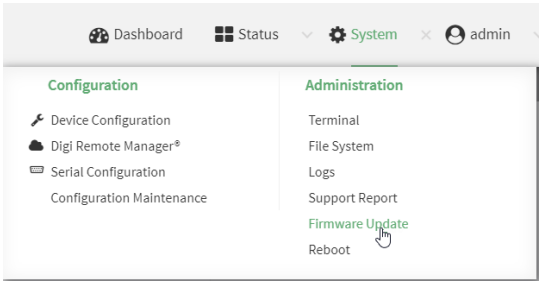
When the device reboots, it will attempt to use the current firmware version. If the current firmware version fails to load after three consecutive attempts, it is marked as invalid and the device will use the previous firmware version stored in the alternate memory bank.

If the device consistently loses power during the boot process, this may result in the current firmware being marked as invalid and the device downgrading to a previous version of the firmware. As a result of this behavior, you can use the following procedure to guarantee that the same firmware is stored in both memory banks:

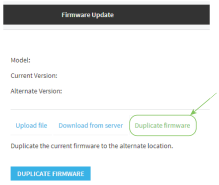
### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the main menu, click **System**. Under **Administration**, click **Firmware Update**.




2. Click **Duplicate firmware**.




3. Click **Duplicate Firmware**.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Duplicate the firmware:

```
> system duplicate-firmware
>
```

## Upgrade cellular modem firmware

You can upgrade modem firmware by downloading firmware from the Digi firmware repository, or by uploading firmware from your local storage onto the device. You can also schedule modem firmware updates. See Schedule system maintenance tasks for details.

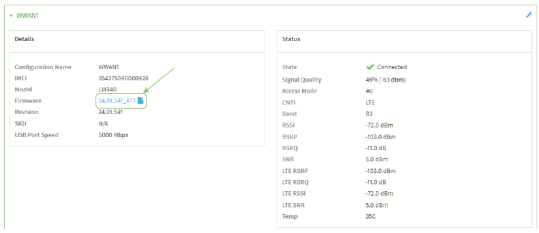
**Note** Before attempting to update cellular module firmware, you should either ensure that there is a SIM card in the module, or disable **SIM failover**. See Configure a Wireless Wide Area Network (WWAN) for details about **SIM failover**.

### Web

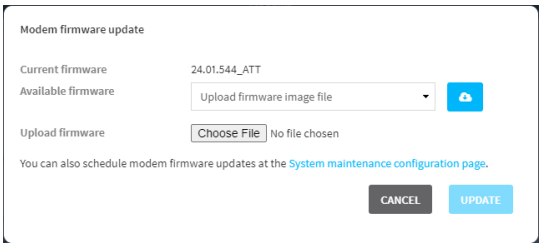
1. (Optional) Download the appropriate modem firmware from the Digi repository to your local machine.

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

2. From the main menu, click **Status** > **Modems**.
3. Click the modem firmware version.



The **Modem firmware update** window opens.




4. To update using firmware from the Digi firmware repository:
   a. Click to view available versions.
   b. For Available firmware, select the firmware.
5. To update using firmware from your local file system:
   a. Click **Choose File**.
   b. Select the firmware.
6. To schedule firmware updates, click **System maintenance configuration page**. See Schedule system maintenance tasks for details.
7. Click **Update**.

### Command line

## Update modem firmware over the air (OTA)

You can update your modem firmware by querying the Digi firmware repository to determine if there is new firmware available for your modem and performing an OTA modem firmware update:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the **modem firmware ota check** command to determine if new modem firmware is available on the Digi firmware repository.

```
> modem firmware ota check
```

```
Checking for latest ATT firmware ...
Retrieving modem firmware list ...
Newest firmware version available to download is '24.01.5x4_ATT'
Modem firmware update from '24.01.544_ATT' to '24.01.5x4_ATT' is needed
24.01.5x4_ATT
24.01.544_ATT

>
```

3. Use the **modem firmware ota list** command to list available firmware on the Digi firmware repository.

```
>  modem firmware ota list

Retrieving modem firmware list ...
25.20.664_CUST_044_3
25.20.666_CUST_067_1
25.20.663_CUST_040

>
```

4. Perform an OTA firmware update:
   - A firmware bundle includes images for each carrier supported by a specific modem. To perform an OTA update by choosing a firmware bundle based on the type of modem in your device:

     ```
     modem firmware bundle ota [check|list|download|update]
     ```

   - To perform an OTA firmware update by using the most recent available modem firmware from the Digi firmware repository, type:

     ```
     >  modem firmware ota update

     Checking for latest Generic firmware ...
     Retrieving modem firmware list ...
     Newest firmware version available to download is '25.20.666_CUST_
     067_1'
     Retrieving download location for modem firmware '25.20.666_CUST_067_
     1' ...

     >
     ```

   - To perform an OTA firmware update by using a specific version from the Digi firmware repository, use the **version** parameter to identify the appropriate firmware version as determined by using **modem firmware ota list** command. For example::

     ```
     >  modem firmware ota update version 24.01.5x4_ATT

     Retrieving download location for modem firmware '24.01.5x4_ATT' ...
     Downloading modem firmware '24.01.5x4_ATT' to '/opt/LE910C4_
     NF/Custom_Firmware' ...
     ```

```
Modem firmware '24.01.5x4_ATT' downloaded
Updating modem firmware ...
Programming modem firmware ...

Found modem ...
Validate modem firmware ...
Getting ready for update ...
Stopping services ...
Running update pass 1 of 3 ...
Restarting services ...
-----------------------------
Successfully updated firmware
Modem firmware update complete

>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Update modem firmware by using a local firmware file

You can update your modem firmware by uploading a modem firmware file to your Connect EZ 16/32 device. Firmware should be uploaded to /opt/*MODEM_MODEL*/Custom_Firmware, for example, /opt/LM940/Custom_Firmware.

Modem firmware can be downloaded from Digi here. Follow instructions on this page to determine the cellular module used by your device. After downloading, use tar or a similar unzipping tool to extract the firmware prior to uploading to the device. Note that the firmware file may not have a tar.gz extension, but it is a tar file and can be unzipped with tar or a similar tool. See Use the scp command for information about uploading files to the Connect EZ 16/32 device.

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Use the **modem firmware check** command to determine if new modem firmware is available on local device.

```
> modem firmware check

Checking for latest ATT firmware in flash ...
Newest firmware version available in flash is '05.05.58.00_ATT_005.026_
000'
Modem firmware up to date
05.05.58.00_ATT_005.026_000

> modem firmware check
```

3. Use the **modem firmware list** command to list available firmware on the Connect EZ 16/32 device.

```
>  modem firmware list

ATT, 24.01.544_ATT, current
Generic, 24.01.514_Generic, image
Verizon, 24.01.524_Verizon, image
ATT, 24.01.544_ATT, image
Sprint, 24.01.531-B003_Sprint, image

>
```

4. To perform a firmware update by using a local file, use the **version** parameter to identify the appropriate firmware version as determined using the **modem firmware check** or **modem firmware list** command. For example, to update a Telit modem to firmware version 24.01.5x4_ATT:

```
>  modem firmware update version 24.01.5x4_ATT name [modem_name]

Updating modem firmware ...

------------------------------
Successfully updated firmware
Modem firmware update complete

>
```

Or, to update a Sierra modem firmware using the firmware files loaded into the /opt/MODEM_MODEL/Custom_Firmware directory:

```
>  modem firmware update version /opt/MODEM_MODEL/Custom_Firmware name
[modem_name]
Updating modem firmware...

------------------------------
Successfully updated firmware
Modem firmware update complete

>
```

Where **[modem_name]** is the name of the modem you would like to update (e.g. modem, wwan1, wwan2). If you don't know the modem name, you can use tab-completion in the above command, or run the **show modem** CLI command to see a list of available modems in the device.

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# External storage

You can configure different methods of external storage for system and serial logs from the **External Storage** page.

## Configure external storage on an SD card

You can configure the external storage on an SD card by formatting the SD card and selecting a partition to mount.

Once you have configured the SD card storage options, you can enable the automount feature, which ensures that the defined storage configuration is automatically applied each time you connect an SD card to the Connect EZ 16/32.

**Note** As an alternative, you can use the following CLI commands to configure an SD card:system storage show, system storage mount, system storage format, and config system storage mount.

1. Connect an SD card to the Connect EZ 16/32.

   The SD card is on the front of the device. See Front panel and LEDs.
2. Log into the WebUI as a user with Admin access.
3. From the main menu, click **System**.
4. Click **External Storage**.
5. Expand the **SD Card** section. Information about the SD card displays.

   **Note** If an SD card is not connected to the device, the default mount path displays and a message displays for the device path. No other fields display.

   - **Mount Path**: /opt/ext/sd
   - **Device Path**: The device path assigned to the mounted SD card. If an SD card is not connected to the device, the message "Device not present" displays.
   - **Total Size**: The amount of space on the SD card.
   - **Partitions**: The number of partitions on the SD card, and the file system and size of each partition.
6. You can format the SD card.
   a. From the **Format Device** list box, select a format option: **exfat** or **ext4**.
   b. Click **Format**.
7. You can specify the partition on the SD card that you want to use.
   a. From the **Mount Device** list box, select a partition.
   b. Click **Mount**.
8. Enable the automount feature. When enabled, the SD card is automatically mounted as configured when is is connected to the Connect EZ 16/32 or if it is rebooted.
   a. Click **Auto Mount**.
   b. Click **Apply**. Additional fields display.
9. Review the space available. The amount of space currently used and the corresponding percentage displays in the **Used Size** field

   (Optional) You can choose to generate a system log event when a specified percentage of the share is used.
   a. In the **Monitor** field, enter the threshold percentage. When this threshold is met, an **External Storage** system log event is generated. For information about system log event categories, see Configure options for the event and system logs.

b. If a system log event is generated, you can choose email a notification or save it to an SNMP trap. See Configure an email notification for a system event and Configure an SNMP trap for a system event.

c. Click **Apply**.

## Configure external storage on a network server

You can configure the external storage on a network server.

1. Log into the WebUI as a user with Admin access.
2. From the main menu, click **System**.
3. Click **External Storage**.
4. Expand the **NFS Filesystem** section. Information about the NFS share displays.
   - **Mount Path**: /opt/ext/nfs
5. Specify the server name and server path.
   a. In the **Server Name** field, enter the hostname or IP address of the network server.
   b. In the **Server Path** field, enter the NFS share that can be used for storage.
   c. Click **Apply**.
6. Enable the automount feature. When enabled, the NFS share is automatically mounted when the Connect EZ 16/32 is powered or if it is rebooted.
   a. Click **Enable**.
   b. Click **Apply**. Additional fields display.
7. Review the space available. The amount of space currently used and the corresponding percentage displays in the **Used Size** field

   (Optional) You can choose to generate a system log event when a specified percentage of the share is used.
   a. In the **Monitor** field, enter the threshold percentage. When this threshold is met, an **External Storage** system log event is generated. For information about system log event categories, see Configure options for the event and system logs.
   b. If a system log event is generated, you can choose email a notification or save it to an SNMP trap. See Configure an email notification for a system event and Configure an SNMP trap for a system event.
   c. Click **Apply**.

## Configure log location

You can configure the location to which system and serial logs are stored.

1. Log into the WebUI as a user with Admin access.
2. From the main menu, click **System**.
3. Click **External Storage**.
4. Expand the **Logging Location** section.
5. From the **Store Logs to** list box, select an option.
   - **RAM**: The system and serial logs are stored in volatile memory. Log contents are not retained across a reboot.

- **SD Card**: The system and serial logs are stored on the SD card. When this option is selected, the **Log Path** field displays. The log path defaults to the mount path for the SD card, but can be changed.
- **NFS**: The system and serial logs are stored on a network server. When this option is selected, the **Log Path** field displays. The log path defaults to the mount path for the network server, but can be changed.

6. Click **Apply**.

# Reboot your Connect EZ 16/32 device

You can reboot the Connect EZ 16/32 device immediately or schedule a reboot for a specific time every day.

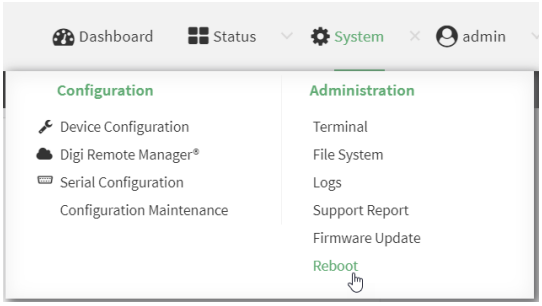
**Note** You may want to save your configuration settings to a file before rebooting. See Save configuration to a file.

## Reboot your device immediately

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. From the main menu, click **System**.
2. Click **Reboot**.




3. Click **Reboot** to confirm that you want to reboot the device.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the prompt, type:

```
> reboot
```

## Schedule reboots of your device

### Web

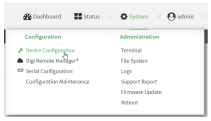
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Select **System** > **Scheduled tasks**.
4. For **Reboot time**, enter the time of the day that the device should reboot, using the format *HH*:*MM*. The device will reboot at this time every day.

   If **Reboot time** is set, but the device is unable to synchronize its time with an NTP server, the device will reboot after it has been up for 24 hours. See System time synchronization for information about configuring NTP servers. If **Reboot window** is set, the reboot will occur during a random time within the reboot window.
5. For **Reboot window**, enter the maximum random delay that will be added to **Reboot Time**.

   Allowed values are any number of hours, minutes, or seconds, and take the format ***number*** {**h|m|s**}.

   For example, to set **parameter name** to ten minutes, enter **10m** or **600s**.
   The default is **10m**, and the maximum allowed time is **24h**.
6. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Set the reboot time:

```
(config>> system schedule reboot_time time
(config)>
```

where *time* is the time of the day that the device should reboot, using the format *HH:MM*. For example, the set the device to reboot at two in the morning every day:

```
(config>> system schedule reboot_time 02:00
(config)>
```

If **reboot_time** is set, but the device is unable to synchronize its time with an NTP server, the device will reboot after it has been up for 24 hours. See System time synchronization for information about configuring NTP servers. If **reboot_window** is set, the reboot will occur during a random time within the reboot window.

4. Set the maximum random delay that will be added to **reboot_time**:

```
(config>> system schedule reboot_window value
(config)>
```

where *value* is any number of hours, minutes, or seconds, and takes the format ***number*** {**h|m|s**}.

For example, to set **reboot_window** to ten minutes, enter either **10m** or **600s**:

```
(config)> system schedule reboot_window 600s
(config)>
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Erase device configuration and reset to factory defaults

You can erase the device configuration in the WebUI, at the command line, or by using the **RESET** button on the device. Erasing the device configuration performs the following actions:

- Clears all configuration settings. When the device restarts, it uses the factory default configuration.
- Deletes all user files including Python scripts.
- Clears event and system log files.

Additionally, if the **RESET** button is used to erase the configuration, pressing the **RESET** button a second time immediately after the device has rebooted:

- Erases all automatically generated certificates and keys.
- With firmware release 22.2.9.x and newer, erases the client-side certificate used for communication with Digi Remote Manager.

  If you are using Digi Remote Manager with firmware release 22.2.9.x and newer, by default the device uses a client-side certificate for communication with Remote Manager. If the client-side certificate is erased, you must use the Remote Manager interface to reset the certificate.
- If your device uses a custom factory default, the custom factory default will be removed and the device will reboot using standard factory default settings.

You can also reset the device to the default configuration without removing scripts, keys, and logfiles by using the **revert** command.

### Reset the device by using the RESET button

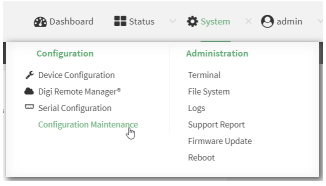
1. Locate the **RESET** button on your device.
2. Press the **RESET** button perform a device reset. The **RESET** button has the following modes:
   - **Configuration reset**:
     - Press and release the **RESET** button for **10** seconds.
     - The device reboots automatically and resets to factory defaults. This does not remove any automatically generated certificates and keys.
   - **Full device reset**:
     - After the device reboots from the first button press, immediately press and release the **RESET** button for **10** seconds again.
     - The device reboots again and resets to factory defaults, as well as also removing generated certificates and keys.
3. After resetting the device:
   a. Connect to the Connect EZ 16/32 by using the serial port or by using an Ethernet cable to connect the Connect EZ 16/32 **ETH2** port to your PC.
   b. Log into the Connect EZ 16/32:

      **User name**: Use the default user name: **admin**.

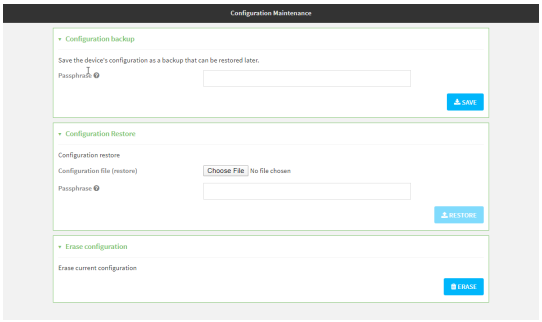
      **Password**: Use the unique password printed on the bottom label of the device (or the printed label included in the package).
   c. (Optional) Reset the default password for the admin account. See Change the default password for the admin user for further information.

### Web

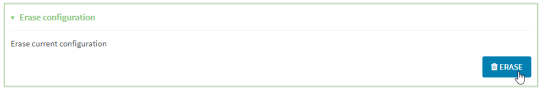
1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. On the main menu, click **System**. Under **Configuration**, click **Configuration Maintenance**.



The **Configuration Maintenance** windows is displayed.




3. In the **Erase configuration** section, click **ERASE**.




4. Click **CONFIRM**.
5. After resetting the device:
   a. Connect to the Connect EZ 16/32 by using the serial port or by using an Ethernet cable to connect the Connect EZ 16/32 **ETH2** port to your PC.
   b. Log into the Connect EZ 16/32:

      **User name**: Use the default user name: **admin**.

      **Password**: Use the unique password printed on the bottom label of the device (or the printed label included in the package).
   c. (Optional) Reset the default password for the admin account. See Change the default password for the admin user for further information.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Enter the following:

```
> system factory-erase
```

   A confirmation message appears.
3. Type `yes` to confirm that you want all configurations deleted, the factory configuration reset, and the device rebooted.
4. After resetting the device:
   a. Connect to the Connect EZ 16/32 by using the serial port or by using an Ethernet cable to connect the Connect EZ 16/32 **ETH2** port to your PC.
   b. Log into the Connect EZ 16/32:

      **User name**: Use the default user name: **admin**.

**Password**: Use the unique password printed on the bottom label of the device (or the printed label included in the package).

c. (Optional) Reset the default password for the admin account. See Change the default password for the admin user for further information.

### Reset the device with the revert command

You can reset the device to the default configuration without removing scripts, keys, and logfiles by using the **revert** command:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, enter **revert**:

```
(config)> revert
(config)>
```

4. Set the password for the admin user prior to saving the changes:

```
(config)> auth user admin password pwd
(config)>
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Custom factory default settings

You can configure your Connect EZ 16/32 device to use a custom factory default configuration file. This way, when you erase the device's configuration, the device will reset to your custom configuration rather than to the original factory defaults.

### *Required configuration items*

- Custom factory default configuration (*bin*) file.

### *Configure the Connect EZ 16/32 device to use custom factory default settings*

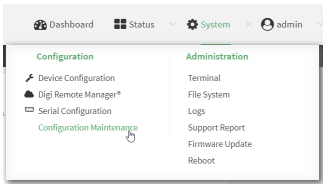
Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

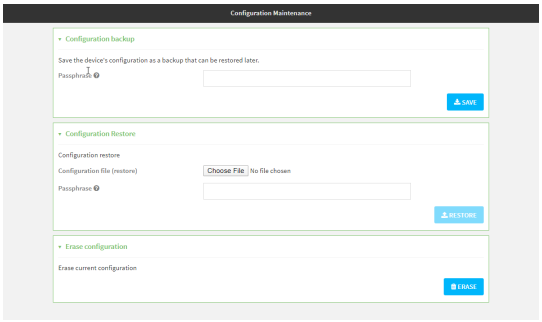
1. Configure your Connect EZ 16/32 device to match the desired custom factory default configuration.

   For example, you may want to configure the device to use a custom APN or a particular network configuration, so that when you reset the device to factory defaults, it will automatically have your required network configuration.

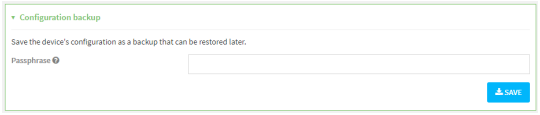
2. On the main menu, click **System**. Under **Configuration**, click **Configuration Maintenance**.




   The **Configuration Maintenance** windows is displayed.




3. In the **Configuration backup** section, click **SAVE**.

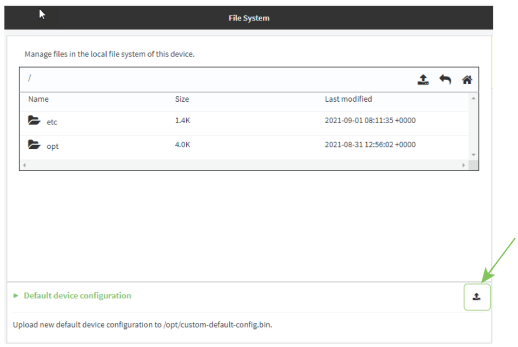



   Do not set a **Passphrase** for the configuration backup. The file will be downloaded using your browser's standard download process.

4. After the configuration backup file has been downloaded, rename the file to:

   **custom-default-config.bin**

5. Upload the file to the device:
   a. From the main menu, select **System** > **Filesystem**.
   b. Under **Default device configuration**, click .




c. Select the file from your local file system.

6. Reboot the device.

**Note** After configuring a device to use custom factory default settings, wait five minutes after restoring to defaults before:

- Powering off the device.
- Performing any additional configuration restoration activities.

If you do not wait five minutes after restoring to custom factory defaults before performing these activities, the device will clear the custom factory defaults and reboot to standard factory defaults.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. The table below lists the available commands.

| Commands | Description |
|---|---|
| **system custom-default-config file** ***[file name]*** | Set the file you specify as the custom factory default configuration file (custom-default-config.bin). The SHA file is also created.<br>Where *filename* is the name of the file created using the *system backup* command. |
| **system custom-default-config current** | Save the current configuration as a *custom-default-config.bin* file. The SHA file is also created. |
| **system custom-default-config remove** | Remove the *custom-default-config.bin* and SHA files. |

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

---

Note After configuring a device to use custom factory default settings, wait five minutes after restoring to defaults before:

- Powering off the device.
- Performing any additional configuration restoration activities.

If you do not wait five minutes after restoring to custom factory defaults before performing these activities, the device will clear the custom factory defaults and reboot to standard factory defaults.

---

### Clear the custom factory default settings

After configuring the device to use custom factory default settings, to clear the custom default configuration and reset the device to standard factory defaults:

1. Press the device's RESET button.
2. Wait for the device to reboot.
3. Press the RESET button a second time.

You must press the RESET the second time within five minutes of the first in order to clear the custom default configuration.

## Locate the device by using the Find Me feature

Use the **Find Me** feature to cause LEDs on the device to blink, which can help you to identify the specific device.

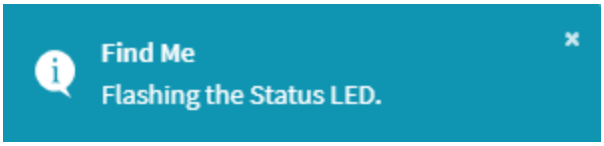
To use this feature:

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

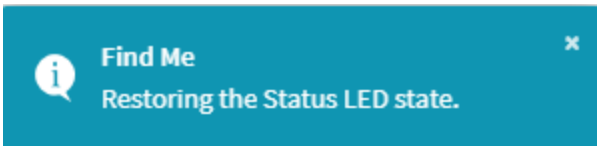
1. On the menu, click **System**. Under **Administration**, click **Find Me**.

   A notification message appears, noting that the LED is flashing on the device. Click the **x** in the message to close it.




2. On the menu, click **System** again. Ablue circle next to **Find Me** is blinking, indicating that the **Find Me** feature is active.
3. To deactivate the **Find Me** feature, click **System** and click **Find Me** again.

   A notification message appears, noting that the LED is no longer flashing on the device. Click the **x** in the message to close it.




### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. To activate the **Find Me** feature, at the prompt, type the following at the command prompt:

```
> system find-me on
>
```

3. To deactivate the **Find Me** feature, type the following at the command prompt:

```
> system find-me off
>
```

4. To determine the status of the **Find Me** feature, type the following at the command prompt:

```
> system find-me status
off
>
```

## Enable FIPS mode

You can enable your device to be Federal Information Processing Standard (FIPS) 140-2 compliant.

With FIPs 140-2 compliance, only FIPS 140-2 cipher and MAC algorithms are available. As a result, features like stunnel, ssh, and openvpn are limited in what they can use. For example, in FIPS mode ssh will only offer and negotiate AES based ciphers.

When the FIPS setting is changed, the device will reboot automatically. Disabling FIPS after it has been enabled will cause the current configuration to be erased.

### Web

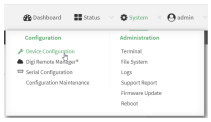
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

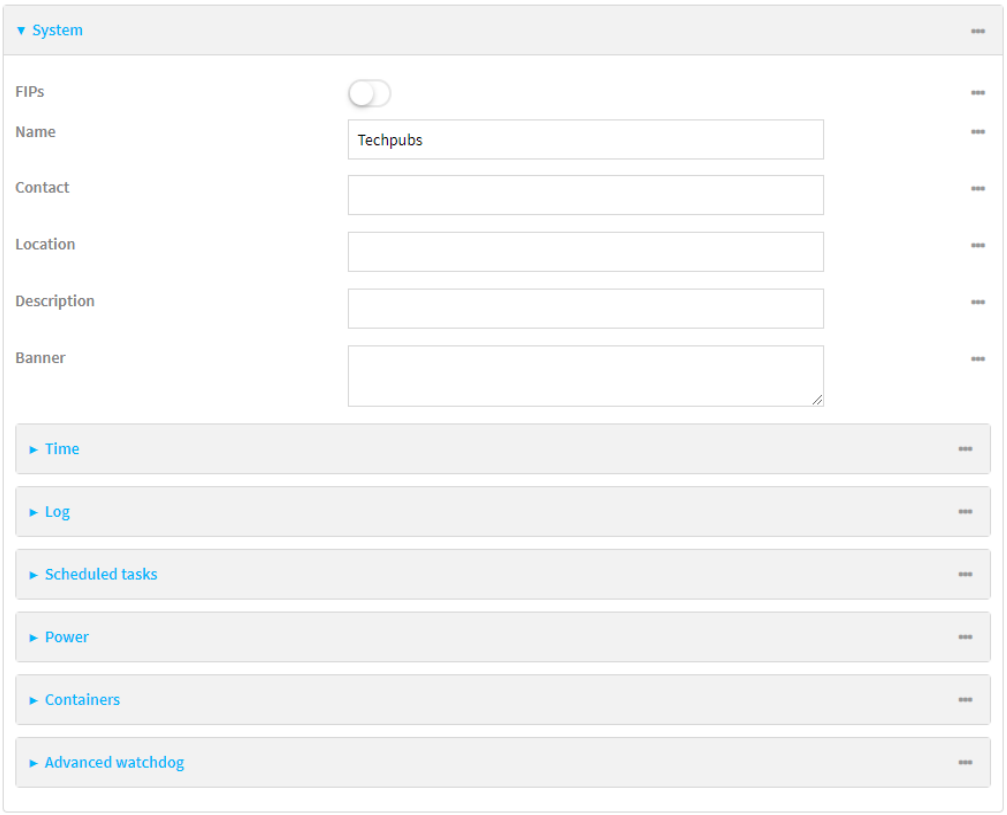
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Expand **System**.




4. Click to enable **FIPs**.
5. Click **Apply** to save the configuration and apply the change. The the device will reboot automatically.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Enable FIPS:

```
(config)> system fips true
>
```

3. Save the change. The the device will reboot automatically.

```
(config)> save
>
```

# Configuration files

The Connect EZ 16/32 configuration file, /etc/config/accns.json, contains all configuration changes that have been made to the device. It does not contain the complete device configuration; it only contains changes to the default configuration. Both the default configuration and the changes contained in the accns.json file are applied when the device reboots.

## Save configuration changes

When you make changes to the Connect EZ 16/32 configuration, the changes are not automatically saved. You must explicitly save configuration changes, which also applies the changes. If you do not save configuration changes, the system discards the changes.

### Web

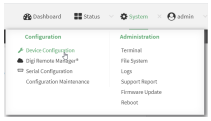
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Make any necessary configuration changes.
4. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Make any necessary configuration changes.
4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Save configuration to a file

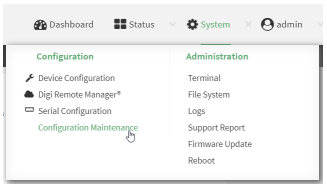
You can save your Connect EZ 16/32 device's configuration to a file and use this file to restore the configuration, either to the same device or to similar devices.

### Web

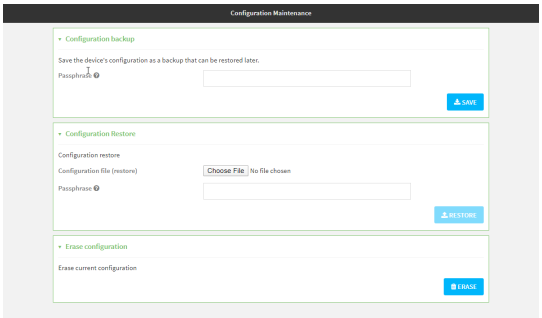
This procedure creates a binary archive file containing the device's configuration, certificates and keys, and other information.

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the main menu, click **System**. Under **Configuration**, click **Configuration Maintenance**.




The **Configuration Maintenance** windows is displayed.




2. In the **Configuration backup** section:
   a. (Optional) To encrypt the configuration using a passphrase, for **Passphrase (save/restore)**, enter the passphrase.
   b. Click **SAVE**.

The file will be downloaded using your browser's standard download process.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Enter the following:

   ```
   > system backup path [passphrase passphrase] type type
   ```

   where
   - *path* is the location on the Connect EZ 16/32's filesystem where the configuration backup file should be saved.
   - *passphrase* (optional) is a passphrase used to encrypt the configuration backup.
   - *type* is the type of backup, either:
     - **archive**: Creates a binary archive file containing the device's configuration, certificates and keys, and other information.
     - **cli-config**: Creates a text file containing only the configuration changes.

   For example:

   ```
   > system backup /etc/config/scripts/ type archive
   ```
3. (Optional) Use **scp** to copy the file from your device to another host:

   ```
   > scp host hostname-or-ip user username remote remote-path local local-path to remote
   ```

   where:
   - *hostname-or-ip* is the hostname or IP address of the remote host.
   - *username* is the name of the user on the remote host.
   - *remote-path* is the location on the remote host where the file will be copied.
   - *local-path* is the path and filename on the Connect EZ 16/32 device.

   For example:

   ```
   > scp host 192.168.4.1 user admin remote /home/admin/bin/ local /etc/config/backup-archive-0040FF800120-19.05.17-19.01.17.bin to remote
   ```

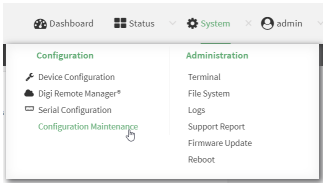
## Restore the device configuration

You can restore a configuration file to your Connect EZ 16/32 device by using a backup from the device, or a backup from a similar device.

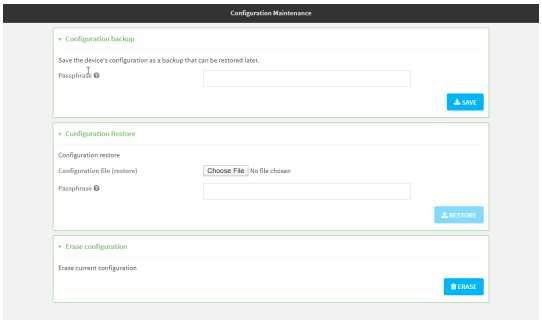
### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the main menu, click **System**. Under **Configuration**, click **Configuration Maintenance**.




The **Configuration Maintenance** windows is displayed.




2. In the **Configuration Restore** section:
   a. If a passphrase was used to create the configuration backup, for **Passphrase (save/restore)**, enter the passphrase.
   b. Under **Configuration Restore**, click **Choose File**.
   c. Browse to the system firmware file location on your local computer and select the file.
   d. Click **RESTORE**.
3. Click **CONFIRM**.

   The configuration will be restored and the device will be rebooted.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. If the configuration backup is on a remote host, use **scp** to copy the file from the host to your device:

```
> scp host hostname-or-ip user username remote remote-path local local-path to local
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the path and filename of the file on the remote host that will be copied to the Connect EZ 16/32 device.

- *local-path* is the location on the Connect EZ 16/32 device where the copied file will be placed.

For example:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/backup-archive-
0040FF800120-25.2-19.23.42.bin local /opt to local
```

3. Enter the following:

```
> system restore filepath [passphrase passphrase]
```

where

- *filepath* is the the path and filename of the configuration backup file on the Connect EZ 16/32's filesystem (*local-path* in the previous step).
- *passphrase* (optional) is the passphrase to restore the configuration backup, if a passphrase was used when the backup was created.

For example:

```
> system restore /opt/backup-archive-0040FF800120-25.2-
19.23.42.bin
```

# Schedule system maintenance tasks

You can configure tasks to be run during a specified maintenance window. When the device is within its maintenance window, firmware updates and Digi Remote Manager configuration checks will be performed.

You can also schedule custom scripts to run during the maintenance window. See Configure scripts to run automatically for more information.

### *Required configuration items*

- Events that trigger the maintenance window to begin.
- Whether all configured triggers, or only one of the triggers, must be met.
- The tasks to be performed. Options are:
  - Firmware updates.
  - Digi Remote Manager configuration check.
- Whether the device will check for updates to the device firmware.
- Whether the device will check for updates to the modem firmware.
- The frequency (daily, weekly, or monthly) that checks for firmware updates will run.

## Web

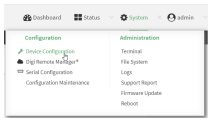
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

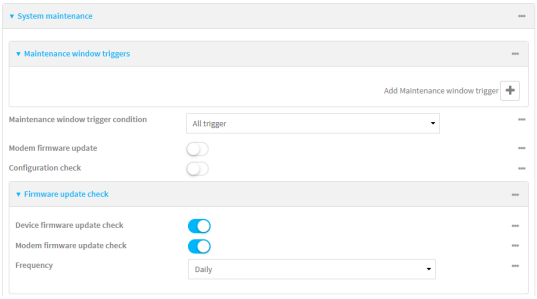
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.

3. Click **System** > **Scheduled tasks** > **System maintenance**.




4. Click to expand **Maintenance window triggers**.
5. Click ✚ to add a maintenance window trigger.

6. For **Maintenance window trigger type**, select one of the following:
   - **Check if interface is up**, for **Test Interface**, select the interface.
   - **Time period for maintenance window**:
     a. Click to expand **Maintenance window**.
     b. For **Start time**, type the time of day that the maintenance window should start, using the syntax *HH*:*MM*. If **Start time** is not set, maintenance tasks are not scheduled and will not be run.

        The behavior of **Start time** varies depending on the setting of **Duration window**, which is configured in the next step.

        - If **Duration window** is set to **Immediately**, all scheduled tasks will begin at the exact time specified in **Start time**.
        - If **Duration window** is set to **24 hours**, **Start time** is effectively obsolete and the maintenance tasks will be scheduled to run at any time. Setting **Duration window** to **24 hours** can potentially overstress the device and should be used with caution.
        - If **Duration window** is set to any value other than to **Immediately** or **24 hours**, the maintenance tasks will run at a random time during the time allotted for the duration window.
        - If **Duration window** is set to one or more hours, the minutes field in **Start time** is ignored and the duration window will begin at the beginning of the specified hour.

     c. For **Duration window**, select the amount of time that the maintenance tasks will be run. If **Immediately** is selected, all scheduled tasks will begin at the exact time specified in **Start time**.
     d. For **Frequency**, select whether the maintenance window will be started every day, or once per week.

- If **Check if Python Out-of-Service** is set, the maintenance window will only start if the Python Out-of-Service is set. See Use Python to set the maintenance window for further information.

7. If **Central Management** is disabled, click **Device firmware update** to instruct the system to look for any updated device firmware during the maintenance window. If updated firmware is found, it will then be installed. This options is only available if **Central Management** is disabled; see Central management for more information.
8. The **Modem firmware update** option, which is only available if **Central Management** is disabled, is not used with the Connect EZ.
9. If **Central Management** is disabled, click to enable **Modem firmware update** to instruct the system to look for any updated modem firmware during the maintenance window. If updated firmware is found, it will then be installed. Modem firmware update looks for updated firmware both on the local device and over the network, using either a WAN or cellular connection. This options is only available if **Central Management** is disabled; see Central management for more information.
10. (Optional) Configure automated checking for device and modem firmware updates:
    a. Click to expand **Firmware update check**.
    b. **Device firmware update check** is enabled by default. This enables the automated checking for device firmware updates.
    c. **Modem firmware update check** is enabled by default. This enables the automated checking for modem firmware updates.

    Note The **Modem firmware update** option is not used with theConnect EZ. Any selection is ignored.

    d. For **Frequency**, select how often automated checking for device and modem firmware should take place. Allowed values are **Daily**, **Weekly**, and **Monthly**. The default is **Daily**.
11. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Configure a system maintenance trigger:
   a. Add a trigger:

```
(config)> add system schedule maintenance trigger end
(config)>
```

b. Set the type of trigger:

```
(config add system schedule maintenance trigger)> type value
(config)>
```

where *value* is one of:

- **interface_up**: If **interface_up** is set:
  i. Set the interface:

  ```
  (config add system schedule maintenance trigger)> interface
  value
  (config)>
  ```

  ii. i. Use the **?** to determine available interfaces:
  ii. Set the interface. For example:

  ```
  (config system schedule maintenance trigger 0)> interface
  /network/interface/eth1
  (config system schedule maintenance trigger 0)>
  ```

- **out_of_service**: The maintenance window will only start if the Python Out-of-Service is set. See Use Python to set the maintenance window for further information.
- **time**: Configure a time period for the maintenance window:
  i. Configure the time of day that the maintenance window should start, using the syntax *HH*:*MM*. If the start time is not set, maintenance tasks are not scheduled and will not be run.

  ```
  (config system schedule maintenance trigger 0)> time from
  HH:MM
  (config system schedule maintenance trigger 0)>
  ```

  The behavior of the start time varies depending on the setting of the duration length, which is configured in the next step.
  - If the duration length is set to **0**, all scheduled tasks will begin at the exact time specified in the start time.
  - If the duration length is set to **24 hours**, the start time is effectively obsolete and the maintenance tasks will be scheduled to run at any time. Setting the duration length to **24 hours** can potentially overstress the device and should be used with caution.
  - If the duration length is set to any value other than to **0** or **24 hours**, the maintenance tasks will run at a random time during the time allotted for the duration window.
  - If the duration length is set to one or more hours, the minutes field in the start time is ignored and the duration window will begin at the beginning of the specified hour.

  ii. Configure the duration length (the amount of time that the maintenance tasks will be run). If **0** is used, all scheduled tasks will begin at the start time,

defined in the previous step.

```
(config system schedule maintenance trigger 0)> length num
(config system schedule maintenance trigger 0)>
```

where *num* is any whole number between **0** and **24**.

iii. Configure the frequency that the maintenance tasks should be run:

```
(config system schedule maintenance trigger 0)> frequency
value
(config system schedule maintenance trigger 0)>
```

where *value* is either **daily** or **weekly**. **Daily** is the default.

4. If **Central Management** is disabled, configure the device to look for any updated device firmware during the maintenance window. If updated firmware is found, it will then be installed. The device will look for updated firmware both on the local device and over the network, using either a WAN or cellular connection.

   This options is only available if **Central Management** is disabled; see Central management for more information.

```
(config)> system schedule maintenance device_fw_update true
(config)>
```

5. If **Central Management** is disabled, configure the device to look for any updated modem firmware during the maintenance window. If updated firmware is found, it will then be installed. The device will look for updated firmware both on the local device and over the network, using either a WAN or cellular connection.

   This options is only available if **Central Management** is disabled; see Central management for more information.

```
(config)> system schedule maintenance modem_fw_update true
(config)>
```

6. (Optional) Configure automated checking for device and modem firmware updates:

   a. **Device firmware update check** is enabled by default. This enables to automated checking for device firmware updates. To disable:

```
(config)> system schedule maintenance firmware_update_check device
false
(config)>
```

   b. **Modem firmware update check** is enabled by default. This enables to automated checking for modem firmware updates.

```
(config)> system schedule maintenance firmware_update_check modem
false
(config)>
```

c. Set how often automated checking for device and modem firmware should take place:

```
(config)> system schedule maintenance frequency value
(config)>
```

where *value* is either **daily**, **weekly**, or **monthly**. **daily** is the default.

7. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

7. (Optional) Configure automated checking for device and modem firmware updates:

a. **Device firmware update check** is enabled by default. This enables to automated checking for device firmware updates. To disable:

```
(config)> system schedule maintenance firmware_update_check device
false
(config)>
```

b. **Modem firmware update check** is enabled by default. This enables to automated checking for modem firmware updates.

```
(config)> system schedule maintenance firmware_update_check modem
false
(config)>
```

c. Set how often automated checking for device and modem firmware should take place:

```
(config)> system schedule maintenance frequency value
(config)>
```

where *value* is either **daily**, **weekly**, or **monthly**. **daily** is the default.

8. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

9. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Disable device encryption

You can disable the cryptography on your Connect EZ 16/32 device. This can be used to ship unused devices from overseas without needing export licenses from the country from which the device is being shipped.

When device encryption is disabled, the following occurs:

- The device is reset to the default configuration and rebooted.
- After the reboot:
  - Access to the device via the WebUI and SSH are disabled.
  - All internet connectivity is disabled, including WAN and WWAN. Connectivity to central management software is also disabled.
  - All IP networks and addresses are disabled except for the default 192.168.210.1/24 network on the local LAN Ethernet port. DHCP server is also disabled.

    The device can only be accessed by using telnet from a local machine connecting to the 192.168.210.1/24 network.

Disabling device encryption is not available in the WebUI. It can only be performed from the Admin CLI.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Disable encryption with the following command:

```
> system disable-cryptography
>
```

3. Type **exit** to exit the Admin CLI.

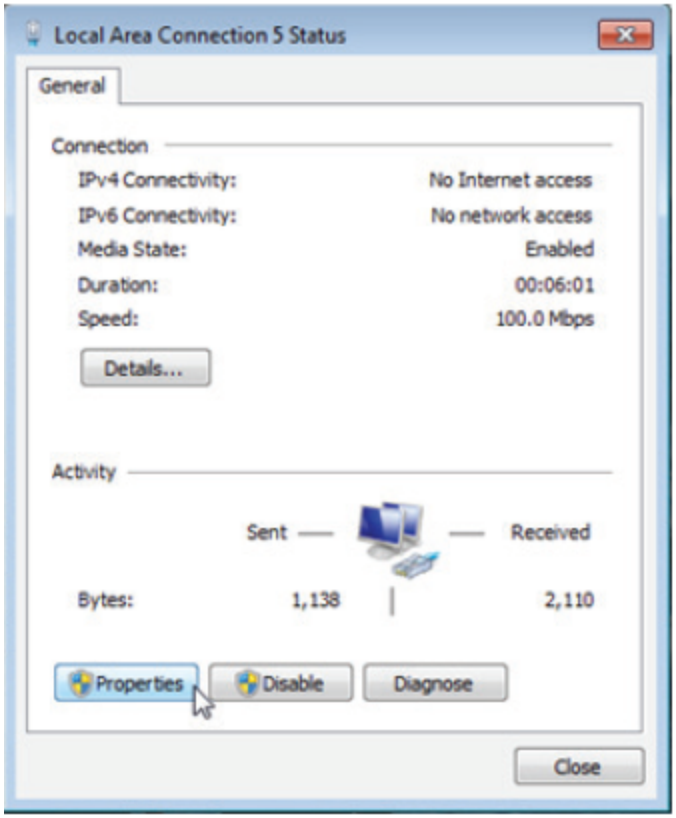
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Re-enable cryptography after it has been disabled.

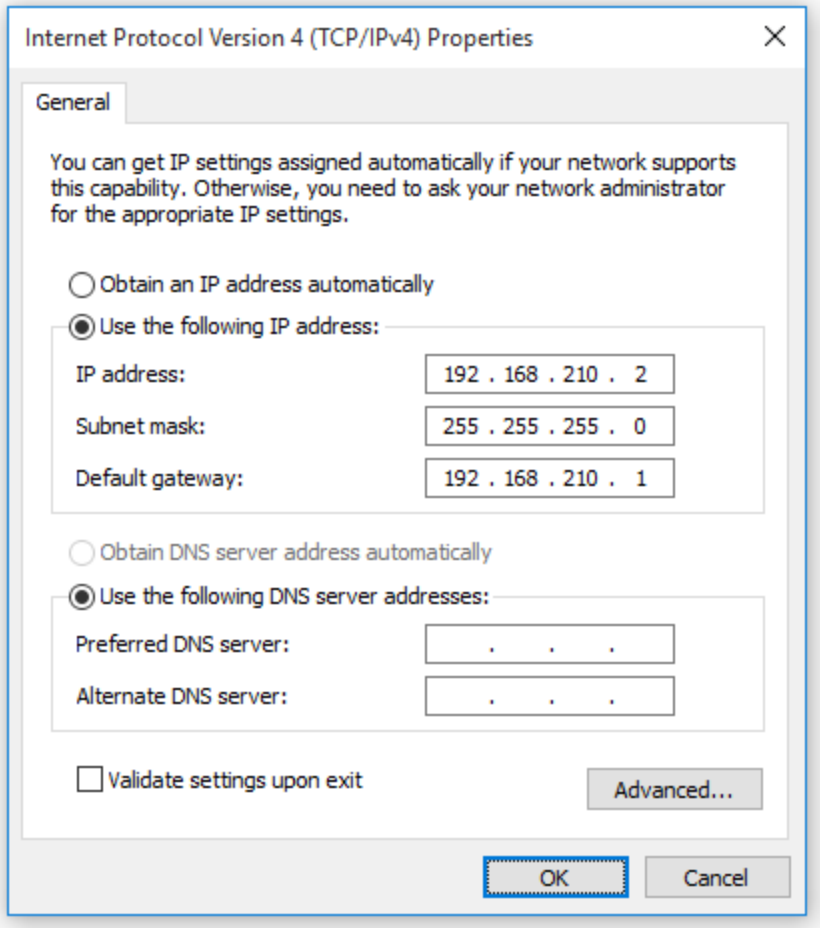
To re-enable cryptography:

1. Configure your PC network to connect to the 192.168.210 subnet. For example, on a Windows PC:

a. Select the **Properties** of the relevant network connection on the Windows PC.




b. Click the **Internet Protocol Version 4 (TCP/IPv4)** parameter.
c. Click **Properties**. The **Internet Protocol Version 4 (TCP/IPv4) Properties** dialog appears.
d. Configure with the following details:
   - **IP address** for PC: 192.168.210.2
   - **Subnet**: 255.255.255.0
   - **Gateway**: 192.168.210.1




2. Connect the PC's Ethernet port to the ETH1 Ethernet port on your Connect EZ 16/32 device.
3. Open a telnet session and connect to the Connect EZ 16/32 device at the IP address of 192.168.210.1.
4. Log into the device:
   - Username: **admin**
   - Password: The default unique password for your device is printed on the device label.
5. At the shell prompt, type:

```
# rm /etc/config/.nocrypt
# flatfsd -i
```

This will re-enable encryption and leave the device at its factory default setting.

## Configure the speed of your Ethernet ports

You can configure the speed of your Connect EZ 16/32 device's Ethernet ports.

### Web

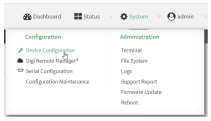
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Network** > **Device**.
4. Click to expand the Ethernet port to be configured.
5. For **Speed**, select the appropriate speed for the Ethernet port, or select **Auto** to automatically detect the speed. The default is **Auto**.
6. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. At the config prompt, type:

```
(config)> network device eth_port value
```

   where:

   - *eth_port* is the name of the Ethernet port (for example, **eth1**)
   - *value* is one of:
     - **10**—Sets the speed to 10 Mbps.
     - **100**—Sets the speed to 100 Mbps.

- **1000**—Sets the speed to 1 Gbps. Available only for devices with Gigabit Ethernet ports.

  **auto**—Configures the device to automatically determine the best speed for the Ethernet port.

The default is **auto**.

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Watchdog service

The Watchdog service can monitor the operation of your device, test the system for problems, and automatically restart that device if it detects a fault or failure. You can also see metrics for the Watchdog service and performance results of the tests performed.

When the Watchdog service has been enabled, the service name and green check mark displays in the dashboard.

# Configure the Watchdog service

To configure the Watchdog service on your Connect EZ 16/32:

## Web

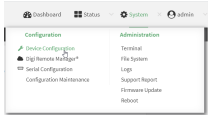
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



   The **Configuration** window is displayed.

3. Click **System** > **Advanced Watchdog**.
4. The watchdog is disabled by default. To enable, click to toggle off **Disable**.
5. For **Watchdog test interval**, type the amount of time between running system tests.

   Allowed values are any number of days, hours, minutes, or seconds, and take the format ***number***{**d|h|m|s**}.

   For example, to set **Watchdog test interval** to ten minutes, enter **10m** or **600s**.

   The maximum is two days (**2d**), and the default is five minutes (**5m**).
6. Type or select the **Number of test failures before a reboot**.
7. Configure the tests that the watchdog will perform:
   a. Click to expand **Fault detection tests**.
   b. Click to expand **Memory usage**.
      i. The memory check is enabled by default. To disable, click the **Enable memory check** toggle.
      ii. For **RAM usage threshold to trigger a warning**, type or select the percentage of RAM usage that will trigger a warning. The minimum value is **60** percent, the maximum is **100** percent. The default is **90** percent.
      iii. Type or select the **Percentage of system memory used before triggering a reboot**. The minimum value is **60** percent, the maximum is **100** percent. The default is **95** percent.
      iv. To log memory usage with every watchdog memory usage test, click to enable **Log memory usage every interval**.
   c. Click to expand **Interface tests**.
      i. Click the **Enable interface(s) down check** toggle to enable. The system periodically checks the interfaces you configure here and, after the specified amount of time, reboots them.
      ii. Click to expand **Check interface(s)**.
      iii. Click ✚ to add a new interface.
      iv. For **Interface**, choose the interface you want to test.
   d. Click to expand **Modem down**. This configuration is enabled by default.
      i. Click the **Enable modem check** toggle to disable.
      ii. Click the **Enable modem power cycle** toggle if you want the modem to be power cycled after an initial timeout instead of this timeout being reported as a failure.
      iii. For **Downtime**, type the amount of time the modem is down before it is reported.
8. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The watchdog is enabled by default. To disable:

```
(config)> system watchdog enable false
(config)>
```

4. Set the amount of time between running system tests:

```
(config)> system watchdog interval value
(config)>
```

where *value* is any number of days, hours, minutes, or seconds, and takes the format ***number*** {**d|h|m|s**}.

For example, to set **interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> system watchdog interval 600s
(config)>
```

The maximum is two days (**2d**), and the default is five minutes (**5m**).

5. Set the number of test failures before the system reboots:

```
(config)> system watchdog num_failures int
(config)>
```

6. Configure the tests that the watchdog will perform:
   a. The memory check is enabled by default. To disable:

```
(config)> system watchdog tests memory enable false
(config)>
```

   b. Set the percentage of RAM usage that will trigger a warning:

```
(config)> system watchdog tests memory max_memory_warning int
(config)>
```

   The minimum value is **60** percent, the maximum is **100** percent. The default is **90** percent.

   c. Set the percentage of RAM usage that will trigger a reboot of the device:

```
(config)> system watchdog tests memory max_memory_critical int
(config)>
```

   The minimum value is **60** percent, the maximum is **100** percent. The default is **95** percent.

   d. To log memory usage with every watchdog memory usage test, enable **log_memory**:

```
(config)> system watchdog tests memory log_memory true
(config)>
```

e. To have the interface(s) checked and rebooted after the specified amount of time:

```
(config)> system watchdog tests interfaces interfaces add [value]
(config)>
```

with *value* being the name of the interface.

f. To have the modem power cycled after an initial timeout instead of this timeout being reported as a failure:

```
(config)> system watchdog tests modem
(config)>
```

7. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

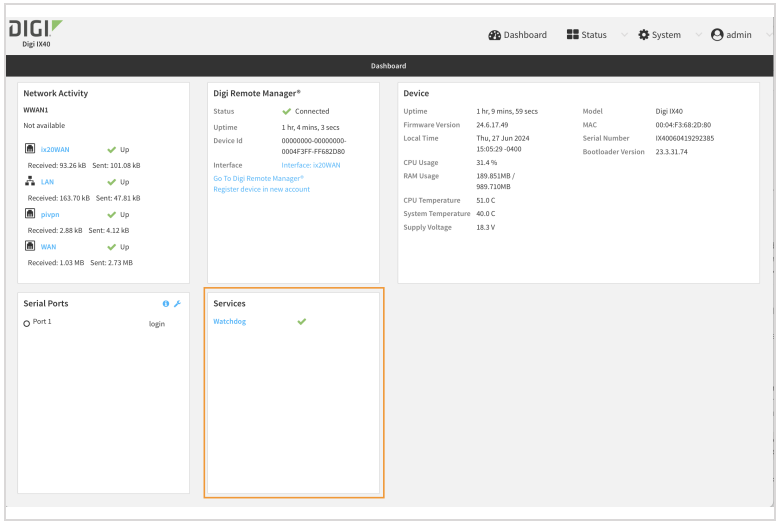
# View Watchdog metrics

To view metrics for the Watchdog service and the tests performed:

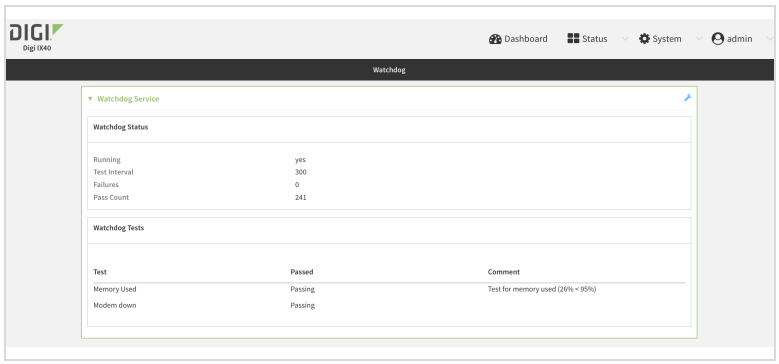
## Web

**In the local Web UI of your Connect EZ 16/32:**

1. Log in to the local Web UI of your device as a user with full Admin access rights.
2. To access the Watchdog Service page:
   **From the Dashboard of the device:**
   a. In the **Services** card, you can see the operational status of the Watchdog service.




   b. Click **Watchdog** to view metrics.




**From the menu:**

Click **Status** > **Services** > **Watchdog** to see the page.

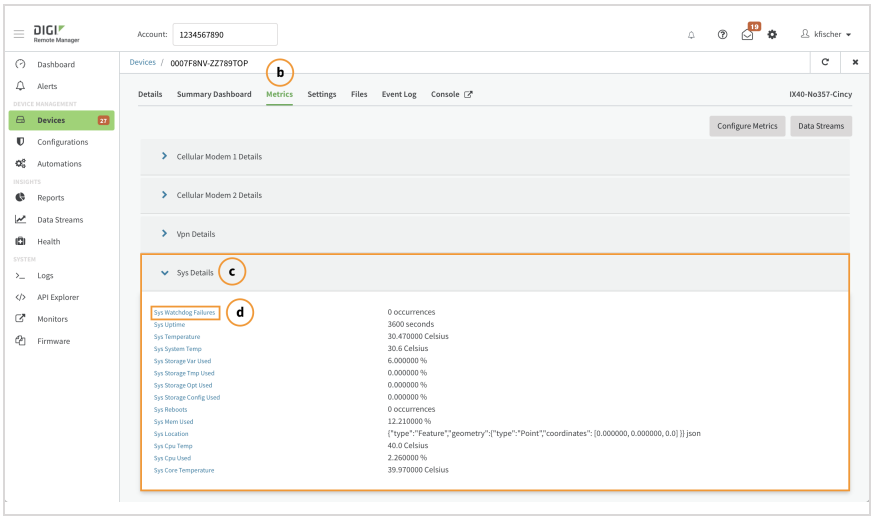
**In Digi Remote Manager, to view the test failures:**

a. Click **Devices**, and select a device from the list.

b. Click **Metrics**.

c. Click to expand **Sys Details**.

d. Click **Sys Watchog Failures**.




A new window opens and displays a chart showing the test failures and when they occurred.

## Command line

To view the results of the Watchdog tests:

1. Access the Command Line Interface for your Connect EZ, from either the local web UI as an administrator with full access rights or from Digi Remote Manager.
2. At the prompt, type

```
show watchdog
```

   All tests that were performed, as well as their status are listed.
3. Type **exit** to exit the CLI.

# Monitoring

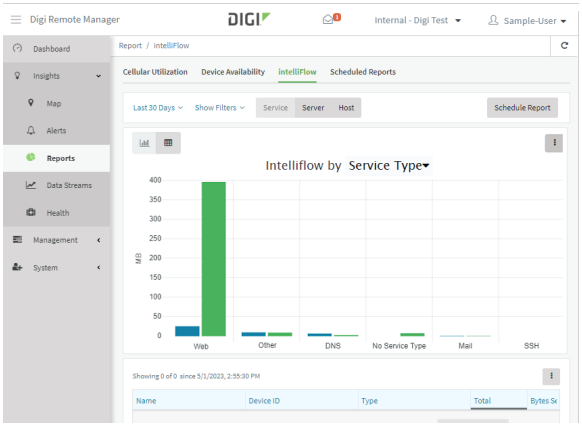
This chapter contains the following topics:

intelliFlow ..... 917
Configure NetFlow Probe ..... 929

# intelliFlow

Digi intelliFlow is a reporting and graphical presentation tool for visualizing your network's data usage and network traffic information.

intelliFlow can be enabled on Digi Remote Manager to provide a full analysis of all Digi devices on your network. Contact your Digi sales representative for information about enabling intelliFlow on Remote Manager.




IntelliFlow is also available on the local device for device-specific visualization of network use. To use intelliFlow on the local device, you must have access to the local WebUI. Once you enable intelliFlow, the **Status** > **intelliFlow** option is available in the main menu. By default, intelliFlow is disabled on the local device.

On the local device, intelliFlow provides charts on the following information:

- System utilisation
- Top data usage by host
- Top data usage by server
- Top data usage by service
- Host data usage over time

intelliFlow charts are dymanic; at any point, you can click inside the chart to drill down to view more granular information, and menu options allow you to change various aspects of the information being displayed.

This section contains the following topics:

Enable intelliFlow ..... 918
Configure service types ..... 920
Configure domain name groups ..... 922
Use intelliFlow to display average CPU and RAM usage ..... 925
Use intelliFlow to display top data usage information ..... 926
Use intelliFlow to display data usage by host over time ..... 928

# Enable intelliFlow

## *Required configuration items*

- Enable intelliFlow.

## *Additional configuration items*

- The firewall zone for internal clients being monitored by intelliFlow.

To enable intelliFlow:

### Web

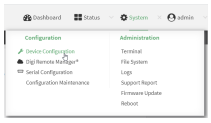
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

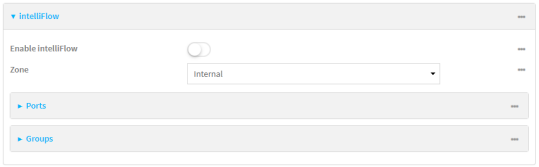
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Monitoring** > **intelliFlow**.
   The intelliFlow configuration window is displayed.

   
   
4. Click **Enable intelliFlow**.
5. For **Zone**, select the firewall zone. Internal clients that are being monitored by IntelliFlow should be present on the specified zone.
6. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable IntelliFlow:

```
(config)> monitoring intelliflow enable true
```

4. Set the firewall zone. Internal clients that are being monitored by IntelliFlow should be present on the specified zone:
   a. Determine available zones:

```
(config)> monitoring intelliflow zone ?

Zone: The firewall zone which is assigned to the network interface(s)
that
intelliFlow will see as internal clients.  intelliFlow relies on an
internal to
external relationship, where the internal clients are present on the
zone specified.
Format:
  any
  dynamic_routes
  edge
  external
  internal
  ipsec
  loopback
  setup
Default value: internal
Current value: internal

(config)>
```

   b. Set the zone to be used by IntelliFlow:

```
(config)> monitoring intelliflow zone my_zone
```

5. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure service types

The service type is used to categorize several ports under one service. For example, port numbers 80, 443, and 8080 are included in the **Web** service type.

There are several predefined service types:

- Web: Ports 80, 443, and 8080.
- FTP: Ports 20, 21, 989, and 990.
- SSH: Port 22.
- Telnet: Ports 23 and 992.
- Mail: Ports 25, 110, 143, 220, 993 and 995.
- DNS: Port 53.
- IRC: Ports 194 and 994.
- RSYNC: Ports 873.

You can add and remove ports from the predefined service port types, and you can also define your own service types. For example, to define a service type called "MyService" using ports 9000 and 9001:

### Web

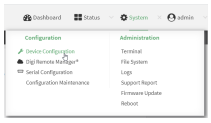
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

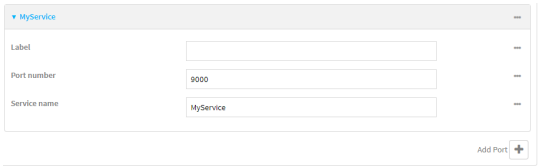
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Monitoring** > **intelliFlow**.
4. Click to expand **Ports**.

5. At the bottom of the list of ports, click ✚ to add a port.

6. **Label** is optional.
7. For **Port number**, type **9000**.
8. For **Service name**, type **MyService**.




9. Click ✚ to add a another port.
10. For **Port number**, type **9001**.
11. For **Service name**, type **MyService**.
12. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a port:

```
(config)> add monitoring intelliflow ports end
(config monitoring intelliflow ports 20)>
```

4. Set the port number:

```
(config monitoring intelliflow ports 20)> port 9000
(config monitoring intelliflow ports 20)>
```

5. Set the service type:

```
(config monitoring intelliflow ports 20)> service MyService
(config monitoring intelliflow ports 20)>
```

6. Add another port:

```
(config monitoring intelliflow ports 20)> add .. end
(config monitoring intelliflow ports 21)>
```

7. Set the port number:

```
(config monitoring intelliflow ports 21)> port 9001
(config monitoring intelliflow ports 21)>
```

8. Set the service type:

```
(config monitoring intelliflow ports 21)> service MyService
(config monitoring intelliflow ports 21)>
```

9. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Configure domain name groups

Domain name groups are used to categorize serveral domains names in one group. For example, digi.com and devicecloud.com could be grouped together in an intelliFlow group called Digi.

### Web

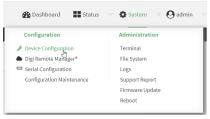
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

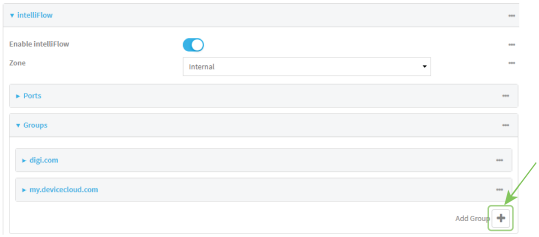
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Monitoring** > **intelliFlow** > **Groups**.
4. Click ✚ to add a domain.




5. **Label** is optional.
6. For **Domain name**, type **digi.com**.
7. For **Group**, type **Digi**.
8. Click ✚ to add a another port.
9. For **Domain name**, type **devicecloud.com**.
10. For **Group**, type **Digi**.
11. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a group:

```
(config)> add monitoring intelliflow groups end
(config monitoring intelliflow groups 1)>
```

4. Set the domain name:

```
(config monitoring intelliflow groups 1)> domian digi.com
(config monitoring intelliflow groups 1)>
```

5. Set the group name:

```
(config monitoring intelliflow groups 1)> group Digi
(config monitoring intelliflow groups 1)>
```

6. Add another port:

```
(config monitoring intelliflow groups 1)> add .. end
(config monitoring intelliflow groups 2)>
```

7. Set the port number:

```
(config monitoring intelliflow groups 2)> domain devicecloud.com
(config monitoring intelliflow groups 2)>
```

8. Set the service type:

```
(config monitoring intelliflow groups 2)> group Digi
(config monitoring intelliflow groups 2)>
```

9. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

10. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Use intelliFlow to display average CPU and RAM usage

This procedure is only available from the WebUI.

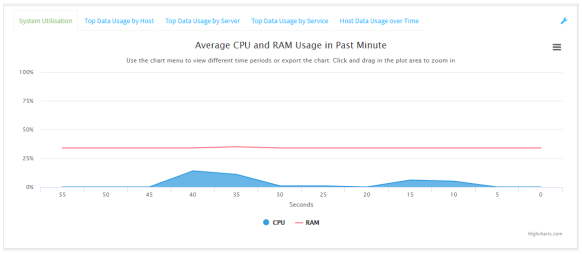
To display display average CPU and RAM usage:

### Web

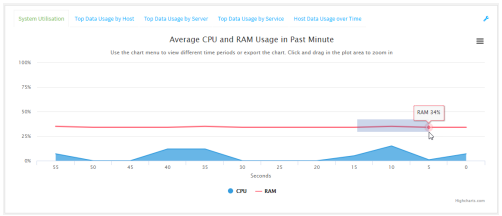
Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. If you have not already done so, enable intelliFlow. See Enable intelliFlow.
2. From the menu, click **Status** > **intelliFlow**.

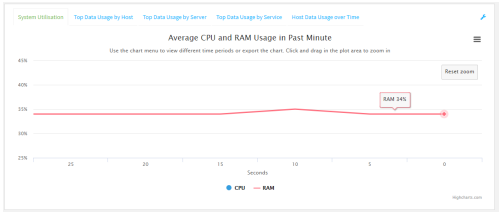
The System Utilisation chart is displayed:



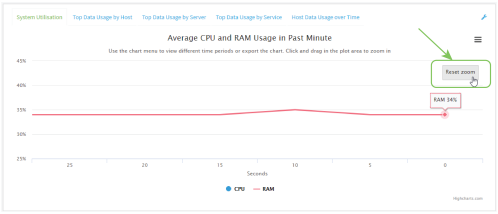

- Display more granular information:
  1. Click and drag over an area in the chart to zoom into that area and provide more granular information.




  2. Release to display the selected portion of the chart:



3. Click **Reset zoom** to return to the original display:

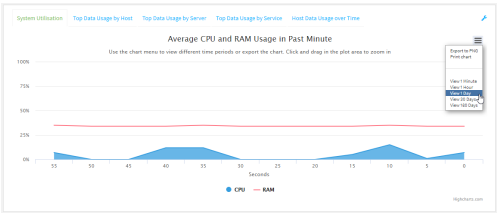



- Change the time period displayed by the chart.

  By default, the **System utilisation** chart displays the average CPU and RAM usage over the last minute. You can change this to display the average CPU and RAM usage:

  - Over the last hour.
  - Over the last day.
  - Over the last 30 days.
  - Over the last 180 days.

  1. Click the menu icon (☰).
  2. Select the time period to be displayed.




- Save or print the chart.

  1. Click the menu icon (☰).
  2. To save the chart to your local filesystem, select **Export to PNG**.
  3. To print the chart, select **Print chart**.

## Use intelliFlow to display top data usage information

With intelliFlow, you can display top data usage information based on the following:

- Top data usage by host
- Top data usage by server
- Top data usage by service

To generate a top data usage chart:

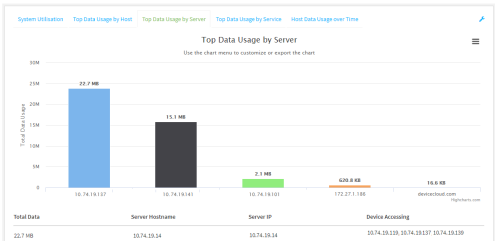
### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

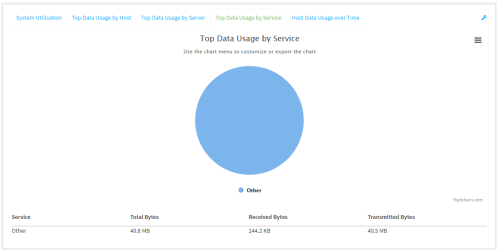
1. If you have not already done so, enable intelliFlow. See Enable intelliFlow.
2. From the menu, click **Status** > **intelliFlow**.

3. Display a data usage chart:
   - To display the **Top Data Usage by Host** chart, click **Top Data Usage by Host**.

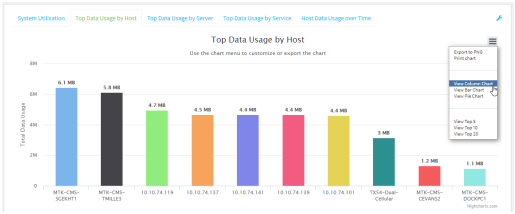
   - To display the **Top Data Usage by Server** chart, click **Top Data Usage by Server**.




   - To display the **Top Data Usage by Service** chart, click **Top Data Usage by Service**.

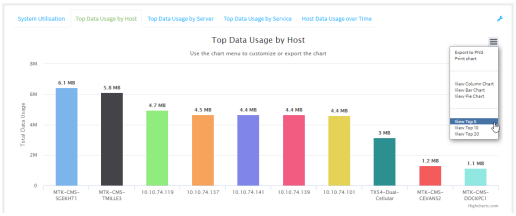



4. Change the type of chart that is used to display the data:
   a. Click the menu icon (☰).
   b. Select the type of chart.




5. Change the number of top users displayed.
   You can display the top five, top ten, or top twenty data users.

a. Click the menu icon (☰).
b. Select the number of top users to displayed.




6. Save or print the chart.
   a. Click the menu icon (☰).
   b. To save the chart to your local filesystem, select **Export to PNG**.
   c. To print the chart, select **Print chart**.

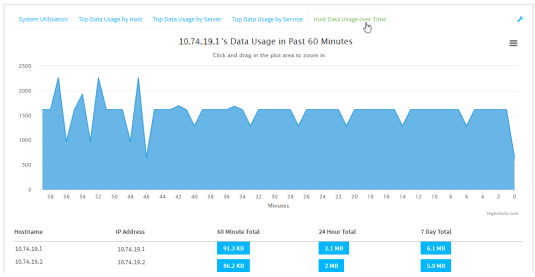
## Use intelliFlow to display data usage by host over time

To generate a chart displaying a host's data usage over time:

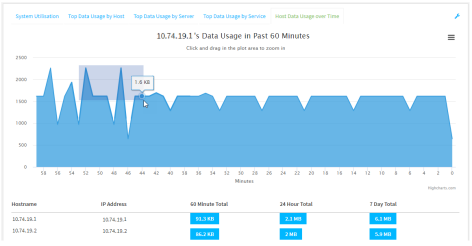
### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

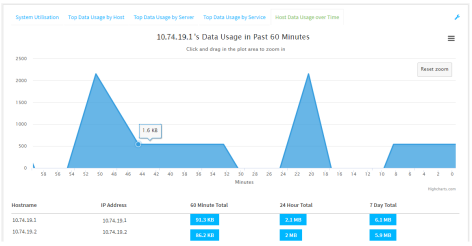
1. If you have not already done so, enable intelliFlow. See Enable intelliFlow.
2. From the menu, click **Status** > **intelliFlow**.
3. Click **Host Data Usage Over Time**.



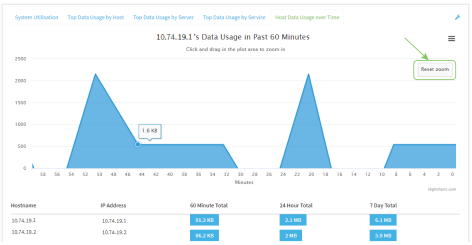

- Display more granular information:
  a. Click and drag over an area in the chart to zoom into that area and provide more granular information.



b. Release to display the selected portion of the chart:




c. Click **Reset zoom** to return to the original display:




- Save or print the chart.
  a. Click the menu icon (☰).
  b. To save the chart to your local filesystem, select **Export to PNG**.
  c. To print the chart, select **Print chart**.

# Configure NetFlow Probe

NetFlow probe is used to probe network traffic on the Connect EZ 16/32 device and export statistics to NetFlow collectors.

## *Required configuration items*

- Enable NetFlow.
- The IP address of a NetFlow collector.

## *Additional configuration items*

- The NetFlow version.
- Enable flow sampling and select the flow sampling technique.
- The number of flows from which the flow sampler can sample.
- The number of seconds that a flow is inactive before it is exported to the NetFlow collectors.
- The number of seconds that a flow is active before it is exported to the NetFlow collectors.
- The maximum number of simultaneous flows.
- A label for the NetFlow collector.
- The port of the NetFlow collector.
- Additional NetFlow collectors.

To probe network traffic and export statistics to NetFlow collectors:

## Web

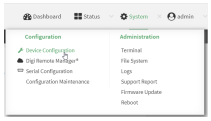
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

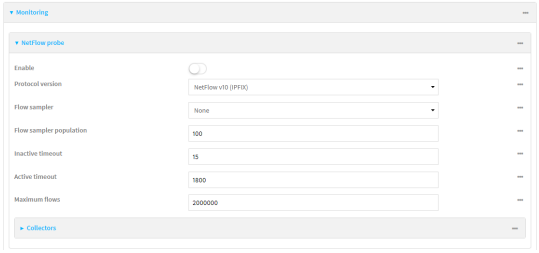
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **Monitoring** > **NetFlow probe**.

   
   
4. **Enable** NetFlow probe.
5. **Protocol version:** Select the **Protocol version**. Available options are:
   - **NetFlow v5**—Supports IPv4 only.
   - **NetFlow v9**—Supports IPv4 and IPv6.
   - **NetFlow v10 (IPFIX)**—Supports both IPv4 and IPv6 and includes IP Flow Information Export (IPFIX).

   The default is **NetFlow v10 (IPFIX)**.
6. Enable **Flow sampler** by selecting a sampling technique. Flow sampling can reduce flow processing and transmission overhead by providing a representative subset of all flows. Available options are:
   - **None**—No flow sampling method is used. Each flow is accounted.
   - **Deterministic**—Selects every *n*th flow, where *n* is the value of **Flow sampler population**.

- **Random**—Randomly selects one out of every *n* flows, where *n* is the value of **Flow sampler population**.
- **Hash**—Randomly selects one out of every *n* flows using the hash of the flow key, where *n* is the value of **Flow sampler population**.

7. For **Flow sampler population**, if you selected a flow sampler, enter the number of flows for the sampler. Allowed value is any number between **2** and **16383**. The default is **100**.
8. For **Inactive timeout**, type the the number of seconds that a flow can be inactive before sent to a collector. Allowed value is any number between **1** and **15**. The default is **15**.
9. For **Active timeout**, type the number of seconds that a flow can be active before sent to a collector. Allowed value is any number between **1** and **1800**. The default is **1800**.
10. For **Maximum flows**, type the maximum number of flows to probe simultaneously. Allowed value is any number between **0** and **2000000**. The default is **2000000**.
11. Add collectors:
    a. Click to expand **Collectors**.
    b. For **Add Collector**, click ✚.
    c. (Optional) Type a **Label** for the collector.
    d. For **Address**, type the IP address of the collector.
    e. (Optional) For **Port**, enter the port number used by the collector. The default is 2055.

    Repeat to add additional collectors.
12. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Enable NetFlow:

```
(config)> monitoring netflow enable true
(config)>
```

4. Set the protocol version:

```
(config)> monitoring netflow protocol version
                                                (config)>
```

   where *version* is one of:

   - **v5**—NetFlow v5 supports IPv4 only.
   - **v9**—NetFlow v9 supports IPv4 and IPv6.
   - **v10**—NetFlow v10 (IPFIX) supports both IPv4 and IPv6 and includes IP Flow Information Export (IPFIX).

The default is **v10**.

1. Enable flow sampling by selecting a sampling technique. Flow sampling can reduce flow processing and transmission overhead by providing a representative subset of all flows.

```
(config)> monitoring netflow sampler type
(config)>
```

where *type* is one of:

- **none**—No flow sampling method is used. Each flow is accounted.
- **deterministic**—Selects every *n*th flow, where *n* is the value of the flow sample population.
- **random**—Randomly selects one out of every *n* flows, where *n* is the value of the flow sample population.
- **hash**—Randomly selects one out of every *n* flows using the hash of the flow key, where *n* is the value of the flow sample population.

5. If you are using a flow sampler, set the number of flows for the sampler:

```
(config)> monitoring netflow sampler_population value
(config)>
```

where *value* is any number between **2** and **16383**. The default is **100**.

6. Set the number of seconds that a flow can be inactive before sent to a collector:

```
(config)> monitoring netflow inactive_timeout value
(config)>
```

where *value* is any is any number between **1** and **15**. The default is **15**.

7. Set the number of seconds that a flow can be active before sent to a collector:

```
(config)> monitoring netflow active_timeout value
(config)>
```

where *value* is any is any number between **1** and **1800**. The default is **1800**.

8. Set the maximum number of flows to probe simultaneously:

```
(config)> monitoring netflow max_flows value
(config)>
```

where *value* is any is any number between **0** and **2000000**. The default is **2000000**.

9. Add collectors:
   a. Add a collector:

```
(config)> add monitoring netflow collector end
(config monitoring netflow collector 0)>
```

   b. Set the IP address of the collector:

```
(config monitoring netflow collector 0)> address ip_address
(config monitoring netflow collector 0)>
```

c. (Optional) Set the port used by the collector:

```
(config monitoring netflow collector 0)> port port
(config monitoring netflow collector 0)>
```

d. (Optional) Set a label for the collector:

```
(config monitoring netflow collector 0)> label "This is a collector."
(config monitoring netflow collector 0)>
```

Repeat to add additional collectors.

10. Save the configuration and apply the change.

```
(config monitoring netflow collector 0)> save
Configuration saved.
>
```

11. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Central management

This chapter contains the following topics:


Digi Remote Manager support ..... 935
Certificate-based enhanced security ..... 935
Configure your device for Digi Remote Manager support ..... 935
Reach Digi Remote Manager on a private network ..... 947
Log in to Digi Remote Manager ..... 947
Use Digi Remote Manager to view and manage your device ..... 949
Add a device to Remote Manager ..... 949
Configure multiple Connect EZ 16/32 devices by using Digi Remote Manager configurations ..... 951
View Digi Remote Manager connection status ..... 952
Learn more ..... 953

# Digi Remote Manager support

Digi Remote Manager is a hosted remote configuration and management system that allows you to remotely manage a large number of devices. Remote Manager includes a web-based interface that you can use to perform device operations, such as viewing and changing device configurations and performing firmware updates. Remote Manager servers also provide a data storage facility. The Digi Remote Manager is the default cloud-based management system, and is enabled by default.

To use Remote Manager, you must set up a Remote Manager account. To set up a Remote Manager account and learn more about Digi Remote Manager, go to http://www.digi.com/products/cloud/digi-remote-manager.

To learn more about Remote Manager features and functions, see the *Digi Remote Manager User Guide*.

# Certificate-based enhanced security

Beginning with firmware version 22.2.9.x, the default URL for the device's Remote Manager connection is edp12.devicecloud.com. This URL is required to utilize the client-side certificate support. Prior to release 22.2.9.x, the default URL was my.devicecloud.com.

- If your Digi device is configured to use a non-default URL to connect to Remote Manager, updating the firmware will not change your configuration. However, if you erase the device's configuration, the Remote Manager URL will change to the default of edp12.devicecloud.com.
- If you perform a factory reset by pressing the **RESET** twice, the client-side certificate will be erased and you must use the Remote Manager interface to reset the certificate. Select the device in Remote Manager and select **Actions** > **Reset Device Certificate**.
- The certificate that is provided to the client by Remote Manager is signed by a specific certificate authority, and the device is expecting that same certificate authority. If your IT infrastructure uses its own certificate-based authentication, this might cause the device to interpret the certificate provided by Remote Manager as being from an incorrect certificate authority. If this is the case, you need to include an exception to allow edp12.devicecloud.com to authenticate using its own certificate.

The new URL of edp12.devicecloud.com is for device communication only. Use https://remotemanager.digi.com for user interaction with remote manager.

### *Firewall issues*

To utilize the certificate-based security, you may need to open a port through your firewall for egress connectivity to edp12.devicecloud.com. TCP port 3199 is used for communication with Remote Manager.

# Configure your device for Digi Remote Manager support

By default, your Connect EZ 16/32 device is configured to use for central management.

### *Additional configuration options*

These additional configuration settings are not typically configured, but you can set them as needed:

- Disable the Digi Remote Manager connection if it is not required. You can also configure an alternate cloud-based central management application.
- Change the reconnection timer.
- The non-cellular keepalive timeout.
- The cellular keepalive timeout.
- The keepalive count before the Remote Manager connection is dropped.
- SMS support.
- HTTP proxy server support.

To configure your device's Digi Remote Manager support:

## Web

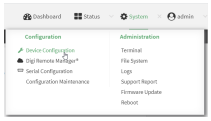
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

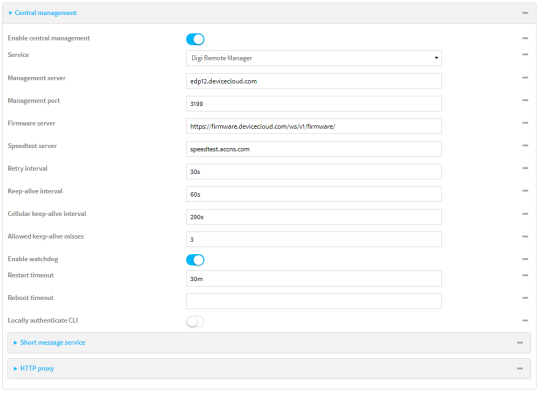
   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.

3. Click **Central management**.

   The Central management configuration window is displayed.




   Digi Remote Manager support is enabled by default. To disable, toggle off **Enable central management**.

4. For **Service**, select **Digi Remote Manager**.
5. (Optional) For **Management server**, type the URL for the central management server.

   The default varies depending on firmware versions:

   - Firmware version 22.2.9.x and newer, the default is the edp12.devicecloud.com. This server is for device-connectivity only, and uses enhanced security through certificate-based communication. See Digi Remote Manager support for further infomation.
   - Firmware prior to version 22.2.9.x, the default is the Digi Remote Manager server, https://remotemanager.digi.com.

6. (Optional) For **Management port**, type the destination port for the remote cloud services connection. The default is **3199**.
7. **Firmware server** should normally be left at the default location.
8. (Optional) For **Speedtest server**, type the name or IP address of the server to use to test the speed of the device's internet connection(s).
9. (Optional) For **Retry interval**, type the amount of time that the Connect EZ 16/32 device should wait before reattempting to connect to remote cloud services after being disconnected. The default is 30 seconds.

   Allowed values are any number of hours, minutes, or seconds, and take the format ***number*** {**h|m|s**}.

   For example, to set **Retry interval** to ten minutes, enter **10m** or **600s**.
10. (Optional) For **Keep-alive interval**, type the amount of time that the Connect EZ 16/32 device should wait between sending keep-alive messages to remote cloud services when using a non-cellular interface. The default is 60 seconds.

    Allowed values are any number of hours, minutes, or seconds, and take the format ***number*** {**h|m|s**}.

    For example, to set **Keep-alive interval** to ten minutes, enter **10m** or **600s**.
11. (Optional) For **Cellular keep-alive interval**, type the amount of time that the Connect EZ 16/32 device should wait between sending keep-alive messages to remote cloud services when using a cellular interface. The default is 290 seconds.

Allowed values are any number of hours, minutes, or seconds, and take the format ***number*** {**h|m|s**}.

For example, to set **Cellular keep-alive interval** to ten minutes, enter **10m** or **600s**.

12. (Optional) For **Allowed keep-alive misses**, type the number of allowed keep-alive misses. The default is **3**.
13. **Enable watchdog** is used to monitor the connection to Digi Remote Manager. If the connection is down, you can configure the device to restart the connection, or to reboot. The watchdog is enabled by default. To configure the Watchdog service and view metrics, see Watchdog service.
14. If **Enable watchdog** is enabled:
    a. (Optional) For **Restart Timeout**, type the amount of time to wait before restarting the connection to the remote cloud services, once the connection is down.

    Allowed values are any number of hours, minutes, or seconds, and take the format ***number***{**h|m|s**}.

    For example, to set **Restart Timeout** to ten minutes, enter **10m** or **600s**.

    The minimum value is 30 minutes and the maximum is 48 hours. If not set, this option is disabled. The default is 30 minutes.

    b. (Optional) For **Reboot Timeout**, type the amount of time to wait before rebooting the device, once the connection to the remote cloud servicesis down. By default, this option is not set, which means that the option is disabled.

    Allowed values are any number of hours, minutes, or seconds, and take the format ***number***{**h|m|s**}.

    For example, to set **Reboot Timeout** to ten minutes, enter **10m** or **600s**.

    The minimum value is 30 minutes and the maximum is 48 hours. If not set, this option is disabled. The default is disabled.
15. (Optional) Enable **Locally authenticate CLI** to require a login and password to authenticate the user from the remote cloud services CLI. If disabled, no login prompt will be presented and the user will be logged in as **admin**. The default is disabled.
16. (Optional) Configure the Connect EZ 16/32 device to communicate with remote cloud services by using SMS:
    a. Click to expand **Short message service**.
    b. **Enable** SMS messaging.
    c. For **Destination phone number**, type the phone number for the remote cloud services:
        - Within the US: **12029823370**
        - International: **447537431797**
    d. (Optional) Type the **Service identifier**.
17. (Optional) Configure the Connect EZ 16/32 device to communicate with remote cloud services via one of two methods: Pinhole or Proxy server.
    If using the Pinhole method, refer to the following
    If using the Proxy server method:
    a. Click to expand **HTTP Proxy**.
    b. **Enable** the use of an HTTP proxy server.
    c. For **Server**, type the hostname of the HTTP proxy server.

d. For **Port**, type or select the port number on the HTTP proxy server that the device should connect to. The default is **2138**.

18. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Digi Remote Manager support is enabled by default. To disable Remote Manager support:

```
(config)> cloud enable false
(config)>
```

4. (Optional) Set the URL for the central management server.

```
(config)> cloud drm drm_url url
(config)>
```

   The default varies depending on firmware versions:

   - Firmware version 22.2.9.x and newer, the default is the edp12.devicecloud.com. This server is for device-connectivity only, and uses enhanced security through certificate-based communication. See Digi Remote Manager support for further infomation.
   - Firmware prior to version 22.2.9.x, the default is the Digi Remote Manager server, https://remotemanager.digi.com.

5. (Optional) Set the amount of time that the Connect EZ 16/32 device should wait before reattempting to connect to the remote cloud services after being disconnected. The minimum value is ten seconds. The default is 30 seconds.

```
(config)> cloud drm retry_interval value
```

   where *value* is any number of hours, minutes, or seconds, and takes the format ***number*** {**h|m|s**}.

   For example, to set **the retry interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> cloud drm retry_interval 600s
(config)>
```

6. (Optional) Set the amount of time that the Connect EZ 16/32 device should wait between sending keep-alive messages to the Digi Remote Manager when using a non-cellular interface. Allowed values are from 30 seconds to two hours. The default is 60 seconds.

```
(config)> cloud drm keep_alive value
(config)>
```

where *value* is any number of hours, minutes, or seconds, and takes the format ***number*** {**h|m|s**}.

For example, to set **the keep-alive interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> cloud drm keep_alive 600s
(config)>
```

7. (Optional) Set the amount of time that the Connect EZ 16/32 device should wait between sending keep-alive messages to the Digi Remote Manager when using a cellular interface. Allowed values are from 30 seconds to two hours. The default is 290 seconds.

```
(config)> cloud drm cellular_keep_alive value
(config)>
```

where *value* is any number of hours, minutes, or seconds, and takes the format ***number*** {**h|m|s**}.

For example, to set **the cellular keep-alive interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> cloud drm cellular_keep_alive 600s
(config)>
```

8. Set the number of allowed keep-alive misses. Allowed values are any integer between **2** and **64**. The default is **3**.

```
(config)> cloud drm keep_alive_misses integer
(config)>
```

9. The **watchdog** is used to monitor the connection to remote cloud services. If the connection is down, you can configure the device to restart the connection, or to reboot. The watchdog is enabled by default. To disable:

```
(config)> cloud drm watchdog false
(config)>
```

10. If **watchdog** is enabled:
    a. (Optional) Set the amount of time to wait before restarting the connection to the remote cloud services, once the connection is down.

    where *value* is any number of hours, minutes, or seconds, and takes the format ***number*** {**h|m|s**}.

    For example, to set **restart_timeout** to ten minutes, enter either **10m** or **600s**:

    ```
    (config)> cloud drm restart_timeout 600s
    (config)>
    ```

    The minimum value is 30 minutes and the maximum is 48 hours. If not set, this option is disabled. The default is 30 minutes.

    b. (Optional) Set the amount of time to wait before rebooting the device, once the connection to the remote cloud servicesis down. By default, this option is not set, which means that the option is disabled.

where *value* is any number of hours, minutes, or seconds, and takes the format ***number*** {**h|m|s**}.

For example, to set **reboot_timeout** to ten minutes, enter either **10m** or **600s**:

```
(config)> cloud drm reboot_timeout 600s
(config)>
```

The minimum value is 30 minutes and the maximum is 48 hours. If not set, this option is disabled. The default is disabled.

11. **firmware_url** should normally be left at the default location. To change:

```
(config)> cloud drm firmware_url url
(config)>
```

12. (Optional) Set the hostname or IP address of the speedtest server. The default is speedtest.accns.com.

```
(config)> cloud drm speedtest_server name
(config)>
```

13. (Optional) Determine whether to require a login and password to authenticate the user from the remote cloud services CLI:

```
(config)> cloud drm cli_local_auth true
(config)>
```

If set to **false**, no login prompt will be presented and the user will be logged in as **admin**. The default is **false**.

14. (Optional) Configure the Connect EZ 16/32 device to communicate with remote cloud services by using SMS:
    a. **Enable** SMS messaging:

```
(config)> cloud drm sms enable true
(config)>
```

    b. Set the phone number for Digi Remote Manager:

```
(config)> cloud drm sms destination value
(config)>
```

    where *value* is either:
    - Within the US: **12029823370**
    - International: **447537431797**

    c. (Optional) Set the service identifier:

```
(config)> cloud drm sms sercice_id id
(config)>
```

15. (Optional) Configure the Connect EZ 16/32 device to communicate with remote cloud services by using an HTTP proxy server:

a. **Enable** the use of an HTTP proxy server:

```
(config)> cloud drm proxy enable true
(config)>
```

b. Set the hostname of the proxy server:

```
(config)> cloud drm proxy host hostname
(config)>
```

c. (Optional) Set the port number on the proxy server that the device should connect to. The default is 2138.

```
(config)> cloud drm proxy port integer
(config)>
```

16. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

17. Type **exit** to exit the Admin CLI.

    Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Collect device health data and set the sample interval

You can enable or disable the collection of device health data to upload to Digi Remote Manager, and configure the interval between health sample uploads. By default, device health data upload is enabled, and the health sample interval is set to 60 minutes. Each time a device connects to Digi Remote Manager after the device boots (or re-boots), the device immediately uploads all health metrics.

To avoid a situation where several devices are uploading health metrics information to Remote Manager at the same time, the Connect EZ 16/32 device includes a preconfigured randomization of two minutes for uploading metrics. For example, if **Health sample interval** is set to five minutes, the metrics will be uploaded to Remote Manager at a random time between five and seven minutes.

To disable the collection of device health data or enable it if it has been disabled, or to change the health sample interval:

### Web

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

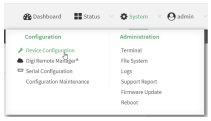
   b. Click the **Device ID**.

   c. Click **Settings**.

d. Click to expand **Config**.

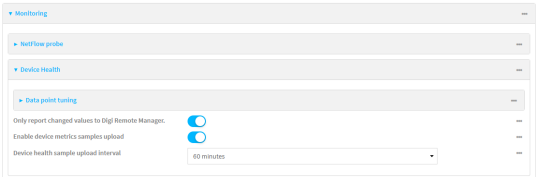
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Monitoring** > **Device Health**.



4. (Optional) Click to expand **Data point tuning**.

   Data point tuning options allow to you configure what data are uploaded to the Digi Remote Manager. All options are enabled by default.

5. **Only report changed values to Digi Remote Manager** is enabled by default.

   When enabled:

   - The device only reports device health metrics that have changed health metrics were last uploaded. This is useful to reduce the bandwidth used to report health metrics.
   - All metrics are uploaded once every hour.

   When disabled, all metrics are uploaded every **Health sample interval**.

6. Device health data upload is enabled by default. To disable, toggle off **Enable Device Health samples upload**.
7. For **Health sample interval**, select the interval between health sample uploads.
8. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Device health data upload is enabled by default. To enable or disable:
   - To enable:

     ```
     (config)> monitoring devicehealth enable true
     (config)>
     ```

   - To disable:

     ```
     (config)> monitoring devicehealth enable false
     (config)>
     ```

4. The interval between health sample uploads is set to 60 minutes by default. To change:

   ```
   (config)> monitoring devicehealth interval value
   (config)>
   ```

   where *value* is one of **1**, **5**, **15**, **30**, or **60**, and represents the number of minutes between uploads of health sample data.

5. By default, the device will only report health metrics values to Digi Remote Manager that have changed health metrics were last uploaded. This is useful to reduce the bandwidth used to report health metrics. This is useful to reduce the bandwidth used to report health metrics. Even if enabled, all metrics are uploaded once every hour.

   To disable:

   ```
   (config)> monitoring devicehealth only_send_deltas false
   (config)>
   ```

   When disabled, all metrics are uploaded every **Health sample interval**.

6. (Optional) Tuning parameters allow to you configure what data are uploaded to the Digi Remote Manager. By default, all tuning parameters are enabled.

   To view a list of all available tuning parameters, use the **show** command:

   ```
   (config)> show monitoring devicehealth tuning
   all
          cellular
                  rx
                          bytes
                                  enable true
                  tx
                          bytes
                                  enable true
          eth
                  rx
                          bytes
                                  enable true
                  tx
                          bytes
                                  enable true
          serial
                  rx
   ```

```
                        bytes
                                enable true
                tx
                        bytes
                                enable true
cellular
       1
                rx
                        bytes
                                enable true
                        packets
                                enable true
...
                                                (config)>
```

To disable a tuning parameter, set its value to false. For example, to turn off all reporting for the serial port:

```
(config)> monitoring devicehealth tuning all serial rx bytes enabled
false
(config)> monitoring devicehealth tuning all serial tx bytes enabled
false
(config)>
```

7. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Event log upload to Digi Remote Manager

Your device is automatically configured to upload the event log to Digi Remote Manager. These logs are uploaded every 60 minutes.

### *Change the upload interval*

To change how often the event logs are uploaded to Digi Remote Manager:

**Web**

1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

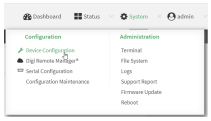
   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.

b. Click the **Device ID**.
c. Click **Settings**.
d. Click to expand **Config**.

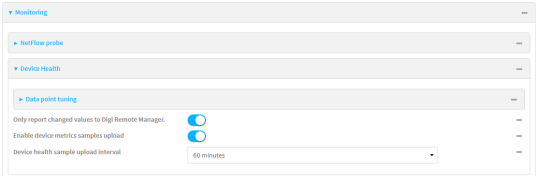
Local Web UI:

a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.



The **Configuration** window is displayed.

3. Click **Monitoring** > **Device event logs**.



4. For **Device event log upload interval**, change the interval between health sample uploads. The default is **60 minutes**.
5. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. The interval between event log uploads is set to 60 minutes by default. To change:

```
(config)> monitoring events interval value
(config)>
```

where *value* is one of **1**, **5**, **15**, **30**, or **60**, and represents the number of minutes between uploads of health sample data.

4. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Reach Digi Remote Manager on a private network

If your company has a private network and you have devices that need to reach Digi Remote Manager, there are several methods available:

- **Pinhole**: a communication port on your network not protected by the firewall which allows the application on the device to reach Digi Remote Manager.
- **Proxy server**: a dedicated software system equipped with its own IP address that runs on your network and acts as an intermediary between the device and Digi Remote Manager.
- **VPN Tunnel**: a virtual private network that offers a secure, encrypted connection between a device and the internet.

## Pinhole method

Using the pinhole method requires your network administrator to remove the firewall connection on a communication port. For more information, see Firewall concerns for outbound EDP connections to Digi Remote Manager.

## Proxy server method

The device is capable of connecting through an HTTP proxy, such as Squid, but it is up to the network administrator to decide which HTTP proxy type to use.

To enable a proxy server and enter the server and port in Digi Remote Manager, see step 17 in Configure your device for Digi Remote Manager support.

**Tip** To see instructions for setting up Squid and then configuring a device (not DAL) to reach Digi Remote Manager, see the Digi Quick Note, Connecting to Digi Remote Manager Through Web Proxy. Though this Quick Note references older technology and device types, it may provide a network administrator with concrete examples from which they can draw correlations to newer technology and devices.

## VPN Tunnel method

Configuring a VPN tunnel to communicate with Digi Remote Manager is a two-step process. One step is done by your organization's network administrator and the other by Digi Support.

**Step 1: Set up the VPN tunnel**

Your organization's network administrator needs to set up a VPN tunnel on your network, which will be used to communicate with Digi Remote Manager through the Digi cloud service.

**Step 2. Contact Digi Support.**

Digi Support configures the Digi cloud service to allow your VPN to communicate with Digi Remote Manager. Contact Digi Support at https://www.digi.com/contactus.

# Log in to Digi Remote Manager

To log in to Remote Manager:

1. In a web browser, go to remotemanager.digi.com.
2. Type your username.
3. Click **Continue**.
4. Type your password.
5. Click **Login**.

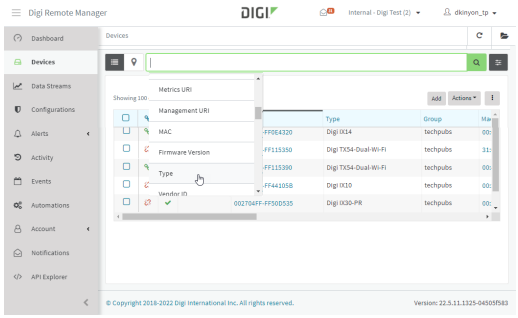
   If you used the same browser tab/window to log in again, you will see the page you were on in your previous session. If you opened a new browser tab/window to log in, you will see the default fleet Dashboard page.

**Tip** If you cannot remember your password, go to remotemanager.digi.com, type your username and then click **Forgot username?**. You will be asked to provide your email address associated with your user account. If you are not sure that you have a user account, talk with your Remote Manager administrator.

# Use Digi Remote Manager to view and manage your device

To view and manage your device:

1. If you have not already done so, connect to your Digi Remote Manager account.
2. From the menu, click **Devices** to display a list of your devices.
3. Use the Filter bar to locate the device you want to manage. For example, to search by type of device:
   a. Click the Advanced Search button ( )
   b. Click in the filter bar.




   c. Type the type of device (for example, Connect EZ 16/32).

# Add a device to Remote Manager

There are several options for adding a device to Remote Manager.

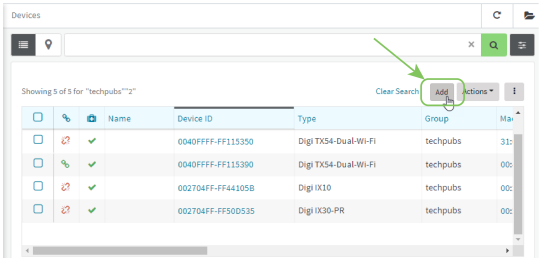
- **Quick Start process.** Use this process to both install a device and then add it to Remote Manager. See the Connect EZ 16/32 .
- **Device label information.** Use the information on the device label (e.g., Device ID, MAC address, Password) to add a new device to Remote Manager. See Add a device to Remote Manager using information from the label.
- **Digi Remote Manager credentials.** Use your Remote Manager credentials to add a device to Remote Manager when you do not have the device password. See Add a device to Remote Manager using your Remote Manager login credentials.

## Add a device to Remote Manager using information from the label

**Tip** If you do not have access to the device label, you can add the device using your Remote Manager login credentials. See Add a device to Remote Manager using your Remote Manager login credentials.

1. If you have not already done so, connect to your Digi Remote Manager account.
2. From the menu, click **Devices** to display a list of your devices.

3. Click **Add**.




4. Type the Device ID, MAC Address, or IMEI.
5. For **Device Default Password**, enter the default password on the printed label packaged with your device. The same default password is also shown on the label affixed to the bottom of the device.
6. (Optional) Complete the other fields.
1. Click **Add Device**.
   Remote Manager adds the Connect EZ 16/32 device to your account and it appears in the **Device Management** view.

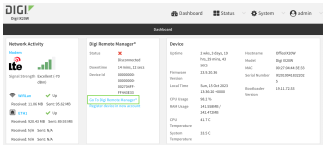
## Add a device to Remote Manager using your Remote Manager login credentials

If you want to add a device to Remote Manager, and you do not have its password, you can add it using your Remote Manager login credentials.

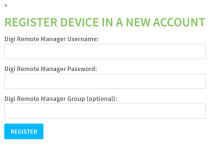
To add a device using your Remote Manager credentials:

### Web

1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
2. On the dashboard, in **Digi Remote Manager** status pane, click **Register device in new account**.



3. The **Register Device in New Account** page displays.




4. For **Digi Remote Manager Username**, type your Remote Manager username.
5. For **Digi Remote Manager Password**, type your Remote Manager password.
6. For **Digi Remote Manager Group (optional)**, type the group to which the device will be added, if needed.
7. Click **Register**.

The device is added to Remote Manager.

### Command line

1. Log into the Connect EZ 16/32 local command line as a user with full Admin access rights.
2. Register a device.

```
(register) [group STRING] password STRING username STRING
```

where:

- group: group to add device in Digi Remote Manager.
- password: Digi Remote Manager password (required).
- username: Digi Remote Manager username (required).

1. Click **Apply** to save the configuration and apply the change.
2. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

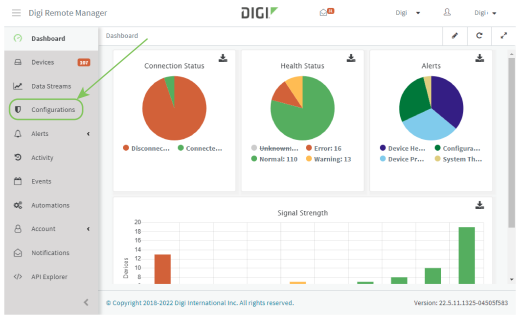
# Configure multiple Connect EZ 16/32 devices by using Digi Remote Manager configurations

Digi recommends you take advantage of Remote Manager configurations to manage multiple Connect EZ 16/32 devices. A Remote Manager configuration is a named set of device firmware, settings, and file system options. You use the configuration to automatically update multiple devices and to periodically scan devices to check for compliance with the configuration. See the *Digi Remote Manager User Guide* for more information about Remote Manager configurations.

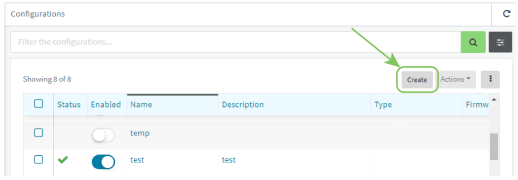
Typically, if you want to provision multiple Connect EZ 16/32 routers:

1. Using the Connect EZ 16/32 local WebUI, configure one Connect EZ 16/32 router to use as the model configuration for all subsequent Connect EZ 16/32s you need to manage.
2. Register the configured Connect EZ 16/32 device in your Remote Manager account.

3. In Remote Manager, create a configuration:
   a. From the Dashboard, select Configurations.




   b. Click **Create**.




   c. Enter a **Name** and an optional **Description** for the configuration, and select the **Groups**, **Device Type**, and **Firmware Version**.
   d. Click **Save and continue**.
   e. Click **Import from device** and select the device configured above.
   f. Click **Import**.
   g. At the **Settings** page, configure any desired configuration overrides and click **Continue**.
   h. At the **File System** page, make any desired changes to the files that were imported from the device and click **Continue**.
   i. At the Automations page, click **Enable Scanning**, make any other desired changes, and click **Save**.

Digi Remote Manager provides multiple methods for applying configurations to registered devices. You can also include site-specific settings with a profile to override settings on a device-by-device basis.

# View Digi Remote Manager connection status

To view the current Digi Remote Manager connection status from the local device:

## Web

1. Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.
   The dashboard includes a Digi Remote Manager status pane:

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the show cloud command to view the status of your device's connection to Remote Manager:

```
> show cloud

 Device Cloud Status
 -------------------

 Status    : Connected
 Server    : edp12.devicecloud.com Device ID : 00000000-00000000-89E1FE-
7550D7>
```

1. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Learn more

To learn more about Digi Remote Manager features and functions, see the *Digi Remote Manager User Guide*.

# File system

This chapter contains the following topics:

The Connect EZ 16/32 local file system ..... 955
Display directory contents ..... 955
Create a directory ..... 956
Display file contents ..... 957
Copy a file or directory ..... 957
Move or rename a file or directory ..... 958
Delete a file or directory ..... 959
Upload and download files ..... 960

# The Connect EZ 16/32 local file system

The Connect EZ 16/32 local file system has approximately 150 MB of space available for storing files, such as Python programs, alternative configuration files and firmware versions, and release files, such as cellular module images. The writable directories within the file system are:

- /tmp
- /opt
- /etc/config

Files stored in the /tmp directory do not persist across reboots. Therefore, /tmp is a good location to upload temporary files, such as files used for firmware updates. Files stored in /opt and /etc/config do persist across reboots, but are deleted if a factory reset of the system is performed. See Erase device configuration and reset to factory defaults for more information.

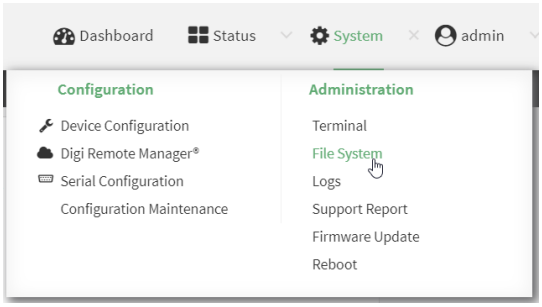
# Display directory contents

To display directory contents by using the WebUI or the Admin CLI:

## Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, click **System**. Under **Administration**, click **File System**.




The **File System** page appears.

2. Highlight a directory and click ↱ to open the directory and view the files in the directory.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, type **ls** */path/dir_name*. For example, to display the contents of the **/etc/config** directory:

```
> ls /etc/config
-rw-r--r--    1 root     root           856 Nov 20 20:12 accns.json
drw-------    2 root     root           160 Sep 23 04:02 analyzer
drwxr-xr-x    3 root     root           224 Sep 23 04:02 cc_acl
-rw-r--r--    1 root     root            47 Sep 23 04:02 dhcp.leases
...
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Create a directory

## Command line

This procedure is not available through the WebUI. To make a new directory, use the mkdir command, specifying the name of the directory.

For example:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, type **mkdir** */path/dir_name*. For example, to create a directory named **temp** in **/etc/config**:

```
> mkdir /etc/config/temp
>
```

3. Verify that the directory was created:

```
> ls /etc/config
...
-rw-r--r--    1 root     root          1436 Aug 12 21:36 ssl.crt
-rw-------    1 root     root          3895 Aug 12 21:36 ssl.pem
-rw-r--r--    1 root     root            10 Aug  5 06:41 start
drwxr-xr-x    2 root     root           160 Aug 25 17:49 temp
>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Display file contents

This procedure is not available through the WebUI. To display the contents of a file by using the Admin CLI, , use the more command, specifying the name of the directory.

For example:

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type **more /*path*/*filename***. For example, to view the content of the file **accns.json** in **/etc/config**:

```
> more /etc/config/accns.json
{
    "auth":
        "user": {
            "admin": {
                "password":
"$2a$05$W1sls1oxsadf/n4J0XT.Rgr6ewr1yerHtXQdbafsatGswKg0YUm"
            }
        }
    },
    "schema": {
        "version": "461"
    }
}
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Copy a file or directory

This procedure is not available through the WebUI. To copy a file or directory by using the Admin CLI, use the cp command, specifying the existing path and filename followed by the path and filename of the new file, or specifying the existing path and directory name followed by the path and directory name of the new directory.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, type **cp /*path*/*filename*|*dir_name* /*path*[*filename*]|*dir_name***. For example:
   - To copy the file **/etc/config/accns.json** to a file named **backup_cfg.json** in a directory named **/etc/config/test**, enter the following:

```
> cp /etc/config/accns.json /etc/config/test/backup_cfg.json
>
```

   - To copy a directory named **/etc/config/test** to **/opt**:

```
> cp /etc/config/test/ /opt/
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Move or rename a file or directory

This procedure is not available through the WebUI. To move or rename a file or directory by using the Admin CLI, use the mv command.

### Command line

To rename a file named **test.py** in **/etc/config/scripts** to **final.py**:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type:

```
> mv /etc/config/scripts/test.py /etc/config/scripts/final.py
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

To move **test.py** from **/etc/config/scripts** to **/opt**:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type:

```
> mv /etc/config/scripts/test.py /opt/
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

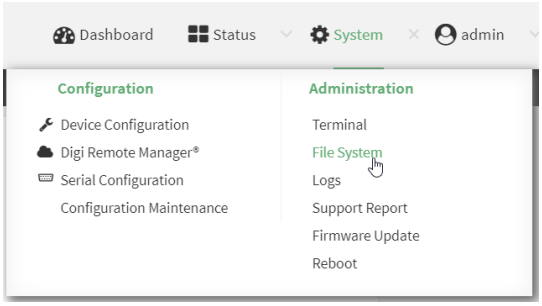
# Delete a file or directory

To delete a file or directory by using the WebUI or the Admin CLI:

## Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, click **System**. Under **Administration**, click **File System**.




   The **File System** page appears.

2. Highlight the directory containing the file to be deleted and click to open the directory.
3. Highlight the file to be deleted and click .
4. Click **OK** to confirm.

## Command line

To delete a file named **test.py** in **/etc/config/scripts**:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the Admin CLI prompt, type:

```
> rm /etc/config/scripts/test.py
rm: remove '/etc/config/scripts/test.py'? yes
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

To delete a directory named **temp** from **/opt**:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type:

```
> rm /opt/temp/
rm: descend into directory '/opt/temp'? yes
rm: remove directory '/opt/temp'? yes
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Upload and download files

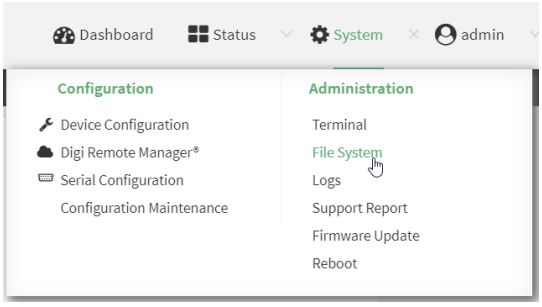
You can download and upload files by using the WebUI or from the command line by using the scp Secure Copy command, or by using a utility such as SSH File Transfer Protocol (SFTP) or an SFTP application like FileZilla.

## Upload and download files by using the WebUI

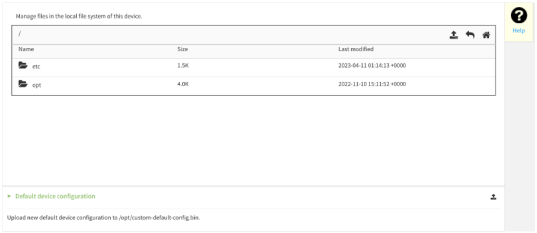
### *Upload files*

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, click **System**. Under **Administration**, click **File System**.




   The **File System** page appears.

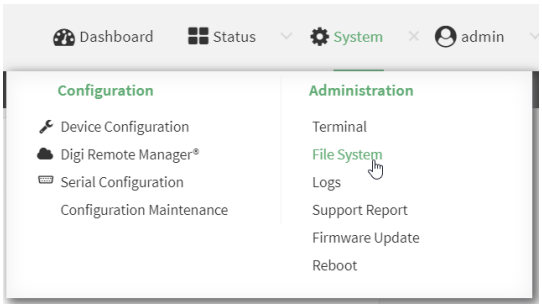


2. Highlight the directory to which the file will be uploaded and click to open the directory.
3. Click (upload).
4. Browse to the location of the file on your local machine. Select the file and click **Open** to upload the file.

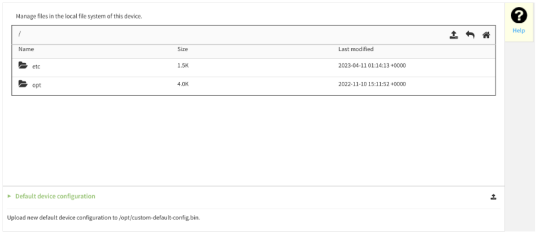
### *Download files*

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, click **System**. Under **Administration**, click **File System**.




The **File System** page appears.



2. Highlight the directory to which the file will be uploaded and click to open the directory.
3. Highlight the appropriate file and click (download).

## Upload and download files by using the Secure Copy command

### *Copy a file from a remote host to the Connect EZ 16/32 device*

To copy a file from a remote host to the Connect EZ 16/32 device, use the scp command as follows:

```
> scp host hostname-or-ip user username remote remote-path local local-path to
local
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the path and filename of the file on the remote host that will be copied to the Connect EZ 16/32 device.
- *local-path* is the location on the Connect EZ 16/32 device where the copied file will be placed.

For example:

To copy firmware from a remote host with an IP address of 192.168.4.1 to the /etc/config directory on the Connect EZ 16/32 device, issue the following command:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/Connect EZ 16/32-
25.2.bin local /etc/config/scripts to local
admin@192.168.4.1's password: adminpwd
Connect EZ 16/32-25.2.bin                          100%    36MB    11.1MB/s        00:03
>
```

### *Transfer a file from the Connect EZ 16/32 device to a remote host*

To copy a file from the Connect EZ 16/32 device to a remote host, use the scp command as follows:

```
> scp host hostname-or-ip user username remote remote-path local local-path to
remote
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the location on the remote host where the file will be copied.
- *local-path* is the path and filename on the Connect EZ 16/32 device.

For example:

To copy a support report from the Connect EZ 16/32 device to a remote host at the IP address of 192.168.4.1:

1. Use the **system support-report** command to generate the report:

   ```
   > system support-report path /var/log/
   Saving support report to /var/log/support-report-0040D0133536-24-01-12-
   12:10:00.bin
   Support report saved.
   >
   ```

2. Use the **scp** command to transfer the report to a remote host:

   ```
   > scp host 192.168.4.1 user admin remote /home/admin/temp/ local
   /var/log/support-report-00:40:D0:13:35:36-24-01-12-12:10:00.bin to remote
   admin@192.168.4.1's password: adminpwd
   support-report-0040D0133536-24-01-12-12:10:00.bin
   >
   ```

## Upload and download files using SFTP

### *Transfer a file from a remote host to the Connect EZ 16/32 device*

This example uploads firmware from a remote host to the Connect EZ 16/32 device with an IP address of **192.168.2.1**, using the username **ahmed**:

```
$ sftp ahmed@192.168.2.1
Password:
Connected to 192.168.2.1
sftp> put Connect EZ 16/32-25.2
Uploading Connect EZ 16/32-25.2 to Connect EZ 16/32-25.2
Connect EZ 16/32-25.2
           100%  24M  830.4KB/s   00:00
sftp> exit
$
```

### *Transfer a file from the Connect EZ 16/32 device to a remote host*

This example downloads a file named **test.py** from the Connect EZ device at the IP address of **192.168.2.1** with a username of **ahmed** to the local directory on the remote host:

```
$ sftp ahmed@192.168.2.1
Password:
Connected to 192.168.2.1
sftp> get test.py
Fetching test.py to test.py
test.py
    100%  254    0.3KB/s   00:00
sftp> exit
$
```

# Diagnostics

This chapter contains the following topics:


Perform a speedtest ..... 965
Generate a support report ..... 965
View system and event logs ..... 970
Configure syslog servers ..... 975
Configure options for the event and system logs ..... 977
Configure an email notification for a system event ..... 982
Configure an SNMP trap for a system event ..... 983
Analyze network traffic ..... 984
Use the ping command to troubleshoot network connections ..... 1002
Use the traceroute command to diagnose IP routing problems ..... 1002

# Perform a speedtest

To perform a speedtest:

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the **iperf** command to generate the report:

   ```
   > iperf host
   ```

   where *host* is the hostname or IP address of a speedtest host. For example:

   ```
   > iperf speedtest.accns.com
   Tx (upload) average: 50.1110 Mbps
   Tx latency: 31.45 ms
   Rx (download) average: 44.7588 Mbps
   Rx latency: 30.05 ms
   >
   ```
3. To output the result in json format, use the **output** parameter:

   ```
   > iperf host output json
   {"tx_avg": "51.8510", "tx_avg_units": "Mbps", "tx_latency": "31.07",
   "tx_latency_units": "ms", "rx_avg": "39.5770", "rx_avg_units": "Mbps",
   "rx_latency": "34.19", "rx_latency_units": "ms" }
   >
   ```
4. To change the size of the speedtest packet, use the **size** parameter:

   ```
   > iperf host size int
   ```
5. By default, the speedtest uses *nuttcp* for the mode. To change this setting from *nuttcp* to *iperf*, use the **mode** parameter:

   ```
   > iperf host mode iperf
   ```
6. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

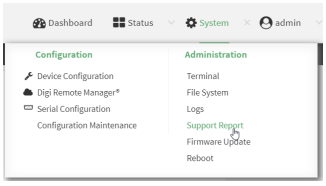
# Generate a support report

To generate and download a support report:

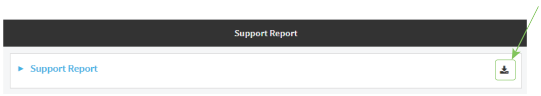
### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the main menu, click **System**. Under **Administration**, click **Support Report**.




2. Click to generate and download the support report.




Attach the support report to any support requests.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the **system support-report** command to generate the report:

```
> system support-report path /var/log/
Saving support report to /var/log/support-report-0040D0133536-24-01-12-
12:10:00.bin
Support report saved.
>
```

3. Use the **scp** command to transfer the report to a remote host:

```
> scp host 192.168.4.1 user admin remote /home/admin/temp/ local
/var/log/support-report-00:40:D0:13:35:36-24-01-12-12:10:00.bin to remote
admin@192.168.4.1's password: adminpwd
support-report-0040D0133536-24-01-12-12:10:00.bin
>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

See Support report overview for an overview of what is contained in the support report.

## Support report overview

#### Generating a Support Report

Support reports provide a snapshot of a device's current settings and connection status at the time of the report's generation. The relevant log files are packaged into a **.bin** file that can be downloaded from the local (web) UI. For more information about generating support reports, see Generate a support report.

**Note** Information logged on the device will be erased when the device is powered off or rebooted to avoid unnecessary wear to the flash memory. See Configure options for the event and system logs for more information on how to enable persistent system logs.

Use 7-Zip or any other file-archiving utility to extract a support report. Its contents are organized into the following directories:

**/etc**

This folder most notably contains a running list of the cellular connections that have been registered by the device's radio.

| Directory | Filename | Notes |
|---|---|---|
| /etc | version | Active firmware version |
| /etc/config | mn.json | Cellular connections logged as having been engaged by the radio; establishes previous APN associations |

**/opt**

Information stored here persists between reboots and system resets.

| Directory | Filename | Notes |
|---|---|---|
| /opt/log_last | messages | With persistent system logs enabled, syslog info will be stored in the /opt directory which isn't erased after reboots or system resets |

**/tmp**

Output from a series of diagnostic queries is stored in a randomly generated sub-directory within /tmp. When combing through these logs, pay particular attention to config_dump-public (to verify local device settings) and mmcli-dump (to validate the cellular connection status).

| Directory | Filename | Notes |
|---|---|---|
| /tmp/#* | | *# is generated at random |
| | arp_-nv | The table of IP-address to MAC-address translations used by the address resolution protocol (ARP) |
| | arptables_-nvv_-L | The tables of ARP packet filter rules in the Linux kernel |
| | cat_procmeminfo | A breakdown of memory utilization at the time when the support report was generated |
| | config_dump-public | The device's current settings, scrubbed of passwords and preshared keys |
| | conntrack_-L | A list of all currently tracked connections through the system |

| Directory | Filename | Notes |
|---|---|---|
| | conntrack_-S | A summary of currently tracked connections |
| | date | Local system time. If the device isn't online when the support report is generated, the date will be based on the date/month/year that the firmware running on the device was created (e.g. 18.4.54.41 was created 2018-07-05) |
| | df_-h | A report of the file system disk space usage |
| | event_list | A list of events leveraged for syslog messages |
| | fw_printenv | The entire environment for the bootloader U-Boot |
| | ip_addr_list | IP addresses listed per interface |
| | ip_route_list | Default routing information per interface |
| | ip6tables_-nv_-L | A list of IPv6 routing tables |
| | ip6tables_-nv_-L_-t_mangle | Firewall table used when handling mangled/fragmented IPv6 packets |
| | ip6tables_-nv_-L_-t_nat | Firewall table used to direct NAT'd traffic |
| | iptables_-nv_-L | A list of IPv4 firewall tables |
| | iptables_-nv_-L_-t_mangle | Firewall table used when handling mangled/fragmented IPv4 packets |
| | iptables_-nv_-L_-t_nat | Firewall table used to direct NAT'd traffic |
| | s_-RlhA_etcconfig | An index of items in /etc/config (and its sub-directories) |
| | ls_-RlhA_opt | An index of items in /opt (and its sub-directories) |
| | ls_-RlhA_tmp | An index of items in /tmp (and its sub-directories) |
| | ls_-RlhA_var | An index of items in /var (and its sub-directories) |
| | mmcli-dump | A repository of critical information about the cellular radio based off of the cited modem-manager output and defined set of AT commands |
| | netstat_-i | Interface statistics for transmitted/ received packets |
| | netstat_-na | List of both listening and non-listening network sockets on the device |
| | ps_l | A snapshot of the current processes running at the time of generating the report |

| Directory | Filename | Notes |
|---|---|---|
| | runt_json | Storage for active/ engaged system variables |
| | sprite_config_ dump | Not used for cellular devices |
| | ubus-dump | A log of ubus calls for network devices and interfaces |
| | uptime | The device's uptime at the time of generating the report, along with CPU load averages for the past 1, 5, and 15 minutes |

**/var/log**

The running system log is stored in "messages" until reaching a set line count (1,000 lines by default). Once this limit is exceeded, that file is renamed to "messages.0" and a new running log is written to the now-empty "messages" log.

| Directory | Filename | Notes |
|---|---|---|
| /var/log | messages | Current syslog information |
| | messages.0 | Rollover syslog information |

**/var/run**

This directory can be disregarded for most troubleshooting/ diagnostic purposes.

| Directory | Filename | Notes |
|---|---|---|
| /var/run | all files | Runtime settings for the device -- referenced in the syslog data gathered in /tmp (see above) |

# View system and event logs

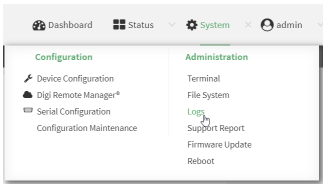
See Configure options for the event and system logs for information about configuring the information displayed in event and system logs.

## View System Logs

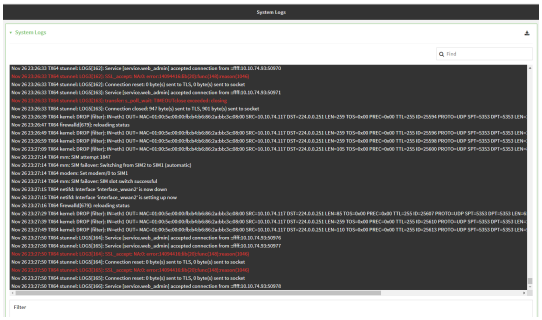
### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the main menu, click **System** > **Logs**.

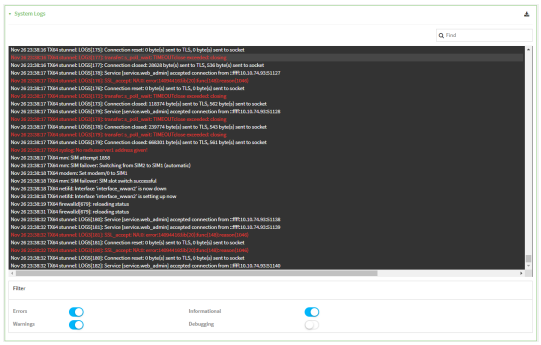



The system log displays:

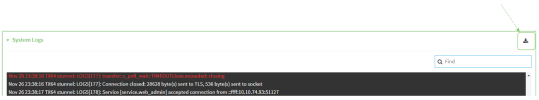



2. Limit the display in the system log by using the **Find** search tool.

3. Use filters to configure the types of information displayed in the system logs.



4. Click to download the system log.



## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the show log command at the Admin CLI prompt:

```
> show log

Timestamp        Message
--------------  ------------------------------------------------------------
----
Nov 26 21:54:34  Connect EZ 16/32 netifd: Interface 'interface_wan' is
setting up now
Nov 26 21:54:35  Connect EZ 16/32 firewalld[621]: reloading status
...
>
```

3. (Optional) Use the **show log number *num*** command to limit the number of lines that are displayed. For example, to limit the log to the most recent ten lines:

```
> show log number 10

Timestamp        Message
--------------  ------------------------------------------------------------
----
Nov 26 21:54:34  Connect EZ 16/32 netifd: Interface 'interface_wan' is
setting up now
Nov 26 21:54:35  Connect EZ 16/32 firewalld[621]: reloading status
...
>
```

4. (Optional) Use the **show log filter *value*** command to limit the number of lines that are displayed. Allowed values are **critical**, **warning**, **info**, and **debug**. For example, to limit the event list to only info messages:

```
> show log filter info

Timestamp        Type    Category  Message
---------------- ------- --------- ------------------------------------
-----
Nov 26 22:01:26  info    user
name=admin~service=cli~state=opened~remote=192.168.1.2
```

```
Nov 26 22:01:25  info    user
name=admin~service=cli~state=closed~remote=192.168.1.2
...
>
```

5. Type **exit** to exit the Admin CLI.

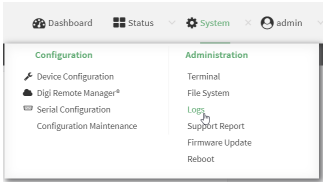
   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## View Event Logs

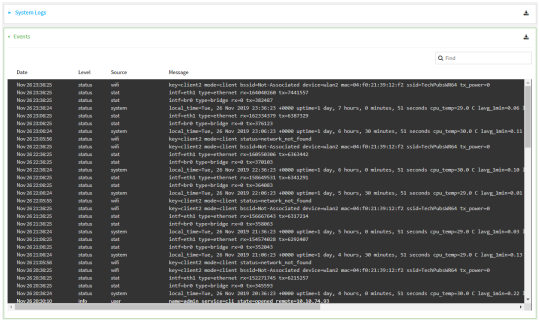
### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

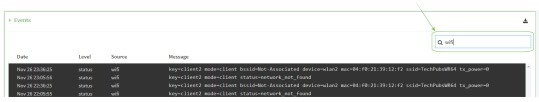
1. On the main menu, click **System** > **Logs**.




2. Click ▾ **System Logs** to collapse the system logs viewer, or scroll down to **Events**.
3. Click ▸ **Events** to expand the event viewer.



4. Limit the display in the event log by using the **Find** search tool.



5. Click 🡻 to download the event log.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Use the show event command at the Admin CLI prompt:

```
> show event

Timestamp        Type    Category  Message
---------------- ------- --------- ------------------------------------
-----
Nov 26 21:42:37  status  stat
intf=eth1~type=ethernet~rx=11332435~tx=5038762
Nov 26 21:42:35  status  system    local_time=Thu, 08 Aug 2019 21:42:35
+0000~uptime=3 hours, 0 minutes, 48 seconds
...
>
```

3. (Optional) Use the **show event number *num*** command to limit the number of lines that are displayed. For example, to limit the event list to the most recent ten lines:

```
> show event number 10

Timestamp        Type    Category  Message
---------------- ------- --------- ------------------------------------
-----
Nov 26 21:42:37  status  stat
intf=eth1~type=ethernet~rx=11332435~tx=5038762
Nov 26 21:42:35  status  system    local_time=Thu, 08 Aug 2019 21:42:35
+0000~uptime=3 hours, 0 minutes, 48 seconds
...
>
```

4. (Optional) Use the **show event table *value*** command to limit the number of lines that are displayed. Allowed values are **error**, **info**, and **status**. For example, to limit the event list to only info messages:

```
> show event table info

Timestamp        Type    Category  Message
---------------- ------- --------- ------------------------------------
-----
Nov 26 22:01:26  info    user
name=admin~service=cli~state=opened~remote=192.168.1.2
Nov 26 22:01:25  info    user
name=admin~service=cli~state=closed~remote=192.168.1.2
...
>
```

5. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Configure syslog servers

You can configure remote syslog servers for storing event and system logs.

## Web

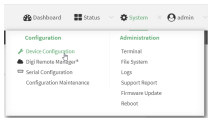
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

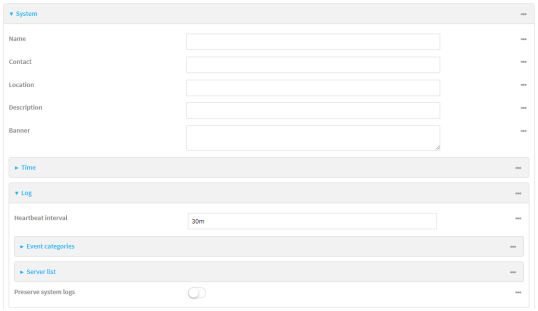
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

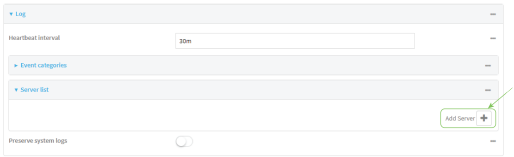
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

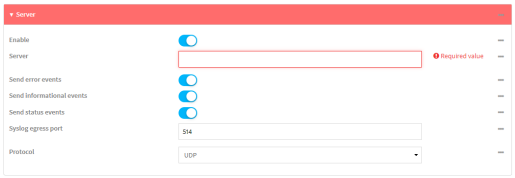
   

   The **Configuration** window is displayed.
3. Click **System** > **Log**.

   
   
4. Add and configure a remote syslog server:
   a. Click to expand **Server list**.
   b. For **Add Server**, click ✚.

The log server configuration window is displayed.




Log servers are enabled by default. To disable, toggle off **Enable**.

c. Type the host name or IP address of the **Server**.

d. Select the event categories that will be sent to the server. By default, all event categories are enabled. You can disable logging for error, informational, and status event categories by clicking to toggle off the category.

e. For **Syslog egress port**, type the port number to use for the syslog server. The default is **514**.

f. For **Protocol**, select the IP protocol to use for communication with the syslog server. Available options are **TCP** and **UPD**. The default is **UPD**.

5. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) To configure remote syslog servers:

   a. Add a remote server:

```
(config)> add system log remote end
(config system log remote 0)>
```

   b. Enable the server:

```
(config system log remote 0)> enable true
(config system log remote 0)>
```

   c. Set the host name or IP address of the server:

```
(config system log remote 0)> server hostname
(config system log remote 0)>
```

   d. The event categories that will be sent to the server are automatically enabled when the server is enabled.

- To disable informational event messages:

```
(config system log remote 0)> info false
(config system log remote 0)>
```

- To disable status event messages:

```
(config system log remote 0)> status false
(config system log remote 0)>
```

- To disable informational event messages:

```
(config system log remote 0)> error false
(config system log remote 0)>
```

4. Set the port number to use for the syslog server:

```
(config system log remote 0)> port value
(config system log remote 0)>
```

   where *value* is any integer between **1** and **65535**. The default is **514**.

5. Set the IP protocol to use for communication with the syslog server:

```
(config system log remote 0)> protocol value
(config system log remote 0)>
```

   where *value* is either **tcp** or **udp**. The default is **udp**.

6. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

7. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Configure options for the event and system logs

The default configuration for event and system logging is:

- The heartbeat interval, which determines the amount of time to wait before sending a heartbeat event if no other events have been sent, is set to 30 minutes.
- All event categories are enabled.

To change or disable the heartbeat interval, or to disable event categories, and to perform other log configuration:

## Web

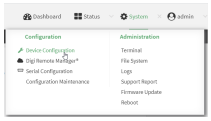
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

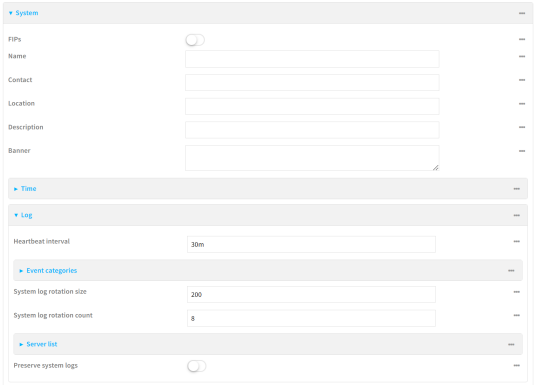
   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

   The **Configuration** window is displayed.
3. Click **System** > **Log**.

4. (Optional) To change the **Heartbeat interval** from the default of 30 minutes, type a new value. The heartbeat interval determines the amount of time to wait before sending a heartbeat event if no other events have been sent.

   Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

   For example, to set **Heartbeat interval** to ten minutes, enter **10m** or **600s**.

   To disable the **Heartbeat interval**, enter **0s**.
5. (Optional) To disable event categories, or to enable them if they have been disabled:

   a. Click to expand **Event Categories**.
   b. Click an event category to expand.

c. Depending on the event category, you can enable or disable different types of events.

- **Enable error events**: Enable to generate an event whenever an error occurs.
- **Enable status events**: Enable to generate periodic reports of the current status. These events are generated at specific time intervals, rather than when changes occur, and are only sent if a change has occurred since the previous report. Status events may also be generated in response to remote control commands.
- **Status interval**: The minimum time interval between periodic status events. The limitation does not apply to events generated in response to remove control commands. Set this field to blank to only send events generated in response to remote control command.

  **Syntax**: *number*{**w**|**d**|**h**|**m**|**s**}

  **Default**: 30m (30 minutes)

  This field works with the **Enable status events** option.
- **Enable informational events**: Enable to generate an event whenever a significant change occurs.
- **Enable email notifications**: Enable to email a system log event notification to a specified email address. The email address must also be specified before a notification can be sent. To configure, see Configure an email notification for a system event.
- **Enable SNMP traps**: Enable to save system log event information to an SNMP trap. At least one SNMP destination must be defined before event information can be saved. To configure, see Configure an SNMP trap for a system event.

6. (Optional) See Configure syslog servers for information about configuring remote syslog servers to which log messages will be sent.
7. (Optional) To change the system log settings from the defaults, type in a new value.
   - **System log rotation size**: Specify the maximum size (measured in kilobytes) the system log file can reach before log rotation. When the specified size is reached, the system log rotates.

     Default is **200** kb. Minimum is **10** kb.
   - **System log rotation count**: Specify the number of system log files to keep.

     Default is **8**. Minimum is **1**; maximum is **20**.
8. Enable **Preserve system logs** to save the current session's system log after a reboot.

   By default, the Connect EZ 16/32 device erases system logs each time the device is powered off or rebooted.

   **Note** You should only enable **Preserve system logs** temporarily to debug issues. Once you are finished debugging, immediately disable **Preserve system logs** to avoid unnecessary wear to the flash memory.
9. (Optional) Configure **Email notifications** to send an email notification of a system event. See Configure an email notification for a system event.
10. (Optional) Configure **SNMP traps** destinations for a Connect EZ 16/32 to save system event information. See Configure an SNMP trap for a system event.
11. Click **Apply** to save the configuration and apply the change.

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. (Optional) To change the heartbeat interval from the default of 30 minutes, set a new value. The heartbeat interval determines the amount of time to wait before sending a heartbeat event if no other events have been sent.

```
(config)> system log heartbeat_interval value
(config)>
```

   where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

   For example, to set **the heartbeat interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> system log heartbeat_interval 600s
(config)>
```

   To disable the heartbeat interval, set the value to **0s**
4. Enable preserve system logs functionality to save the current session's system log after a reboot. By default, the Connect EZ 16/32 device erases system logs each time the device is powered off or rebooted.

   **Note** You should only enable **Preserve system logs** temporarily to debug issues. Once you are finished debugging, immediately disable **Preserve system logs** to avoid unnecessary wear to the flash memory.

```
(config)> system log persistent true
(config)>
```

5. (Optional) To disable event categories, or to enable them if they have been disabled:
   a. Use the question mark (**?**) to determine available event categories:

```
(config)> system log event ?

Event categories: Settings to enable individual event categories.

 Additional Configuration
 ------------------------------------------------------------------------
----------
 arping                    ARP ping
 config                    Configuration
 dhcpserver                DHCP server
```

```
 firmware                  Firmware
 location                  Location
 modem                     Modem
 netmon                    Active recovery
 network                   Network interfaces
 openvpn                   OpenVPN
 portal                    Captive portal
 remote                    Remote control
 restart                   Restart
 serial                    Serial
 sms                       SMS commands
 speed                     Speed
 stat                      Network statistics
 user                      User
 watchdog                 Watchdog

 wol                       Wake-On-LAN

(config)> system log event
```

b. Depending on the event category, you can enable or disable informational events, status events, and error events. Some categories also allow you to set the status interval, which is the time interval between periodic status events. For example, to configure DHCP server logging:

   i. Use the question mark (**?**) to determine what events are available for DHCP server logging configuration:

```
(config)> system log event dhcpserver ?
...
DHCP server: Settings for DHCP server events. Informational events
are generated
when a lease is obtained or released. Status events report the
current list of
leases.

 Parameters                Current Value
 ------------------------------------------------------------------
--------------
 info                      true          Enable informational
events
 status                    true          Enable status events
 status_interval           30m           Status interval

(config)> system log event dhcpserver
```

   ii. To disable informational messages for the DHCP server:

```
(config)> system log event dhcpserver info false
(config)>
```

iii. To change the status interval:

```
(config)> system log event dhcpserver status_interval value
(config)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **the status interval** to ten minutes, enter either **10m** or **600s**:

```
(config)> system log event dhcpserver status_interval 600s
(config)>
```

6. (Optional) See Configure syslog servers for information about configuring remote syslog servers to which log messages will be sent.
7. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Configure an email notification for a system event

You can configure the Connect EZ 16/32 to send an email notification of a system event.

**Step 1**: Configure the SMTP server that is used to send email notifications when a system log event occurs by enabling the **Email notifications** system log feature.

**Step 2**: Review the system log event categories and select the type of information that you want to save to the system log: errors, informational events, or status events, depending on the event category. To ensure the notification is sent, enable the **Enable email notification** option for the event category.

1. Log in to the web UI.
2. Click **System** > **Device Configuration**. The **Configuration** page displays.
3. Expand **System** > **Log**.
4. Expand **Email notifications**.
5. Click **Enable**. The slider is blue when enabled.
   a. From the **Server type** list box, select the method used to connect and authenticate with the SMTP server.
   b. In the **SMTP server name** field, enter the host name or IP address of the SMTP server.
   c. In the **SMTP server port** field, enter the TCP port of the SMTP server.
   d. In the **Server user name** field, enter the server login name.
   e. In the **Server password** field, enter the server password.
   f. In the **Email from address** field, enter the email address that should be placed in the **From** field on an email.

g. the **Email to address** field, enter the email address that should be place in the **To** field on an email.

h. In the **Email subject** field, enter the text for the subject line of the email.

6. Click **Apply** to save the configuration and apply the change.
7. Review the system log event categories and select the type of information that you want to save to the system log, and enable the **Enable email notification** option. To configure these options, see Configure options for the event and system logs.

# Configure an SNMP trap for a system event

You can configure an SNMP trap destination for a Connect EZ 16/32 to save system event information.

**Step 1**: Configure an SNMP trap by enabling the **SNMP traps** system log feature.

**Step 2**: Review the system log event categories and select the type of information that you want to save to the system log and the SNMP trap: errors, informational events, or status events, depending on the event category. To ensure the log information is saved to an SNMP trap, enable the **Enable SNMP traps** option for the event category.

1. Log in to the web UI.
2. Click **System** > **Device Configuration**. The **Configuration** page displays.
3. Expand **System** > **Log**.
4. Expand **SNMP traps**.
5. Click **Enable**. The slider is blue when enabled.
6. Add a destination.
   a. Click **Add Destination**.
   b. In the **Host Name** field, enter the host name or IP address of the SNMP destination.
   c. In the **Port** field, enter the UDP port of the SNMP destination. The default is **162**.
   d. In the **Community name** field, enter the SNMP destination community name. The default is **public**.
   e. Repeat this process to add an additional destination, if needed.
7. Click **Apply** to save the configuration and apply the change.
8. Review the system log event categories and select the type of information that you want to save to the system log, and enable the **Enable SNMP traps** option. To configure these options, see Configure options for the event and system logs.

# Analyze network traffic

The Connect EZ 16/32 device includes a network analyzer tool that captures data traffic on any interface and decodes the captured data traffic for diagnostics. You can capture data traffic on multiple interfaces at the same time and define capture filters to reduce the captured data. You can capture up to 10 MB of data traffic in two 5 MB files per interface.

To perform a more detailed analysis, you can download the captured data traffic from the device and view it using a third-party application.

**Note** Data traffic is captured to RAM and the captured data is lost when the device reboots unless you save the data to a file. See Save captured data traffic to a file.

This section contains the following topics:

Configure packet capture for the network analyzer ..... 985
Example filters for capturing data traffic ..... 994
Capture packets from the command line ..... 995
Stop capturing packets ..... 996
Show captured traffic data ..... 997
Save captured data traffic to a file ..... 998
Download captured data to your PC ..... 999
Clear captured data ..... 1000

## Configure packet capture for the network analyzer

To use the network analyzer, you must create one or more packet capture configuration.

**Required configuration items**

- The interface used by this packet capture configuration.

**Additional configuration items**

- The filter expression for this packet capture configuration.
- Schedule the analyzer to run based on a specified event or at a particular time:
  - The events or time that will trigger the analyzer to run, using this capture configuration.
  - The amount of time that the analyzer session will run.
  - The frequency with which captured events will be saved.

To configure a packet capture configuration:

### Web

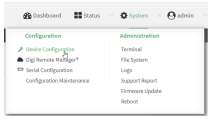
1. Log into Digi Remote Manager, or log into the local Web UI as a user with full Admin access rights.
2. Access the device configuration:

   Remote Manager:

   a. Locate your device as described in Use Digi Remote Manager to view and manage your device.
   b. Click the **Device ID**.
   c. Click **Settings**.
   d. Click to expand **Config**.

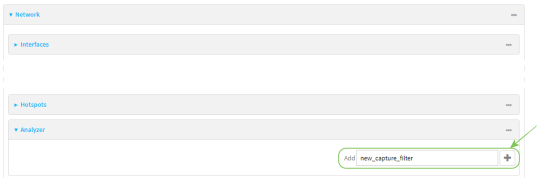
   Local Web UI:

   a. On the menu, click **System**. Under **Configuration**, click **Device Configuration**.

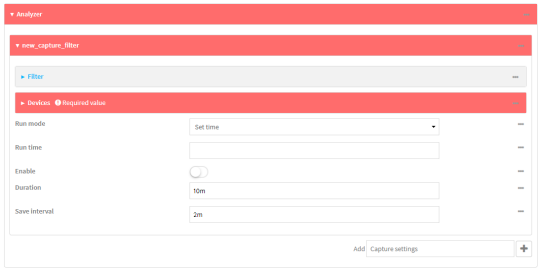
   

   The **Configuration** window is displayed.
3. Click **Network** > **Analyzer**.

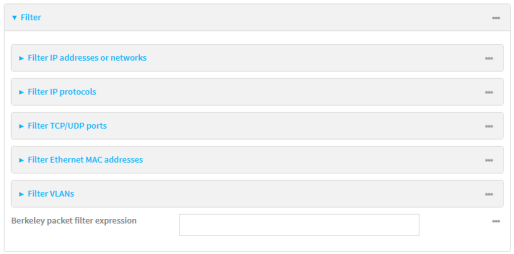
4. For **Add Capture settings**, type a name for the capture filter and click ✚.




The new capture filter configuration is displayed.

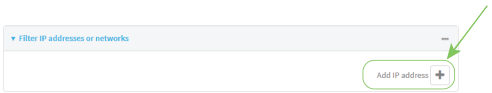



5. (Optional) Add a filter type:
   a. Click to expand **Filter**.




   You can select from preconfigured filters to determine which types of packets to capture or ignore, or you can create your own Berkeley packet filter expression.

   b. To create a filter that either captures or ignores packets from a particular IP address or network:
      i. Click to expand **Filter IP addresses or networks**.
      ii. Click ✚ to add an IP address/network.




      iii. For **IP address or network**, type the IPv4 or IPv6 address (and optional netmask).
      iv. For **Source or destination IP address**, select whether the filter should apply to packets when the IP address/network is the source, the destination, or both.
      v. Click **Ignore this IP address or network** if the filter should ignore packets from this IP address/network. By default, is option is disabled, which means that the filter will capture packets from this IP address/network.
      vi. Click ✚ to add additional IP address/network filters.

c. To create a filter that either captures or ignores packets that use a particular IP protocol:
   i. Click to expand **Filter IP protocols**.
   ii. Click ✚ to add an IP protocol.
   iii. For **IP protocol to capture or ignore**, select the protocol. If **Other protocol** is selected, type the number of the protocol.
   iv. Click **Ignore this protocol** if the filter should ignore packets that use this protocol. By default, is option is disabled, which means that the filter will capture packets that use this protocol.
   v. Click ✚ to add additional IP protocols filters.
d. To create a filter that either captures or ignores packets from a particular port:
   i. Click to expand **Filter TCP/UDP port**.
   ii. Click ✚ to add a TCP/UDP port.
   iii. For **IP TCP/UDP port to capture or ignore**, type the number of the port to be captured or ingored.
   iv. For **TCP or UDP port**, select the type of transport protocol.
   v. For **Source or destination TCP/UDP port**, select whether the filter should apply to packets when the port is the source, the destination, or both.
   vi. Click **Ignore this TCP/UDP port** if the filter should ignore packets that use this port. By default, is option is disabled, which means that the filter will capture packets that use this port.
   vii. Click ✚ to add additional port filters.
e. To create a filter that either captures or ignores packets from one or more specified MAC addresses:
   i. Click to expand **Filter Ethernet MAC addresses**.
   ii. Click ✚ to add a MAC address.
   iii. For **Ethernet MAC address**, type the MAC address to be captured or ingored.
   iv. For **Source or destination Ethernet MAC address**, select whether the filter should apply to packets when the Ethernet MAC address is the source, the destination, or both.
   v. Click **Ignore this MAC address** if the filter should ignore packets that use this port. By default, is option is disabled, which means that the filter will capture packets that use this port.
   vi. Click ✚ to add additional MAC address filters.
f. To create a filter that either captures or ignores packets from one or more VLANs:
   i. Click to expand **Filter VLANs**.
   ii. Click ✚ to add a VLAN.
   iii. For **The VLAN to capture or ignore**, type the number of the VLAN.
   iv. Click **Ignore this VLAN** if the filter should ignore packets that use this port. By default, is option is disabled, which means that the filter will capture packets that use this port.
   v. Click ✚ to add additional VLAN filters.

g. For **Berkeley packet filter expression**, type a filter using Berkeley Packet Filter (BPF) syntax. See Example filters for capturing data traffic for examples of filters using BPF syntax.

6. Add one or more interface to the capture filter:
   a. Click to expand **Device**.
   b. Click ✚ to add an interface to the capture setting instance.

   c. For **Device**, select an interface.
   d. Repeat to add additional interfaces to the capture filter.
7. (Optional) For **Berkeley packet filter expression**, type a filter using Berkeley Packet Filter (BPF) syntax. See Example filters for capturing data traffic for examples of filters using BPF syntax.
8. (Optional) Schedule the analyzer to run, using this capture filter, based on a specified event or at a particular time:
   a. For **Run mode**, select the mode that will be used to run the capture filter. Available options are:
      - **On boot**: The capture filter will run once each time the device boots.
      - **Interval**: The capture filter will start running at the specified interval, within 30 seconds after the configuration change is saved.
        - If **Interval** is selected, in **Interval**, type the interval.

          Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

          For example, to set **Interval** to ten minutes, enter **10m** or **600s**.
      - **Set time**: Runs the capture filter at a specified time of the day.
        - If **Set Time** is selected, specify the time that the capture filter should run in **Run time**, using the format *HH:MM*.
      - **During system maintenance**: The capture filter will run during the system maintenance time window.
   b. **Enable** the capture filter schedule.
   c. For **Duration**, type the amount of time that the scheduled analyzer session will run.

      Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

      For example, to set **Duration** to ten minutes, enter **10m** or **600s**.
   d. For **Save interval**, type the frequency with which captured events will be saved.

      Allowed values are any number of weeks, days, hours, minutes, or seconds, and take the format ***number***{**w|d|h|m|s**}.

      For example, to set **Save interval** to ten minutes, enter **10m** or **600s**.
9. Click **Apply** to save the configuration and apply the change.

## Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the command line, type **config** to enter configuration mode:

```
> config
(config)>
```

3. Add a new capture filter:

```
(config)> add network analyzer name
(config network analyzer name)>
```

4. Add an interface to the capture filter:

```
(config network analyzer name)> add device end device
(config network analyzer name)>
```

   Determine available devices and the proper syntax.

   To determine available devices and proper syntax, use the space bar autocomplete feature:

```
(config network analyzer name)> add device end <space>
(config network analyzer name)> add interface end /network/
```

   Repeat to add additional interfaces.
5. (Optional) Set a filter for the capture filter:
   a. To create a filter that either captures or ignores packets from a particular IP address or network:
      i. Add a new IP address/network filter:

```
(config network analyzer name)> add filter address end
(config network analyzer name filter address 0)>
```

      ii. Set the IPv4 or IPv6 address (and optional netmask):

```
(config network analyzer name filter address 0)> address ip_
address[/netmask]
(config network analyzer name filter address 0)>
```

      iii. Set whether the filter should apply to packets when the IP address/network is the source, the destination, or both:

```
(config network analyzer name filter address 0)> match value
(config network analyzer name filter address 0)>
```

      where *value* is one of:

      - **source**: The filter will apply to packets when the IP address/network is the source.
      - **destination**: The filter will apply to packets when the IP address/network is the destination.

- **either**: The filter will apply to packets when the IP address/network is either the source or the destination.

iv. (Optional) Set the filter should ignore packets from this IP address/network:

```
(config network analyzer name filter address 0)> ignore true
(config network analyzer name filter address 0)>
```

By default, is option is set to **false**, which means that the filter will capture packets from this IP address/network.

v. Repeat these steps to add additional IP address filters.

b. To create a filter that either captures or ignores packets that use a particular IP protocol:

i. Add a new IP protocol filter:

```
(config network analyzer name)> add filter protocol end
(config network analyzer name filter protocol 0)>
```

ii. Use the **?** to determine available protocols and the appropriate format:

```
(config network analyzer name filter protocol 0)> protocol ?

IP protocol to capture or ignore: IP protocol to capture or
ignore.
Format:
  ah
  esp
  gre
  icmp
  icmpv6
  igmp
  ospf
  other
  tcp
  udp
  vrrp
Current value:

(config network analyzer name filter protocol 0)>
```

iii. Set the protocol:

```
(config network analyzer name filter protocol 0)> protocol value
(config network analyzer name filter protocol 0)>
```

iv. If other is set for the protocol, set the number of the protocol:

```
(config network analyzer name filter protocol 0)> protocol_other
value
(config network analyzer name filter protocol 0)>
```

where *value* is an integer between 1 and 255 and represents the the number of the protocol.

v. (Optional) Set the filter should ignore packets from this protocol:

```
(config network analyzer name filter protocol 0)> ignore true
(config network analyzer name filter protocol 0)>
```

By default, is option is set to **false**, which means that the filter will capture packets from this protocol.

vi. Repeat these steps to add additional protocol filters.

c. To create a filter that either captures or ignores packets from a particular port:

i. Add a new port filter:

```
(config network analyzer name)> add filter port end
(config network analyzer name filter port 0)>
```

ii. Set the transport protocol that should be filtered for the port:

```
(config network analyzer name filter port 0)> protocol value
(config network analyzer name filter port 0)>
```

where *value* is one of **tcp**, **udp**, or **either**. The default is either.

iii. Set whether the filter should apply to packets when the port is the source, the destination, or both:

```
(config network analyzer name filter port 0)> match value
(config network analyzer name filter port 0)>
```

where *value* is one of:

- **source**: The filter will apply to packets when the port is the source.
- **destination**: The filter will apply to packets when the port is the destination.
- **either**: The filter will apply to packets when the port is either the source or the destination.

iv. (Optional) Set the filter should ignore packets from this port:

```
(config network analyzer name filter port 0)> ignore true
(config network analyzer name filter port 0)>
```

By default, is option is set to **false**, which means that the filter will capture packets from this port.

v. Repeat these steps to add additional port filters.

d. To create a filter that either captures or ignores packets from one or more specified MAC addresses:

i. Add a new MAC address filter:

```
(config network analyzer name)> add filter mac_address end
(config network analyzer name filter mac_address 0)>
```

ii. Set the MAC address that should be be captured or ignored:

```
(config network analyzer name filter mac_address 0)> address value
(config network analyzer name filter mac_address 0)>
```

where *value* is the MAC address to be filtered, using colon-hexadecimal notation with lower case, for example, **00:aa:11:bb:22:cc**.

iii. Set whether the filter should apply to packets when the MAC address is the source, the destination, or both:

```
(config network analyzer name filter mac_address 0)> match value
(config network analyzer name filter mac_address 0)>
```

where *value* is one of:

- **source**: The filter will apply to packets when the MAC address is the source.
- **destination**: The filter will apply to packets when the MAC address is the destination.
- **either**: The filter will apply to packets when the MAC address is either the source or the destination.

iv. (Optional) Set the filter should ignore packets from this port:

```
(config network analyzer name filter mac_address 0)> ignore true
(config network analyzer name filter mac_address 0)>
```

By default, is option is set to **false**, which means that the filter will capture packets from this MAC address.

v. Repeat these steps to add additional MAC addresses.

e. To create a filter that either captures or ignores packets from one or more specified VLANs:

i. Add a new VLAN filter:

```
(config network analyzer name)> add filter vlan end
(config network analyzer name filter vlan 0)>
```

ii. Set the VLAN that should be be captured or ignored:

```
(config network analyzer name filter vlan 0)> vlan value
(config network analyzer name filter vlan 0)>
```

where *value* is number o the VLAN.

iii. (Optional) Set the filter should ignore packets from this VLAN:

```
(config network analyzer name filter vlan 0)> ignore true
(config network analyzer name filter vlan  0)>
```

By default, is option is set to **false**, which means that the filter will capture packets from this MAC address.

iv. Repeat these steps to add additional VLANs.

f. To create a filter using Berkeley Packet Filter (BPF) syntax:

```
(config network analyzer name)> filter custom value
(config network analyzer name)>
```

where *value* is a filter using Berkeley Packet Filter (BPF) syntax. Values that contain spaces must be enclosed in double quotes (").

See Example filters for capturing data traffic for examples of filters using BPF syntax.

6. (Optional) Schedule the analyzer to run, using this capture filter, based on a specified event or at a particular time:
   a. Enable scheduling for this capture filter:

```
(config network analyzer name)> schedule enable true
(config network analyzer name)>
```

   b. Set the mode that will be used to run the capture filter:

```
(config network analyzer name)> when mode
(config network analyzer name)>
```

   where *mode* is one of the following:

   - **boot**: The script will run once each time the device boots.
   - **interval**: The script will start running at the specified interval, within 30 seconds after the configuration change is saved. If **interval** is selected, set the interval:

```
(config add network analyzer name)> on_interval value
(config add network analyzer name)>
```

     where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

     For example, to set **on_interval** to ten minutes, enter either **10m** or **600s**:

```
(config network analyzer name)> on_interval  600s
(config network analyzer name)>
```

   - **set_time**: Runs the script at a specified time of the day. If **set_time** is set, set the time that the script should run, using the format *HH*:*MM*:

```
(config network analyzer name)> run_time HH:MM
(config network analyzer name)>
```

   - **maintenance_time**: The script will run during the system maintenance time window.

   c. Set the amount of time that the scheduled analyzer session will run:

```
(config network analyzer name)> duration value
(config network analyzer name)>
```

   where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

   For example, to set **duration** to ten minutes, enter either **10m** or **600s**:

```
(config network analyzer name)> save_interval 600s
(config network analyzer name)>
```

d. Set the frequency with which captured events will be saved:

```
(config network analyzer name)> save_interval value
(config network analyzer name)>
```

where *value* is any number of weeks, days, hours, minutes, or seconds, and takes the format ***number***{**w|d|h|m|s**}.

For example, to set **save_interval** to ten minutes, enter either **10m** or **600s**:

```
(config network analyzer name)> save_interval 600s
(config network analyzer name)>
```

7. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Example filters for capturing data traffic

The following are examples of filters using Berkeley Packet Filter (BPF) syntax for capturing several types of network data. See https://biot.com/capstats/bpf.html for detailed information about BPF syntax.

### *Example IPv4 capture filters*

- Capture traffic to and from IP host 192.168.1.1:

```
ip host 192.168.1.1
```

- Capture traffic from IP host 192.168.1.1:

```
ip src host 192.168.1.1
```

- Capture traffic to IP host 192.168.1.1:

```
ip dst host 192.168.1.1
```

- Capture traffic for a particular IP protocol:

```
ip proto protocol
```

where *protocol* is a number in the range of **1** to **255** or one of the following keywords: **icmp**, **icmp6**, **igmp**, **pim**, **ah**, **esp**, **vrrp**, **udp**, or **tcp**.

- Capture traffic to and from a TCP port 80:

```
ip proto tcp and port 80
```

- Capture traffic to UDP port 53:

```
ip proto udp and dst port 53
```

- Capture traffic from UDP port 53:

```
ip proto udp and src port 53
```

- Capture to and from IP host 10.0.0.1 but filter out ports 22 and 80:

```
ip host 10.0.0.1 and not (port 22 or port 80)
```

### *Example Ethernet capture filters*

- Capture Ethernet packets to and from a host with a MAC address of 00:40:D0:13:35:36:

```
ether host 00:40:D0:13:35:36
```

- Capture Ethernet packets from host 00:40:D0:13:35:36:

```
ether src 00:40:D0:13:35:36:
```

- Capture Ethernet packets to host 00:40:D0:13:35:36:

```
ether dst 00:40:D0:13:35:36
```

## Capture packets from the command line

You can start packet capture at the command line with the analyzer start command. Alternatively, you can schedule the network analyzer to run based on a specified event or at a particular time. See Configure packet capture for the network analyzer for information about scheduling packet capturing.

Additional analyzer commands allow you to:

- Stop capturing packets.
- Save captured data traffic to a file.
- Clear captured data.

#### Required configuration items

- A configured packet capture. See Configure packet capture for the network analyzer for packet capture configuration information.

To start packet capture from the command line:

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Type the following at the Admin CLI prompt:

   ```
   > analyzer start name capture_filter
   >
   ```

   where *capture_filter* is the name of a packet capture configuration. See Configure packet capture for the network analyzer for more information.

   To determine available packet capture configurations, use the **?**:

   ```
   > analyzer start name ?

   name: Name of the capture filter to use.
   Format:
     test_capture
     capture_ping

   > analyzer start name
   ```

You can capture up to 10 MB of data traffic in two 5 MB files per interface.

**Note** Data traffic is captured to RAM and the captured data is lost when the device reboots unless you save the data to a file. See Save captured data traffic to a file.

## Stop capturing packets

You can stop packet capture at the command line with the analyzer stop command.

To stop packet capture from the command line:

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Type the following at the Admin CLI prompt:

   ```
   > analyzer stop name capture_filter
   >
   ```

   where *capture_filter* is the name of a packet capture configuration. See Configure packet capture for the network analyzer for more information.

   To determine available packet capture configurations, use the **?**:

   ```
   > analyzer stop name ?
   ```

```
name: Name of the capture filter to use.
Format:
  test_capture
  capture_ping

> analyzer stop name
```

## Show captured traffic data

To view captured data traffic, use the show analyzer command. The command output show the following information for each packet:

- The packet number.
- The timestamp for when the packet was captured.
- The length of the packet and the amount of data captured.
- Whether the packet was sent or received by the device.
- The interface on which the packet was sent or received.
- A hexadecimal dump of the packet of up to 256 bytes.
- Decoded information of the packet.

To show captured data traffic:

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Type the following at the Admin CLI prompt:

```
> show analyzer name capture_filter

Packet 1 : Sept-29-2023 12:10:00.287682, Length 60 bytes (Captured Length
60 bytes)

Received on interface eth1

      00 40 ff 80 01 20 b4 b6  86 21 b5 73 08 00 45 00   .@... ..
.!.s..E.
      00 28 3d 36 40 00 80 06  14 bc 0a 0a 4a 82 0a 0a   .(=6@... ....J..
      4a 48 cd ae 00 16 a4 4b  ff 5f ee 1f d8 23 50 10   JH.....K
._...#P.
      08 02 c7 40 00 00 00 00  00 00 00 00               ...@.... ....

    Ethernet Header
      Destination MAC Addr : 00:40:D0:13:35:36
      Source MAC Addr      : fb:03:53:05:11:2f
      Ethernet Type        : IP (0x0800)
    IP Header
```

```
      IP Version           : 4
      Header Length        : 20 bytes
      ToS                  : 0x00
      Total Length         : 40 bytes
      ID                   : 15670 (0x3d36)
      Flags                : Do not fragment
      Fragment Offset      : 0 (0x0000)
      TTL                  : 128 (0x80)
      Protocol             : TCP (6)
      Checksum             : 0x14bc
      Source IP Address    : 10.10.74.130
      Dest. IP Address     : 10.10.74.72
    TCP Header
      Source Port          : 52654
      Destination Port     : 22
      Sequence Number      : 2756443999
      Ack Number           : 3995064355
      Data Offset          : 5
      Flags                : ACK
      Window               : 2050
      Checksum             : 0xc740
      Urgent Pointer       : 0
    TCP Data
      00 00 00 00 00 00                                  ......

>
```

where *capture_filter* is the name of a packet capture configuration. See Configure packet capture for the network analyzer for more information.

To determine available packet capture configurations, use the **?**:

```
> show anaylzer name ?

name: Name of the capture filter to use.
Format:
  test_capture
  capture_ping

> show anaylzer name
```

## Save captured data traffic to a file

Data traffic is captured to RAM and when the device reboots, the data is lost. To retain the captured data, first save the data to a file and then upload the file to a PC.

To save captured traffic data to a file, use the analyzer save command:

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. Type the following at the Admin CLI prompt:

```
> analyzer save filename filename path path
>
```

where:

- *filename* is the name of the file that the captured data will be saved to.

  Determine filenames already in use:

  Use the tab autocomplete feature to determine filenames that are currently in use:

```
> analyzer save name <tab>
test1_analyzer_capture     test2_analyzer_capture
> analyzer save name
```

- *path* is the path and filename to save captured traffic to. If a relative path is provided, /etc/config/analyzer will be used as the root directory for the path and file.

To transfer the file to your PC, see Download captured data to your PC.

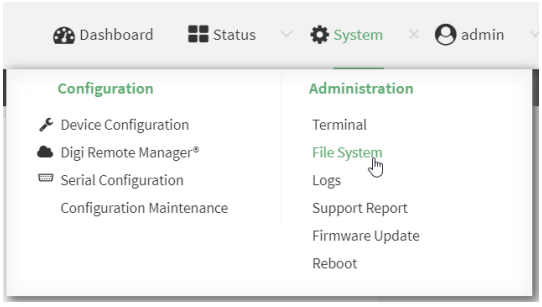
## Download captured data to your PC

After saving captured data to a file (see Save captured data traffic to a file), you can download the file from the WebUI or from the command line by using the scp (secure copy file) command.

### Web

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. On the menu, click **System**. Under **Administration**, click **File System**.




The **File System** page appears.

2. Highlight the **analyzer** directory and click ➦ to open the directory.
3. Select the saved analyzer report you want to download and click 🖴 (download).

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Type **scp** to use the Secure Copy program to copy the file to your PC:

   ```
   > scp host hostname-or-ip user username remote remote-path local local-path to remote
   ```

   where:

   - *hostname-or-ip* is the hostname or IP address of the remote host.
   - *username* is the name of the user on the remote host.
   - *remote-path* is the location on the remote host where the file will be copied.
   - *local-path* is the path and filename on the Connect EZ 16/32 device.

   For example:

   To download the traffic saved in the file **/etc/config/analyzer/eth0.pcpng** to a PC with the IP **192.168.210.2**, for a user named **maria**, to the **/home/maria** directory:

   ```
   > scp host 192.168.210.2 user maria remote /home/maria local
   /etc/config/analyzer/eth0.pcpng to remote

   maria@192.168.210.2's password:
   eth0.pcpng                                    100%   11KB 851.3KB/s
   00:00
   ```

## Clear captured data

To clear captured data traffic in RAM, use the analyzer clear command:

### Command line

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. Type the following at the Admin CLI prompt:

   ```
   > analyzer clear name capture_filter
   >
   ```

   where *capture_filter* is the name of a packet capture configuration. See Configure packet capture for the network analyzer for more information.

   To determine available packet capture configurations, use the **?**:

```
> anaylzer clear name ?

name: Name of the capture filter to use.
Format:
  test_capture
  capture_ping

> anaylzer clear name
```

**Note** You can remove data traffic saved to a file using the rm command.

# Use the ping command to troubleshoot network connections

Use the ping command troubleshoot connectivity problems.

## Ping to check internet connection

To check your internet connection:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, type the ping command followed by the host name or IP address of the server to be pinged:

```
> ping 8.8.8.8
PING 8.8.8.8 (8.8.8.8) 56(84) bytes of data.
64 bytes from 8.8.8.8: icmp_seq=1 ttl=54 time=11.1 ms
64 bytes from 8.8.8.8: icmp_seq=2 ttl=54 time=10.8 ms
64 bytes from 8.8.8.8: icmp_seq=3 ttl=54 time=10.7 ms
...
>
```

3. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Stop ping commands

To stop pings when the number of pings to send (the **count** parameter) has been set to a high value, enter **Ctrl+C**.

# Use the traceroute command to diagnose IP routing problems

Use the **traceroute** command to diagnose IP routing problems. This command traces the route to a remote IP host and displays results. The **traceroute** command differs from ping in that traceroute shows where the route fails, while ping simply returns a single error on failure.

See the traceroute command description for command syntax and examples. The **traceroute** command has several parameters. Only **host** is required.

- **host**: The IP address of the destination host.
- **bypass**: Send directly to a host on an attached network.
- **debug**: Enable socket level debugging.
- **dontfragment**: Do not fragment probe packets.
- **first_ttl**: Specifies with what TTL to start. (Default: 1)
- **gateway**: Route the packet through a specified gateway.
- **icmp**: Use ICMP ECHO for probes.
- **interface**: Specifies the interface.

- **ipchecksums**: Calculate ip checksums.
- **max_ttl**: Specifies the maximum number of hops. (Default: 30)
- **nomap**: Do not map IP addresses to host names
- **nqueries**: Sets the number of probe packets per hop. (Default: 3)
- **packetlen**: Total size of the probing packet. (Default: -1)
- **pausemsecs**: Minimal time interval between probes (Default: 0)
- **port**: Specifies the destination port. (Default: -1)
- **src_addr**: Chooses an alternative source address.
- **tos**: Set Type of Service. (Default: -1)
- **verbose**: Verbose output.
- **waittime**: Max wait for a response to a probe. (Default: 5)

### *Example*

This example shows using **traceroute** to verify that the Connect EZ device can route to host **8.8.8.8** (www.google.com) through the default gateway. The command output shows that **15** routing hops were required to reach the host:

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.
2. At the Admin CLI prompt, use the **traceroute** command to view IP routing information:

```
> traceroute 8.8.8.8
traceroute to 8.8.8.8 (8.8.8.8), 30 hops max, 52 byte packets
 1  192.168.8.1 (192.168.8.1)  0 ms  0 ms  0 ms
 2  10.10.10.10 (10.10.10.10)  0 ms  2 ms  2 ms
 3  * 10.10.8.23 (10.10.8.23)  1 ms  1 ms
 4  96.34.84.22 (96.34.84.22)  1 ms  1 ms  1 ms
 5  96.34.81.190 (96.34.81.190)  2 ms  2 ms  2 ms
 6  * * *
 7  96.34.2.12 (96.34.2.12)  11 ms  11 ms  11 ms
 8  * * *
 9  8.8.8.8 (8.8.8.8)  11 ms  11 ms  11 ms
>
```

By entering a **whois** command on a Unix device, the output shows that the route is as follows:

1. **192/8**: The local network of the Connect EZ 16/32 device.
2. **192.168.8.1**: The local network gateway to the Internet.
3. **96/8**: Charter Communications, the network provider.
4. **216/8**: Google Inc.

### *Stop the traceroute process*

To stop the traceroute process, enter **Ctrl-C**.

# AnywhereUSB 2 Plus USB ports on a Connect EZ 16/32

Your Connect EZ 16/32 includes two USB ports, which act as an AnywhereUSB 2 Plus Hub. The USB ports can only be used in conjunction with the **AnywhereUSB Manager**, which must be installed separately.

The AnywhereUSB 2 Plus ports implement USB over IP®technology over Gigabit Ethernet networks. This Gigabit Ethernet-attached solution provides two USB 3.1 Gen 1 (USB 3.0) ports to connect a wide range of peripheral devices such as USB license dongles, scanners, printers, cameras, storage media, or other USB devices.

**Note** The USB Implementers Forum (USB-IF) renamed USB 3.0 to USB 3.1 Gen 1. There is no change in performance, functionality, or electrical characteristics between USB 3.0 and USB 3.1 Gen 1.

## Get started

The steps in this section explain how to install the **AnywhereUSB Manager** and configure the Connect EZ 16/32 to allow you to use the AnywhereUSB ports.

### Step 1: Install the AnywhereUSB Manager

The **AnywhereUSB Manager** is a separate application that you use to configure and manage the USB ports included in the Connect EZ 16/32. The two USB ports on the Connect EZ 16/32 act as an AnywhereUSB 2 Plus Hub.

You can install the **Anywhere USB Manager** on a computer with a Windows or Linux OS. After the software installs, the **AnywhereUSB Manager** launches and automatically discovers the USB ports on the Connect EZ 16/32.

**Installation instructions**

- Install the AnywhereUSB Manager: Windows
- Install the AnywhereUSB Manager: Linux

#### *Install the AnywhereUSB Manager: Windows*

The **AnywhereUSB Manager** is a separate application that you use to configure and manage the USB ports included in the Connect EZ 16/32. The two USB ports on the Connect EZ 16/32 act as an AnywhereUSB 2 Plus Hub.

The **Anywhere USB Manager** software must be downloaded from the Digi support site and installed on your computer. After the software installs, the **AnywhereUSB Manager** launches and automatically discovers the USB ports on the Connect EZ 16/32.

**CAUTION!** Only a Windows Administrator can perform the software install. If you are logged in as a non-Windows Administrator user and you attempt to install the software, you will be required to enter Windows Administrator log in credentials to be able to complete the installation process.

***Prerequisites***

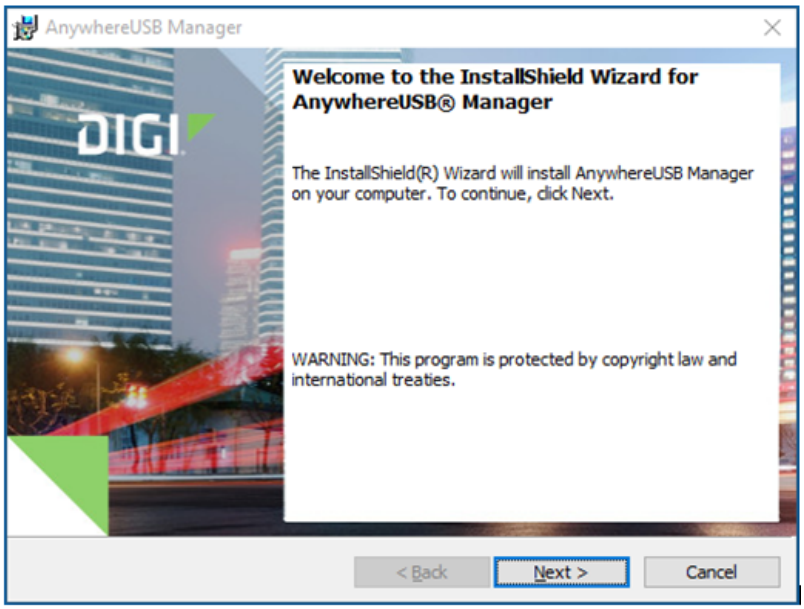
Before you begin, you should determine the following:

- **Mode**: Decide whether you want to run the **AnywhereUSB Manager** as a stand-alone or as a service. For detailed information, see Service.
- **Client ID**: Determine a client ID for the computer on which you are installing the **Manager**. The client ID is associated with the login credentials for the user currently logged on to the computer, and is used by your computer and the Hub to create a connection. See Client ID overview for more information.
- **Uninstall previous version of the Manager**: If you have previously installed the **Manager** on your PC, you must uninstall the existing version before installing a newer version.

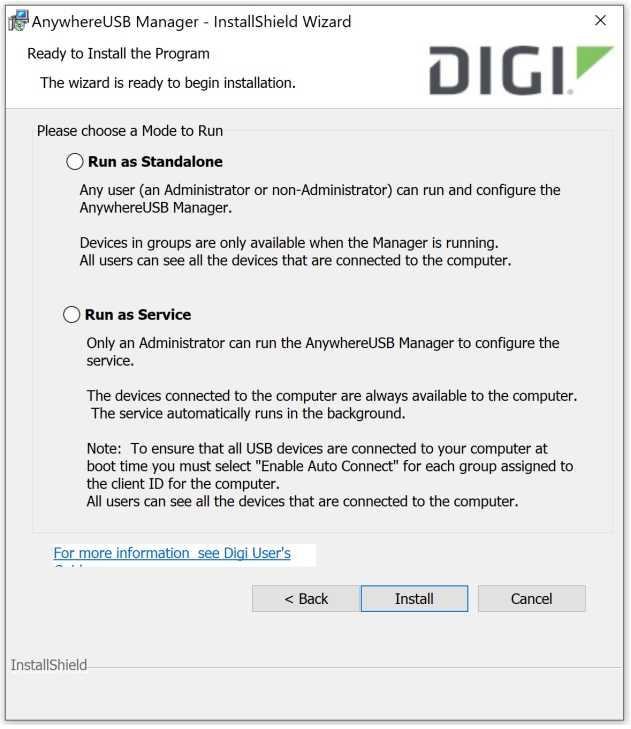
**Step 1: Install the AnywhereUSB Manager**

1. Download the **AnywhereUSB Manager** installer from the AnywhereUSB **Drivers** section of the support page.
   a. Navigate to the AnywhereUSB Plus support page.
   b. Click the **Product Resources** tab. This should be selected by default.
   c. In the **Drivers & Patches** section, click the **AnywhereUSB Manager** link.
   d. From the drop-down list box, select **Microsoft Windows**.
   e. Click the **download** link for the version of the installer than you want to download. Make a note of the version number for future reference.

   Note You should save the downloaded software to your computer before you start the install process. This is useful if you decide to uninstall the **AnywhereUSB Manager** from the original installer in the future.
2. Right-click on the downloaded software and select the **Run as Administrator** menu option.
3. Enter your Administrator login credentials. The **AnywhereUSB Manager** installation wizard launches.



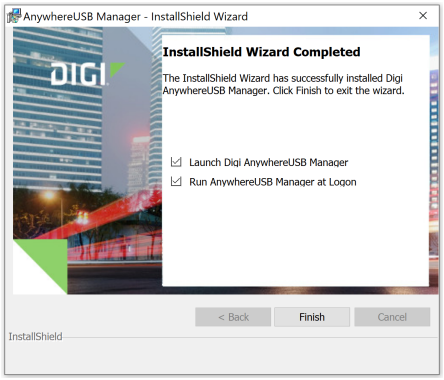

4. Click **Next**. The **Ready to Install** screen appears. You must specify which mode you want to install: Standalone or Service. For detailed information about each mode, refer to Service.




5. Click **Install**. A status bar shows the progress of the installation process. When complete, the **Completed** screen appears.
6. The options in the **Completed** screen are selected by default. De-select the option if you do not want to use the feature.

- **Launch AnywhereUSB Manager**: Launch the **AnywhereUSB Manager** when the installation completes.
- **Run AnywhereUSB Manager at Logon**: Automatically launch **AnywhereUSB Manager** each time you log in to your Windows user account. Digi recommends that you do not de-select this option.

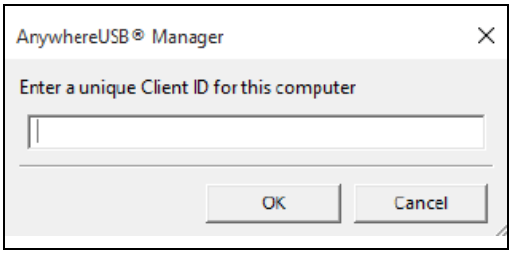
> **Note** If you have installed the **Manager** as a service, this option applies only to the current admin user. Each time this admin user logs in, the **Manager** launches so the user can administer the service. If a non-admin user logs in, the service is available, but the **AnywhereUSB Manager** does not display.



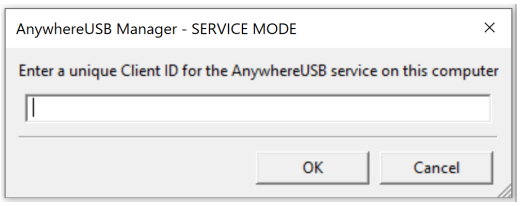

7. Click **Finish**. The client ID entry dialog appears.

> **Note** If you deselected the **Launch AnywhereUSB Manager** option, the client ID entry dialog does not automatically display. You must manually launch the **Manager** to continue with the installation process. If you are in service mode, you must run it as Administrator.

- **Stand-alone**: If you installed the **Manager** in stand-alone mode, the client ID confirmation dialog looks like this:




- **Service**: If you installed the **Manager** in service mode, the client ID confirmation dialog looks like this:



8. Enter a unique client ID. This client ID is associated with the login credentials for the user currently logged on to the computer. See Client ID overview for more information about how the client ID is used by your computer and the Hub to create a connection.
9. Click **OK**.

**Step 2: Add the client ID for the PC to the AnywhereUSB Hub client ID list**

This step allows the PC and the Hub to connect.

1. Right-click on the Hub name in the **AnywhereUSB Manager** and choose the **Open Web UI** menu option. The web UI for the Hub launches.
2. Log in to the web UI using the Hub's user name and password.
3. Select **System** > **AnywhereUSB Configuration**.
4. In the **Client Settings** section, click **Add Client**.
5. In the **Client ID** field, enter the client ID that you just entered during the **AnywhereUSB Manager** installation.
6. A list of the group numbers displays beneath the **Group Access** field. Click the check box next to a group to which this client ID is allowed access. As you select groups, the selected group numbers appear in the **Group Access** field. As an alternative, you can enter group numbers in the **Group Access** field, for example: 1, 5-8, 10-24.
7. Click **Apply**.
8. Return to the **AnywhereUSB Manager**. The **Manager** should connect to the Hub within 60 seconds. You can select **File > Refresh** to have the **Manager** immediately try to connect to the Hub.

**Step 3: Verify that you can see a USB device in the AnywhereUSB Manager that is connected to the Hub**

1. Insert a USB memory stick into port 1 on the Hub. The memory stick appears in the **AnywhereUSB Manager**.
2. Double-click on the group the memory stick is in to connect to the group.
3. In the **Manager**, verify that the memory stick and the group that it is in both have the message **(in use by you)**, which indicates that the USB device is connected to your PC.

**NEXT STEP**: Proceed to the next step: Step 2: Enable the AnywhereUSB Service.

**Determine AnywhereUSB Manager mode for Windows: Service or stand-alone**

You can choose to install the **AnywhereUSB Manager** in service or stand-alone mode. Each mode offers different features and may interact differently with the **Manager**.

Note The **AnywhereUSB Manager** shows information that pertains to the installed mode. Most importantly, if you install the **Manager** in service mode, "SERVICE MODE" displays in the **Manager** title bar and in the Status pane. See AnywhereUSB Manager Status pane for detailed information.

The table below compares the features in each mode. Refer to the table to help you determine which mode is best for your organization. For more information about the user roles, see User roles.

| Feature | Service mode | Stand-alone mode |
|---|---|---|
| **Run and configure the AnywhereUSB Manager** | Only an Administrator can run the **AnywhereUSB Manager** to configure the service. | Any user (an Administrator or a non-Administrator) can run and configure the **AnywhereUSB Manager**. |
| **USB device availability** | The devices in the groups connected to the computer are always available to the computer. The service automatically runs in the background.<br><br>**Note** To ensure that all USB devices are connected to your computer at boot time, you must select Enable Auto Connect for each group assigned to the client ID for the computer. | Devices in connected groups are only available when the **Manager** is running. |
| **Which users can see devices connected to the computer** | All users can see all the devices in the groups that are connected to the computer. | All users can see all the devices in the groups that are connected to the computer.<br><br>**Note** The devices that can be seen are changeable, depending on which users are logged into the computer. |

***Mode interactions with AnywhereUSB features***

The sections below explain how each mode interacts with the **AnywhereUSB Manager** features.

## Service

- To ensure that all USB devices are connected to your computer at boot time, you must select Enable Auto Connect for each group assigned to the client ID for the computer. The USB devices in the groups connected to the computer are available to the users.
- Multiple users can log on with their Windows user account and use the devices connected by the service to the computer at the same time.

- If you are not an Administrator, you cannot run the Manager but you can see and use the devices that are connected from the Hub to you.
- Groups and devices remain connected when users log in or out.

## Stand-alone

- If you install the **AnywhereUSB Manager** as a stand-alone, Digi recommends that you select the **Run AnywhereUSB Manager at Startup** option during the installation process to automatically launch the **Manager** each time you log in to your Windows user account.
- When the user logs in and starts the **AnywhereUSB Manager**, the **Manager** automatically connects to groups that have Enable Auto Connect enabled. The USB devices in those groups are connected to the machine.
- Groups and devices are connected when the **Manager** starts running if auto connect is enabled for the group. If auto connect is not enabled for the group, you can manually connect to a group. Groups and devices are disconnected when the **Manager** stops running, which typically occurs when the user running the **Manager** logs off the computer.

***Warnings***

- Only an Administrator has the rights to install the **AnywhereUSB Manager**.

  If you log onto the computer as a non-Administrative user and attempt to install the **AnywhereUSB Manager**, you will be prompted during the installation process for an Administrator user name and password. If you do not provide Administrator credentials, you will not be able to complete the installation process.
- In stand-alone mode, only one user can open the **AnywhereUSB Manager** at a time. The **Manager** cannot be opened simultaneously by multiple users. In addition, a single user cannot run multiple instances of the **Manager**.
- In stand-alone mode, each user must have a different client ID, which results in an individual **Manager** configuration. Digi does not support sharing a client ID between two different Windows users or computers.
- Digi recommends that you do NOT install the **AnywhereUSB Manager** as a stand-alone, re-install it, and then choose to run the **Manager** as a service. If this does occur, be aware that the stand-alone and the service will have separate configurations. The **Manager** or service will only use the stand-alone or service configuration, respectively.
- If you install the **Manager** as a service and then stop the service, the **AnywhereUSB Manager** will choose not to run.

### *Install the AnywhereUSB Manager: Linux*

You can use distros using RPM or DEB package managers to install the awusbmanager package.

- **DEB**: For Debian derived distributions such as Debian or the Ubuntu-based distros.
- **RPM**: For RedHat derived distributions such as RHEL or openSUSE release packages.

You can install the Linux awusbmanager package as headless only, or as headless and stand-alone. Only root has the rights to install the awusbmanager package.

**Note** If you have previously installed an anywhereusb package on your PC, Digi recommends uninstalling the existing awusbmanager package before installing the desired version.

***Prerequisite***

**Client ID**: A client ID is required during the awusbmanager package installation. Before you begin you should determine the client ID you want to use for this computer. The client ID is associated with the user currently logged on to the computer, and is used by your computer and the Hub to create a connection. See Client ID overview for more information.

**Step 1: Download the Linux awusbmanager package**

1. Navigate to the AnywhereUSB Plus support page.

   Note This link navigates to the AnywhereUSB 2 Plus support page, but you can also navigate to any of the AnywhereUSB Plus support pages. The Linux **AnywhereUSB Manager** package is the same on all support pages.

2. Click the **Product Resources** tab. This should be selected by default.
3. In the **Drivers & Patches** section, click **AnywhereUSB Manager**.
4. From the drop-down list box, select **Linux**.
5. Click the **download** link. The Linux **AnywhereUSB Manager** package is downloaded to your computer. If necessary, transfer it to your Linux PC.
6. Confirm the integrity of the 40003060_C.tgz tarball.
   a. Use this command to display the SHA256 hash.

   ```
   $ sha256sum ./40003060_C.tgz
   ```

   b. Download the release notes.
   c. In the release notes, scroll to the **Change Log** section.
   d. Compare the hash on your computer to the hash included in the **Change Log** section.
7. Extract the files from the downloaded package so that you can access the file you want to install.

   ```
   $ tar xvzf ./40003060_C.tgz
   ```

8. Review the release notes to ensure that you have all of the information you may need.

**Step 2: Choose the Linux AnywhereUSB Manager package**

You need to choose the awusbmanager package for your distro from the packages that were extracted in the previous step.

***Stand-alone or headless***

For ease of use, Digi recommends that you choose a stand-alone package, which includes both the stand-alone awusbmanager and the awusbmanager-headless binaries.

Note The headless package is intended for advanced Linux users.

***Distro type***

- **DEB**: For Ubuntu, Debian and distros with aptitude/apt/apt-get/dpkg package manager, select a deb package.

- 64-bit hosts: Choose the amd64 package.
- 32-bit hosts: Choose the i386 package.
- 64-bit server systems (without X11 or Wayland packages installed): Choose the headless amd64 package.

- **RPM**: For RedHat, Rocky, AlmaLinux and distros with dnf/yum/zypper/rpm package manager, select an rpm package.
  - 64-bit hosts: Choose the x86_64 package.
  - 32-bit hosts: Choose the i386 package.
  - 64-bit server systems (without X11 or Wayland packages installed): Choose the headless x86_64 package.

**Step 3: Install the Linux AnywhereUSB Manager package**

1. Install the selected awusbmanager package.
   - **DEB**: Debian, Ubuntu, Kubuntu and similar distros (aptitude/apt/apt-get/dpkg):

     ***apt install***

     ```
     $ sudo apt install ./SELECTED.RPM
     ```

     where *SELECTED.RPM* is the name of the anywhereusb package

     **Note** The dot and slash notation (./) is required to install the file.

     ***dpkg***

     On some distros you may need to use dpkg:

     ```
     $ sudo dpkg -i SELECTED.RPM
     ```

     where *SELECTED.RPM* is the name of the anywhereusb package
   - **RPM**: RedHat and similar distros (dnf/yum/zypper/rpm):

     ```
     $ sudo dnf install ./SELECTED.RPM
     ```

     where *SELECTED.RPM* is the name of the anywhereusb package

     **Note** The dot and slash notation (./) is required to install the file.
2. Reboot the PC.

   This ensures that the user becomes a member of the new awusb group. Being a member of the awusb group allows that user to successfully use the **Manager** for configuration and monitoring.

   **Note** On some distros, log out and log back in is not enough and a reboot is required.
3. Install vhci_hcd if necessary. Some distributions (RHEL/Rocky/AlmaLinux/CentOS) do not provide the vhci_hcd kernel module.

a. Verify that the kernel module is not already available on your system.

```
$ modinfo vhci-hcd
modinfo: ERROR: Module vhci-hcd not found.
```

b. If you see this error message, you must manually install the vhci-hcd module.

For RPM distros (RedHat-derived), the vhci-hcd module is available in the kmod-usbip package from the add-on El Repo (https://elrepo.org) repository.

**Note** The release you pick must match the release version of the OS. For example, elrepo-release-8.el8 for RHEL 8, elrepo-release-9.el9 for RHEL 9, etc.

You can install the El Repo versions with:

```
$ sudo rpm --import https://www.elrepo.org/RPM-GPG-KEY-elrepo.org
$ sudo yum install https://www.elrepo.org/elrepo-release-
8.el8.elrepo.noarch.rpm
```

```
$ sudo yum --enablerepo=elrepo install kmod-usbip
```

c. When complete, re-run the `modinfo` to confirm the presence of the vhci-hcd driver.

```
$ modinfo vhci-hcd
```

**Note** For additional information on this topic, see /usr/share/doc/awusbmanager/README after installation is complete.

4. Run the awusbmanager stand-alone binary.

**Note** If you chose a headless package, stop at this step and follow the installation process for the headless package. When that is complete, proceed to Additional information: Get started with the Manager and configuring the Hub.

```
$ awusbmanager
```

**Note** The **Manager** is not normally run as root on Linux systems.

5. You are prompted to enter a client ID for this PC.
   a. Enter a unique client ID. This client ID is associated with the login credentials for the user currently logged on to the computer.
   b. Click **OK**.
6. The **AnywhereUSB Manager** is launched. Look for your Hub in the **Manager**. If it does not appear, you can add the Hub's IP address to the list of known Hubs.
   a. Click **Configure** > **Known Hubs**. The **Known Hubs** dialog appears.
   b. Enter the Hub's IP address.
   c. Click **OK**. The Hub appears in the Hub list in the **Known Hubs** dialog.
7. Add the client ID for the PC to the AnywhereUSB Hub client ID list.
   a. Right-click on the Hub name in the **AnywhereUSB Manager** and choose the **Open Web UI** menu option. The web UI for the Hub launches.

b. Log in to the web UI using the Hub's user name and password.
c. Select **System** > **AnywhereUSB Configuration**.
d. In the **Client Settings** section, click **Add Client**.
e. In the **Client ID** field, enter the client ID.
f. A list of the group numbers displays beneath the **Group Access** field. Click the check box next to a group to which this client ID is allowed access. As you select groups, the selected group numbers appear in the **Group Access** field. As an alternative, you can enter group numbers in the **Group Access** field, for example: 1, 5-8, 10-24.
g. Click **Apply**.
h. Return to the **AnywhereUSB Manager**. The **Manager** should connect to the Hub within 60 seconds. You can select **File > Refresh** to have the **Manager** immediately try to connect to the Hub.

8. Verify that you can see a USB device in the **AnywhereUSB Manager** that is connected to the Hub.
   a. Insert a USB memory stick into port 1 on the Hub. The memory stick appears in the **AnywhereUSB Manager**.
   b. Double-click on the group the memory stick is in to connect to the group.
   c. Look for the inserted notification or find the USB device as `/dev/sd*`.

**AnywhereUSB Manager installation is complete!**

**Additional information: Get started with the Manager and configuring the Hub**

Review additional information about using the Manager with Linux and configuring your Hub.

- **Work with the stand-alone or headless Manager**: For detailed information about the **Manager** and important notes, see Script: Initial configuration.
- **Use the command line**: Refer to the command line section in Script: Initial configuration for information about using the command line.
- **Monitor USB devices**: Refer to Manage the Hubs using the AnywhereUSB Manager to learn how to monitor devices connected to the Hub.
- **Advanced topics and troubleshooting**: Refer to the documentation in /usr/share/doc/awusbmanager/ for next steps, advanced topics, troubleshooting information and notes for various distributions.

**Start the AnywhereUSB Manager: Linux**

After installation is complete, you can run the stand-alone **Manager**. Within the **Manager** you can monitor, configure, control the connected AnywhereUSB Hubs, connected groups and the USB devices in each.

**Linux considerations**

- Any normal (non-root) user that wants to run the **Manager** needs to be in the awusb group. For more information see /usr/share/doc/awusbmanager/README.

- Certain Linux distributions provide a limited number of virtual USB devices. See the release notes for more information.
- Both the root user and every normal (non-root) user has an individual AnywhereUSB configuration. Headless and stand-alone mode share the same configuration for each user.

***Stand-alone***

The simplest way to start the **AnywhereUSB Manager** is to run the stand-alone **Manager** .

Run this command to launch the stand-alone **Manager**:

```
$ awusbmanager
```

**Notes**

- You should run the stand-alone **Manager** as a normal (non-root) user, and not as root.
- The stand-alone client **Manager**can be used to control and monitor the headless **Manager**.
- USB devices connected through AnywhereUSB will be available to all users who have appropriate access permissions.
- Only one user can open the **AnywhereUSB Manager** at a time. The **Manager** cannot be opened simultaneously by multiple users. In addition, a single user cannot run multiple instances of the **Manager**.
- When it is monitoring the headless **Manager**, the stand-alone **Manager** displays "HEADLESS" in the **AnywhereUSB Manager** title bar and in the Status pane.
- If you run both the stand-alone and the headless **Managers**, the first **Manager** started determines if it is running in headless or stand-alone mode.
- All other **Managers** must be stopped before you start the headless **Manager**.
- When the user logs in and runs the stand-alone **Manager**, the **Manager** automatically connects to groups that have Enable Auto Connect enabled. The USB devices in those groups are connected to the PC. If auto-connect is not enabled for the group, you can manually connect to a group.
- When the Manager is iconized, the USB devices will still be available to users on the PC.
- When the Manager is stopped with **File** > **Exit**, or the user logs off, the USB devices will no longer be available to the PC.

***Headless***

**Note** The headless package is intended for advanced Linux users.

The standard awusbmanager package and the headless package provide a headless version of the **AnywhereUSB Manager**. The awusbmanager-headless does not provide a window for AnywhereUSB management, and is appropriate for server VMs without a display.

Run this command to launch the headless manager:

```
$ awusbmanager-headless
```

**Notes**

- You cannot run the awusbmanager binary as a GUI client manger.
- All other **Managers** must be stopped before you start the headless **Manager**.

- The awusbmanager-headless binary can be controlled via the cmdline using either the awusbmanager or awusbmanager-headless binary. It can also be controlled by running a client awusbmanager if the system has a graphical display.
- Only root or the same user can run the awusbmanager binary to configure the service.
- Once running, USB devices connected through the Hub are available to all users who have appropriate access permissions.
- USB devices are available to users on the PC, even if the user that started the headless **Manager** logs off. The headless agent runs until the PC is shut down.
- To start the awusbmanager-headless at boot, you will need to create and add a **systemd** startup script.
- To ensure that all USB devices are connected to your computer at boot time, you must select Enable Auto Connect for each group assigned to the client ID for the computer. The USB devices in the groups connected to the computer are available to the users, and the users can see and access the devices for which they have permission.
- USB devices connected through AnywhereUSB will be available to all users who have appropriate access permissions.
- Only the user that initially started the **Manager** or the root user is allowed to monitor and control the running **Manager**.

***Command line***

AnywhereUSB provides a cmdline to control and monitor the Hub. The stand-alone **Manager** or the headless **Manager** needs to be running to use the cmdline.

Either **Manager** binary can be used to send commands to the running **Manager**. For example:

```
$ awusbmanager LIST
```

```
$ awusbmanager-headless LIST
```

**Notes**

- The same user or root can send cmdline commands to that running **Manager**.

## Script: Initial configuration

The cmdline also enables scripting of AnywhereUSB for configuration and monitoring after the installation is complete.

**Example: Configuration**

```
#!/bin/bash -e
# Example script to configure Digi awusbmanager-headless
# Configure headless awusbmanager (once after install)
awusbmanager-headless KNOWN HUB ADD,AW24-010000
awusbmanager-headless AUTOCONNECT GROUP,AW24-010000.1
awusbmanager-headless AUTOCONNECT GROUP,AW24-010000.2
awusbmanager-headless AUTOCONNECT GROUP,AW24-010000.3
awusbmanager-headless AUTOFIND,OFF
awusbmanager-headless SET KEEPALIVES,3,120
```

**Example: Monitoring**

```
#!/bin/bash -e
# Check status of AnywhereUSB Manager devices
awusbmanager-headless LIST FULL
```

**Advanced: Complete the Manager installation using the headless package**

Generally, you should choose a stand-alone package, which includes both the stand-alone awusbmanager and the awusbmanager-headless binaries. For ease of use, Digi recommends choosing the stand-alone package.

The headless package is intended for advanced Linux users.

1. Run the awusbmanager headless binary.

   ```
   $ awusbmanager-headless
   ```

   **Note** The **Manager** is not normally run as root on Linux systems.

2. Provide a client ID for this PC.

   ```
   $ awusbmanager-headless set clientid,CLIENTIDNAME
   ```

   where the *CLIENTIDNAME* is the client ID you have chosen for this PC.

3. Get the IP address of the Hub. This is needed to complete the connection between the **Manager** and the Hub.

   ```
   $ awusbmanager-headless list
   ```

   **Note** This command can be used if you are on the same local subnet as the Hub. If you are not, another method should be used.

4. Add the client ID for the PC to the AnywhereUSB Hub client ID list.
   a. In a web browser, enter the Hub's IP address in the URL field and press **Enter**. The log in screen for the Hub displays.
   b. Log in to the web UI using the Hub's user name and password.
   c. Select **System** > **AnywhereUSB Configuration**.
   d. In the **Client Settings** section, click **Add Client**, then enter the client ID and the desired group access.
   e. Click **Apply**.

5. Verify that the Hub is connected to the **Manager**. When the connection is complete, the groups you selected for the client ID display.

   ```
   $ awusbmanager-headless list
   ```

   **Example output**

   ```
   $ awusbmanager LIST
   AnywhereUSB Manager, below are the available devices:

   AW8W-000001 (192.168.0.1:18574)
   Group 1 (AW8W-000001.1) (In-use by you)
   ```

```
Group 2 (AW08-000001.2)
Group 3 (AW08-000001.3)
Group 4 (AW08-000001.4)
Group 5 (AW08-000001.5)
Group 6 (AW08-000001.6)
Group 7 (AW08-000001.7)
Group 8 (AW8W-002007.8)
Group 8 (AW08-000001.8)
```

6. Connect a device to the Hub and verify that you can see the device in the **Manager**.
   a. Insert a USB memory stick into port 1.
   b. Run the list command so you can see the memory stick in the group.

```
$ awusbmanager-headless list
```

   c. Look for the inserted notification or find the USB device as `/dev/sd*`.

   **Example output**

```
$ awusbmanager LIST
AnywhereUSB Manager, below are the available devices:

AW8W-000001 (192.168.0.1:18574)
* Group 1 (AW8W-000001.1) (In-use by you)
    USB DISK 3.0 (AW08-000001.1601) (In-use by you)
Group 2 (AW08-000001.2)
Group 3 (AW08-000001.3)
Group 4 (AW08-000001.4)
Group 5 (AW08-000001.5)
Group 6 (AW08-000001.6)
Group 7 (AW08-000001.7)
Group 8 (AW8W-002007.8)
Group 8 (AW08-000001.8)
```

7. Enable auto-connect for the group(s) to which you want to automatically connect each time you start the headless agent.

```
$ awusbmanager-headless AUTOCONNECT GROUP,AW08-000001.1
```

8. Refer to Manage the Hubs using the AnywhereUSB Manager to learn how to monitor devices connected to the Hub.to learn how to monitor devices connected to the Hub.

   Refer to the documentation in /usr/share/doc/awusbmanager/ for next steps, advanced topics, troubleshooting information and notes for various distributions.

## Step 2: Enable the AnywhereUSB Service

You must enable the AnywhereUSB service and specify a port to be able to connect the to AnywhereUSB ports on your Connect EZ 16/32 from the **AnywhereUSB Manager**.

For detailed information about all of the optional fields, see Configure AnywhereUSB services.

**Note** You can also enable the AnywhereUSB service and specify the port on the **AnywhereUSB Configuration** page. To display this page, click **System** > **Configuration** > **AnywhereUSB Configuration**. See AnywhereUSB Configuration page.

1. Open the web UI.
2. Click **System** > **Configuration** > **Device Configuration**. The **Configuration** window displays.
3. Click **Services** > **AnywhereUSB**.
4. Click **Enable** to enable the service.
5. In the **Port** field, enter the port number that is used to access the Hub. The default value is 18574. If you change the port number you must also change the corresponding port number on your computer.
6. Click **Apply** to save the configuration and apply the change.

**NEXT STEP**: Proceed to the next step: Step 3: Name groups and assign ports to a group.

## Step 3: Name groups and assign ports to a group

Each USB port on the Connect EZ 16/32 is assigned to a group in the **AnywhereUSB Manager**. By default, all ports are assigned to Group 1. You can update the default name for each group and configure the USB ports into the desired groups.

The number of groups available matches the number of USB ports on the Connect EZ 16/32. Each port can only be assigned to one group. If you do not want a port assigned to any group, you can assign that port to the **Unassigned** row that displays beneath the list of groups.

If a group has ports assigned to it, the group will display in the **AnywhereUSB Manager**, even if a USB device is not connected to a port.

To create a group and assign USB ports to the group:

1. Open the web UI.
2. Select **System** > **Configuration** > **AnywhereUSB Configuration**. The **AnywhereUSB Configuration** page appears.
3. Expand the **Group Settings** section.
4. (Optional) In the **Group Description** field, you can update the name of a group. This name displays in the **Group Name** field in the Group Status pane in the **Anywhere USB Manager**.
5. For each group, the ports available for the device are shown in the **Port Assignments** section. In the row for a group, select the ports for that group.

   You can also use the assignment buttons to quickly assign the ports. You can change the port assignments as needed after using an assignment button.

   - **All Ports in Group 1**: Click **All Ports in Group 1** to assign all of the ports to Group 1.
   - **One Port Per Group**: Click **One Port Per Group** to assign one port to each group. Port 1 is assigned Group 1, port 2 is assigned Group 2, etc. until each port is assigned to a group. The assignments form a diagonal line. If ports are already selected for a group, this reassigns re-assigns all ports as described.
6. Click **Apply** to save the changes.

**NEXT STEP**: Proceed to the next step: Step 4: Assign groups to a client ID.

## Step 4: Assign groups to a client ID

You can assign the groups to a client ID that was specified when you installed the **AnywhereUSB Manager**. When the client ID connects to the **AnywhereUSB Manager**, the computer can access all of the ports in the specified groups.

**Note** Make sure that you have at least one client ID created for the **AnywhereUSB Manager** and device combination. You can manually add client IDs, if needed. See Add client IDs to the client list.

1. Open the web UI.
2. Select **System** > **Configuration** > **AnywhereUSB Configuration**. The **AnywhereUSB Configuration** page appears.
3. Expand the **Client Settings** section.
4. In the **Select a client to configure** list, select the client ID to which you want to assign groups. Information about the selected client ID displays in the **Settings for Client** section.
5. A list of the group numbers displays beneath the **Group Access** field. Click the check box next to a group to which this client ID is allowed access. As you select groups, the selected group numbers appear in the **Group Access** field.

   You can also manually enter group numbers in the **Group Access** field.
6. Click **Apply** to save the changes.

**NEXT STEP**: Proceed to the next step: Step 5: Connect to a group of USB ports.

## Step 5: Connect to a group of USB ports

To be able to use the USB ports on the Connect EZ 16/32, you must launch the **AnywhereUSB Manager** and connect to the group to which the USB port is assigned.

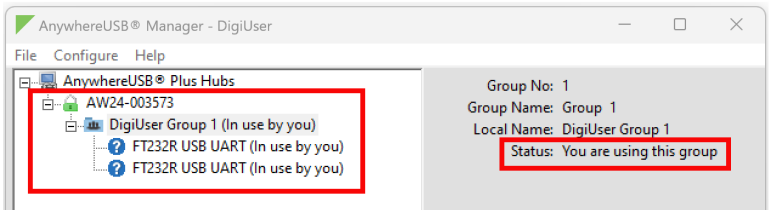
**Note** You can connect to only the groups that have been assigned to your client ID and that are not currently connected to a different client ID.

Once you have connected to a group, no one else can connect to that group. You cannot connect to a group that is already is use.

For detailed information about connecting to a group and USB ports, see Connect to a group or USB device in the AnywhereUSB Manager.

When you have connected to a group, a note appears next to the group name, next to the devices in the group, and in the Group Status pane to show that the device is being used by you.

1. Open the **Anywhere USB Manager**.
2. Expand **AnywhereUSB Plus Hubs** to display the Hubs.
3. Expand a Hub to display the groups in the Hub.
4. Right-click on the group to which you want to connect.
5. Select **Connect to Group**. A note appears next to the group name, next to the devices in the group, and in the Group Status pane to show that the device is being used by you.




**NEXT STEP**: Proceed to the next step: Step 6: Connect to a USB device in a group.

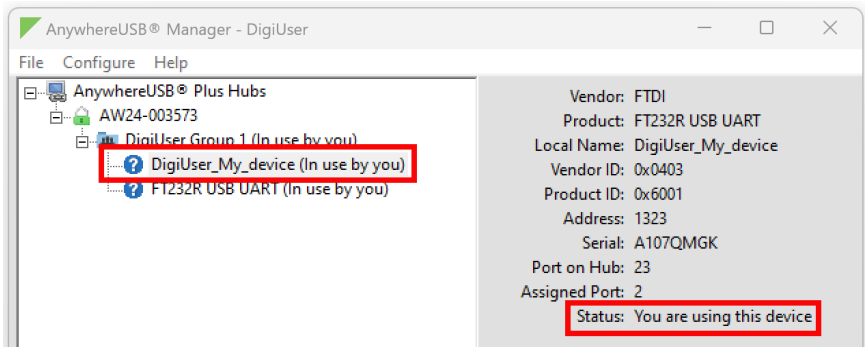
## Step 6: Connect to a USB device in a group

You can connect to a device connected to a USB port in a group to which you are currently connected. You cannot connect to a device in a group that is already is use by another user.

When you have connected to a device, a note appears next to the device name and in the Device Status pane to show that the device is being used by you. The port on the Hub to which the USB device is connected is also listed.

1. Open the **Anywhere USB Manager**.
2. Expand **AnywhereUSB Hubs** to display the Hubs.
3. Expand a Hub to display the groups in the Hub.
4. Expand a group to display the devices in the group.
5. Right-click on the device to which you want to connect. A menu displays.
6. The menu option depends on whether you are already connected to the group.
   - **Connected to the group**: Right-click on the USB device name and click **Connect to Device** to connect to the USB device.
   - **Not connected to the group**: Right-click on the USB device name and click **Connect to Group** to connect to the group and the USB device.

   A note appears next to the device name and in the Device Status pane to show that the device is being used by you.




**NEXT STEP**: You have now completed all the steps. You can return to AnywhereUSB 2 Plus USB ports on a Connect EZ 16/32.

## Manage the Hubs using the AnywhereUSB Manager

You can use the **AnywhereUSB Manager** to view the AnywhereUSB Plus Hubs that are allowed to connect to your computer. You can also connect to groups of USB ports on the Hubs.

By default, the **AnywhereUSB Manager** is configured to automatically discover Hubs that are connected to the same network as your computer. You can also allow a connection to additional Hubs that are not on the same network.

**Note** Before you begin, make sure you have installed the **AnywhereUSB Manager**.

## Launch the AnywhereUSB Manager

You can search for and launch the **Anywhere USB Manager** using the Windows application search feature or from the **Start** menu. If the **Anywhere USB Manager** was configured during the installation process to automatically launch when you logged in, you do not need to do this step.

---

**Note** If the **AnywhereUSB Manager** was installed in service mode, only an Administrator can launch the **AnywhereUSB Manager**.

---

To manually start the **Anywhere USB Manager**:

1. Log in to your computer.
2. Double-click the **Anywhere USB Manager** shortcut on your desktop.

## AnywhereUSB Manager overview: Status panes, menus, and icons

The **AnywhereUSB Manager** displays AnywhereUSB Hubs, groups, and USB devices. Click the plus sign next to each name in the window to display a hierarchy of found Hubs, groups, and USB devices.

**AnywhereUSB Manager application dialog**

Information about the title bar, the icons on the screen, and the menu options can be found here:

- AnywhereUSB Manager title bar
- AnywhereUSB Manager icons and toolbar
- AnywhereUSB Manager menu options

**Hub, group, and USB device menus**

You can use the menus associated with the Hubs, groups, and USB devices to configure local names, preferences, and connections. Right-click on a Hub, group, or device name to display the menus.

- AnywhereUSB Manager Hub menu options
- AnywhereUSB Manager Group menu options
- AnywhereUSB Manager USB device menu options

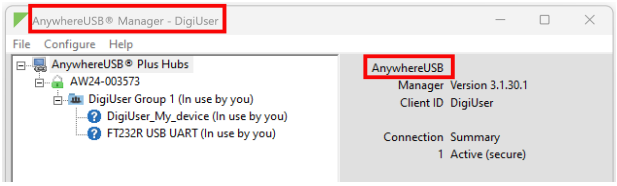
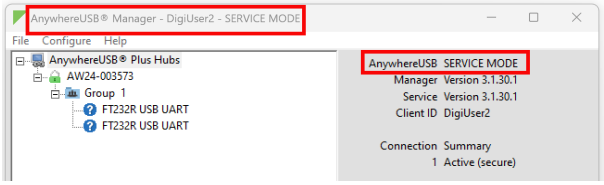
**Status panes**

Click on a Hub, group, or device name to display information about the selected Hub, group, or device in the status pane on the right side of the **AnywhereUSB Manager**.

- AnywhereUSB Manager Status pane
- AnywhereUSB Manager Hub Status pane
- AnywhereUSB Manager Group Status pane
- AnywhereUSB Manager USB Device Status pane

### *AnywhereUSB Manager title bar*

The **AnywhereUSB Manager** title bar displays the mode in which the Manager is installed (stand-alone or service) and the client ID for the user currently logged into the computer.

| Label | Description |
|---|---|
| **Application name** | **AnywhereUSB Manager** displays in the title bar. |
| **Client ID** | The client ID assigned to the user credentials used to log into the computer. For information about the client ID, see Client ID overview. |
| **Mode** | The mode that was selected during installation is indicated in the title bar. You can install the **Manager** in either stand-alone or service mode.<br><br>**Stand-alone mode**<br>When installed in stand-alone mode, the **AnywhereUSB Manager** dialog title is "AnywhereUSB Manager - <*ClientID*>", where <*ClientID*> is the client ID assigned to the user credentials used to logged into the computer.<br>  <br><br>**Service mode**<br>When installed in service mode, the **AnywhereUSB Manager** dialog title is "AnywhereUSB Manager - <*ClientID*> - SERVICE MODE", where <*ClientID*> is the client ID assigned to the user credentials used to logged into the computer.<br>  |

### *AnywhereUSB Manager icons and toolbar*

This section explains how to use the icons in the **AnywhereUSB Manager** and what they represent.

The icons in the **AnywhereUSB Manager** show the status of a Hub or a USB device.

| Icon | Location | Description |
|---|---|---|
| | Hub | Green lock: Active and secure connection between the Hub and the PC. |

| Icon | Location | Description |
|---|---|---|
| | Hub | Yellow dot: The PC and Hub are attempting to connect. |
| | Hub | Red X: Connection between the Hub and the PC failed. |
| | USB device | Question mark: Signifies unknown device class. |

The toolbar icons manage the **AnywhereUSB Manager** dialog.

| Icon | Description |
|---|---|
|  | Minimizes the **AnywhereUSB Manager** into the task bar and the notification area of the task bar. |
| | Maximizes the **AnywhereUSB Manager**. |
| | Minimizes the **AnywhereUSB Manager** into the notification area of the task bar. |

### *AnywhereUSB Manager menu options*

You can use the menu options to view AnywhereUSB Hub information.

- **File** > **Refresh**: Select **File** > **Refresh** to refresh the Hub information.
- File > Preferences
- File > Exit
- Configure > Known Hubs
- Configure > Hidden Hubs
- Configure > Manage Hub Credentials
- Configure > Device to Port Assignment
- Help > System Messages
- Help > Latency graph
- Help > Always on Top
- Help > Create Support File
- Help > Online Manual
- Help > About

### *AnywhereUSB Manager Hub menu options*

Right-click on a Hub name in the **AnywhereUSB Manager** to configure and maintain the Hub.

- Open Web UI
- Assign Local Name
- Add to Known Hubs
- Hide Hub

### AnywhereUSB Manager Group menu options

Right-click on a group name in the **AnywhereUSB Manager** to configure and maintain the group.

- Connect to Group
- Disconnect from Group
- Enable Auto Connect
- Disable Auto Connect
- Assign Local Name

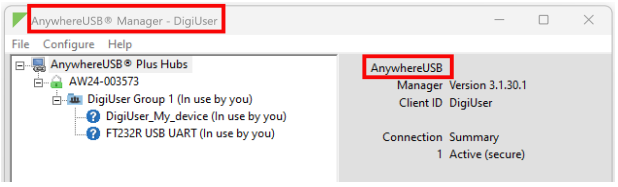
### AnywhereUSB Manager USB device menu options

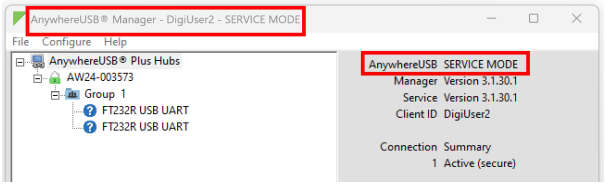
Right-click on a USB device name in the **AnywhereUSB Manager** to configure and connect to the USB device.

- Connect to Device
- Connect to Group
- Disconnect from Device
- Power Cycle Device
- Assign Local Name

### AnywhereUSB Manager Status pane

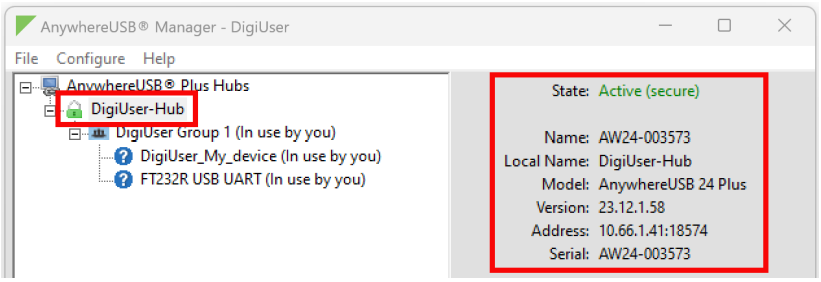
When you select the top node the **AnywhereUSB Manager**, information about the **Manager** displays in the Manager Status pane. The information displayed depends on whether the **Manager** was installed in service mode or stand-alone mode for Windows OS, or as stand-alone or headless for Linux.

| Label | Description |
|---|---|
| **Mode** | The **AnywhereUSB Manager** mode that was selected during installation.<br>■ **Windows**: You can install the **Manager** in either stand-alone or service mode.<br>■ **Linux**: You can pick a package and install the **Manager** as either headless or stand-alone.<br><br>**Stand-alone mode**<br>When installed in stand-alone mode, **AnywhereUSB** displays in the Status pane.<br>  |

| Label | Description |
|---|---|
| | **Service mode**<br>When installed in service mode, **AnywhereUSB SERVICE MODE** displays in the Status pane.<br>  <br>**Headless mode**<br>When installed in service mode, **AnywhereUSB Headless** displays in the Status pane. |
| **Manager Version** | The version number of the currently installed version of the **AnywhereUSB Manager**. |
| **Service Version** | The version number of the currently running AnywhereUSB service.<br>Note This displays only when the **Manager** is installed in service mode. |
| **Client ID** | The client ID assigned to the user credentials used to log into the computer. For information about the client ID, see Client ID overview. |
| **Connection Summary** | A summary of the connection status for each of the Hubs listed in the **AnywhereUSB Manager**.<br>For information about the connection status messages, see AnywhereUSB Manager connection status messages. |

### *AnywhereUSB Manager Hub Status pane*

When you select an AnywhereUSB Hub in the **AnywhereUSB Manager**, information about the Hub displays in the Hub Status pane.

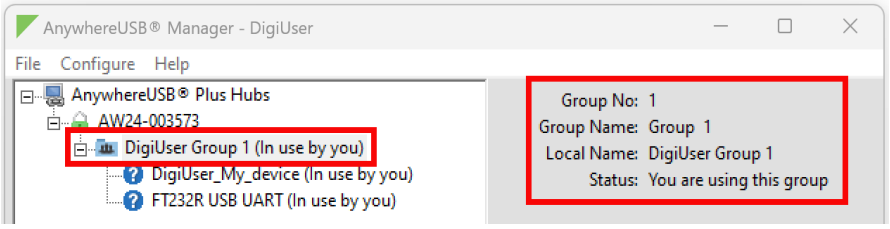



| Label | Description |
|---|---|
| **State** | The current state of the Hub. For a list of status messages, see AnywhereUSB Manager connection status messages. |

| Label | Description |
|---|---|
| **Name** | The name of the Hub supplied by the Hub. The default value for the Hub name is the serial number assigned to the Hub. You can change the Hub name in the **Ethernet Network** section of the web UI. See Rename the AnywhereUSB Hub. |
| **Local Name** | A descriptive local name for the Hub. The local name also displays in the tree view in the left-hand pane in the **AnywhereUSB Manager**. The local name is local to the computer on which the **AnywhereUSB Manager** is running.<br>You can change the local name using the Assign Local Name menu option for the Hub. |
| **Model** | The model name for the AnywhereUSB Hub. |
| **Version** | The version number of the firmware running on the Hub. |
| **Address** | The network address of the Hub. |
| **Serial** | The serial number of the Hub, which is found on the Hub label. |

### *AnywhereUSB Manager Group Status pane*

When you select a group in the **AnywhereUSB Manager**, information about the group displays in the Group Status pane.

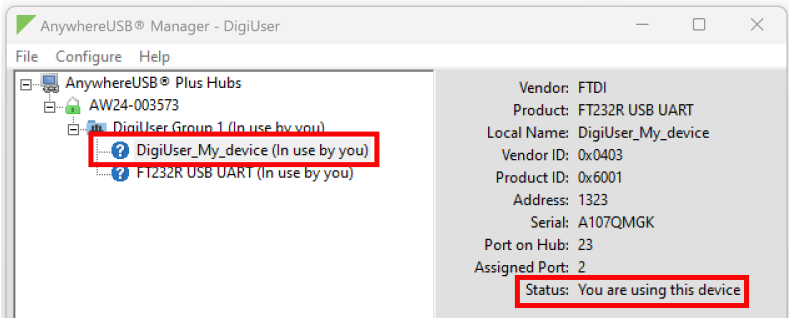



| Label | Description |
|---|---|
| **Group No** | The group number from the Hub. |
| **Group Name** | The name of the group supplied by the Hub. By default, a group is named "Group" appended by a consecutive number, such as Group 1, Group 2, and so on.<br>You can change the group name in the **AnywhereUSB** screen in the web UI. See Step 3: Name groups and assign ports to a group. |

| Label | Description |
|---|---|
| **Local Name** | A descriptive local name for the group. The local name also displays in the tree view in the left-hand pane in the **AnywhereUSB Manager**. The local name is local to the computer on which the **AnywhereUSB Manager** is running.<br>You can change the local name using the Assign Local Name menu option for the group. |
| **Status** | A status message indicates whether a user is currently connected this group. Options are:<br>■ You are using this group<br>■ No one is using this group<br>■ In use by *<client ID>* at *<machine name>*<br>■ Temporarily Blocked: This message displays when the client ID has been blocked from a group and cannot connect to it. See Block a client ID from connecting to groups. |

### *AnywhereUSB Manager USB Device Status pane*

When you select a USB device in a group in the **AnywhereUSB Manager**, information about the device displays in the Device Status pane.




| Label | Description |
|---|---|
| **Vendor** | Name of the USB device vendor, if supplied by the device. |
| **Product** | Name of the USB product, if supplied by the device. |
| **Local Name** | A descriptive local name for the USB device. The local name also displays in the tree view in the left-hand pane in the **AnywhereUSB Manager**. The local name is local to the computer on which the **AnywhereUSB Manager** is running.<br>You can change the local name using the **Assign a Local Name** menu option for the device. See Assign a local name to a USB device. |
| **Vendor ID** | The USB vendor ID. |
| **Product ID** | The USB product ID. |

| Label | Description |
|---|---|
| **Address** | The USB device address that helps to identify a device. |
| **Serial** | The serial number of the USB device, if supplied by the device. |
| **Port on Hub** | The number of the port on the Hub to which the USB device is connected. |
| **Assigned Port** | The Windows address assigned to the virtual port. See Assign Device Address (use the same virtual port number). |
| **Status** | A status message indicates whether a user is currently using this device. Options are:<br>■ You are using this device<br>■ No one is using this device<br>■ In use by *<client ID>* at *<machine name>*<br>■ A question mark icon displays if the **Manager** doesn't have an icon for that specific class of USB device. This does not indicate a functionality issue and the device is working properly. |

### *AnywhereUSB Manager connection status messages*

The connection status messages describe the current status of the Hub connection.

| Message | Description |
|---|---|
| **Active (secure)** | The number of Hubs that are currently connected to the **AnywhereUSB Manager**. |
| **Attempting to connect** | The **AnywhereUSB Manager** is trying to connect to the Hub but a connection has not yet been made. For troubleshooting information, see Hub connection is taking too long. |
| **Duplicate Connection** | The Hub has been found twice and appears twice in the **AnywhereUSB Manager**. See Duplicate Connection. |
| **Invalid Client Certificate** | A mismatch has occurred between the certificate associated with the client ID and the certificate for the client ID on the Hub. See Multiple user accounts with the same client ID. |
| **Invalid Hub Certificate** | The Hub certificate has become invalid. See Step 1: Remove the Hub certificate. |
| **Unregistered Client ID** | The client ID is not registered with the Hub, and a connection between the Hub and the PC cannot be established. See Problem: Client ID has not been added to the Hub. |
| **Unable to Connect** | The number of Hubs that are unable to connect to the **AnywhereUSB Manager**. See Problem: TCP port is not configured correctly. |

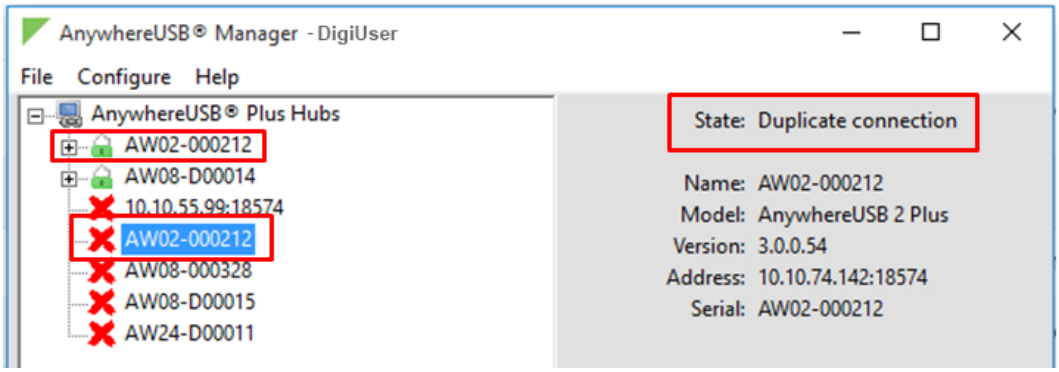
#### Duplicate Connection

The "Duplicate Connection" message displays if a Hub is found twice and appears twice in the **AnywhereUSB Manager**.

This occurs if you have added a Hub to the known Hub list that is on same network as your computer, and you have the **Autofind Hubs** feature enabled. The **AnywhereUSB Manager** attempts

both connections, and the first one to connect will connect as expected. The second connection is discovered as a duplicate, and the **Manager** closes that connection and red X displays.

In this situation, the Hub added to the known Hubs list is considered a duplicate Hub, and should be removed from the known Hubs list.




**Invalid Client Certificate**

In some situations, a mismatch occurs between the certificate associated with the client ID and the certificate for the client ID on the Hub. When this happens, the message "Invalid client cert" displays as the **State** in the **AnywhereUSB Manager**.

The client ID is a unique identifier assigned to a user account the first time a user logs in to a computer and opens the **AnywhereUSB Manager**. The client ID is associated with the login credentials for the user currently logged on to the computer.

During initial log in process, the **AnywhereUSB Manager** creates a secure identity certificate that is associated with the client ID. This certificate is used to validate your user account with the Hub. The certificate associated with the user account client ID must match the certificate for this client ID on the Hub to allow a connection.

Note For more information about the client ID, see Client ID overview.

**WARNING!** Digi recommends that you use a private network to connect the computer to the Hub. This ensures that only clients IDs with known user credentials can connect to the Hub. The first time that a client ID on a computer connects to the Hub, the unique credentials for this known user are stored in your Hub. If you do not use a private network, an unknown computer with the same client ID may happen to connect to the Hub before the known computer connects. In this case, the known computer will not be able to connect and authenticate.

***Examples***

The list below describes situations during which this may occur, and includes a resolution.

## Multiple user accounts with the same client ID

In some cases, multiple computers may inadvertently use the same client ID. When this occurs and computers with the same client ID attempt to connect with the same Hub, the first computer to associate itself with the Hub will be able to connect to the Hub. Subsequent computers will not be able to connect that Hub.

**Resolution**

If you discover that multiple computers are assigned the same client ID, see AnywhereUSB Manager client ID is not unique for help solving this issue.

## AnywhereUSB Manager created a new certificate

If the **AnywhereUSB Manager** creates a new certificate, the certificate on your computer will not match the certificate on the Manager, and a connection cannot be made. Some examples of how this could happen:

- The **AnywhereUSB Manager** was completely removed from the PC, and then reinstalled. In this situation the **Manager** creates a new certificate for the client ID during the reinstall process.
- A factory reset of the **Manager**.

### Resolution

You can fix the client ID and Hub certificates mismatch with this process:

- **Step 1:** Remove the client ID from the Hub.
- **Step 2:** Add the client ID to the Hub.

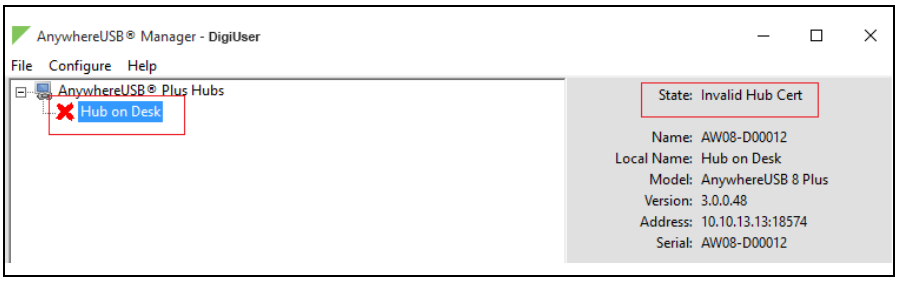
### Invalid Hub Certificate

The status message "Invalid Hub Certificate" displays when the Hub certificate has become invalid.

If this occurs, you should remove the Hub from the Manage Hub Credentials list and then add the Hub certificate to the **AnywhereUSB Manager**.

### Prerequisite

The Hub must be on a secure network before you manually add the Hub to the Manage Hub Credentials list, or if you remove the certificate and a new one is automatically assigned over the network.




## Step 1: Remove the Hub certificate

Remove the Hub from the Manage Hub Credentials list.

1. Open **AnywhereUSB Manager**.
2. Choose **Configure** > **Manage Hub Credentials**. The **Manage Hub Credentials** dialog appears.
3. Select the Hub that you want to remove.
4. Click **Remove**.
5. Click **Close**.

## Step 2: Add the Hub certificate to the Manager

After the Hub has been removed from the Manage Hub Credentials list, the **AnywhereUSB Manager** forgets the Hub certificate and gets a new one on the next connection attempt.

---

Note If the **Auto-register Hub Cert** option is disabled, then provide a new cert in the Manage Hub Credentials dialog. As an alternative, enable the Auto-register Hub Cert option to register the Hub certificate.

---

**Unable to connect**

The "Unable to connect" status message displays in the **Hub Status** pane when the Hub is included in the known Hubs list but the Hub is offline or the network is unreachable. For example, a firewall issue or other network issue could be blocking access from the Manager to the Hub.

## Problem: TCP port is not configured correctly

The Hub cannot be reached via the TCP port (18574 by default) that is used by the **AnywhereUSB Manager** and is listened to by the Hub. Both the Hub and the **Manager** must be configured with the same TCP port in order for the Hub to connect to the client.

**Resolution**

Verify that the TCP port settings match for the Hub and the client.

- Hub: See AnywhereUSB Configuration page.
- Client: Verify the TCP port on your computer.

## Problem: Hub is offline

The Hub could be powered off.

**Resolution**

Verify that it is connected to a power source and turned on.

## Problem: Invalid Hub certificate

In some situations, the Hub certificate may become invalid. The Hub and the **AnywhereUSB Manager** must have matching certificates to be able to communicate. If the certificates do no match, the Hub and the **AnywhereUSB Manager** cannot communicate and a red X displays next to the Hub name in the **Manager**.

**Resolution**

For more information, see Manage Hub credentials and Step 1: Remove the Hub certificate.

## Problem: Hub has a different IP address

The device is no longer connected or has been moved to another network segment. The **AnywhereUSB Manager** does not discover Hubs that are not on the same network segment as the client.

**Resolution**

Add the Hub to the list of known Hubs. This ensures that the **AnywhereUSB Manager** can connect to the Hub, even it is on a different network. See Manage the list of known Hubs.

**Note** If you add a Hub to the list of known Hubs and you have the Hub autofind feature enabled, this may result in a duplicate connection for the same Hub. See Duplicate Hub.

## Problem: Network issue blocking access

You should verify whether a network issue is blocking access to the Hub.

Attempt to ping the Hub:

- If you have a firewall that blocks TCP ports but allows ping, you will see successful pings but still not be able to connect. Contact your system administrator to verify that your firewall is not blocking TCP ports.
- If you can ping the Hub and are able to connect, a network issue does not exist and a different issue has occurred.
- If you cannot ping the Hub, check the configuration of the PC, and the Hub network settings, including firewalls and the network between them.

## Problem: Duplicate Hub

If you have added a Hub to the known Hub list that is on same network as your computer, and you have the **Autofind Hubs** feature enabled, the Hub is found twice. The **AnywhereUSB Manager** attempts both connections, and the first one to connect will connect as expected. The second connection is discovered as a duplicate, and the **Manager** closes that connection and red X displays.

For more information, see Duplicate Connection.

**Resolution**

The Hub added to the known Hubs list is considered a duplicate Hub, and should be removed from the known Hubs list.

## Problem: Old version of AnywhereUSB Manager

In same cases, a Hub cannot connect to an older version of the **AnywhereUSB Manager**.

**Resolution**

Update to the most recent version of the **AnywhereUSB Manager**. See Step 1: Install the AnywhereUSB Manager.

## Problem: Incompatible Hub

In some cases, the Hub firmware is old and must be updated to ensure that it can connect to the **AnywhereUSB Manager**.

**Resolution**

Update to the most recent version of the Hub firmware. See Update system firmware.

**Unregistered Client ID**

The message "Invalid Client ID" displays when the client ID is not registered with the Hub, and a connection between the Hub and the PC cannot be established.

The client ID is a unique identifier assigned to a user account the first time a user logs in to a computer and opens the **AnywhereUSB Manager**. The client ID is associated with the login credentials for the user currently logged on to the computer.

**Note** For more information about the client ID, see Client ID overview.

### Problem: Client ID has not been added to the Hub

The client ID has not been added to the list of client IDs for the Hub.

**Resolution**

Add the client ID, which creates a certificate for the client ID.

- You can add a client ID to the Hub during the **AnywhereUSB Manager** installation process. See Client ID overview.
- You can manually add a client ID to the client list for the Hub. See Manually add a client ID.

### Problem: Initial connection

A red X displays next to a Hub name during the initial connection of the hardware to your PC. This is expected, and is a security feature.

For an example, see Verify initial connection.

**Resolution**

The Hub administrator needs to allow each new client ID to connect to the Hub by adding the client ID to the client list. See Manually add a client ID.

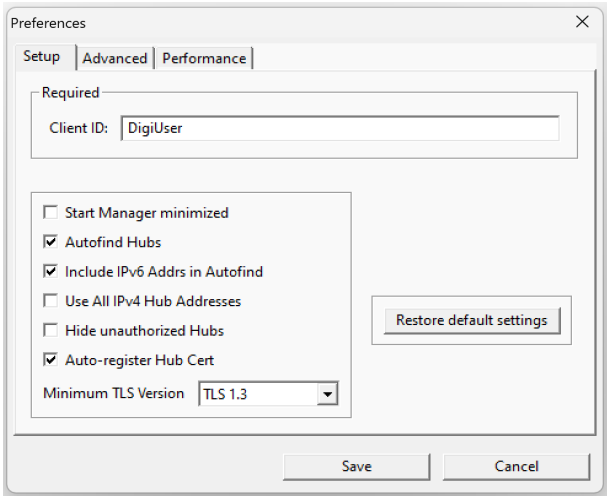
#### *Set Hub preferences*

In the **AnywhereUSB Manager**, you can set preferences for keepalive time messages and responses and how often the **AnywhereUSB Manager** searches for a Hub and the Hub response time.

Click **File > Preferences** to display the **Preferences** dialog.

## Setup tab

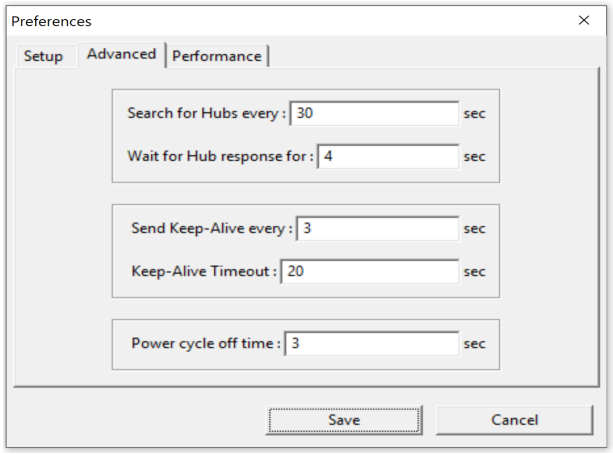
- Client ID
- Start Manager minimized
- Autofind Hubs
- Include IPv6 Addrs in Autofind
- Use All Hub IPv4 Addresses
- Hide unauthorized Hubs
- Auto-register Hub Cert
- Restore default settings
- Minimum TLS Version




## Advanced tab

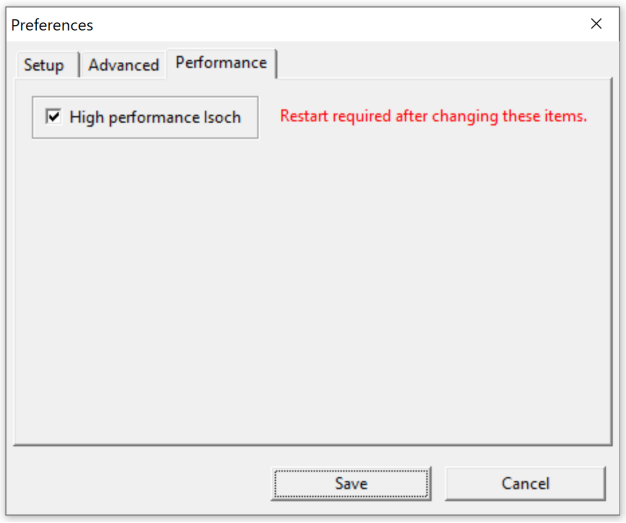
- Specify search, response, and keepalive intervals for a Hub

**Note** The **Power cycle off time** option is not used. Any value in the field is ignored. The power cycle off time configured for the Hub is 1 second.




## Performance tab

- Manage USB isochronous transfers for audio and video streams




## Configure the Auto-register Hub Cert feature

The **Auto-register Hub Cert** option determines what happens when the **AnywhereUSB Manager** doesn't have a certificate for a Hub, and the Hub attempts to connect to the **Manager**. The **Auto-register Hub Cert** option configuration determines whether the **Manager** collects and stores the Hub's certificate.

The table below explains the configuration options.

| Does the Manager have a certificate for the Hub? | Does the Manager have the correct Hub certificate? | Auto-register Hub Cert | Outcome |
|---|---|---|---|
| No | N/A | **Enabled** | The **Manager** collects the Hub certificate and connects. The **Manager** requires that same certificate from the Hub on future connections. |
| No | N/A | **Disabled** | The **Manager** does not collect the Hub's certificate and rejects the connection. |
| Yes | Yes | Not considered | The Hub connects to the **Manager**. |
| Yes | No | Not considered | The connection between the Hub and **Manager** fails and the **Invalid Hub Certificate** message displays in the **Manager**. |

To enable or disable the **Auto-register Hub Cert** option:

1. Open **AnywhereUSB Manager**.
2. Choose **File > Preferences**. The **Preferences** dialog appears.
3. Click the **Setup** tab.

4. Determine the **Auto-register Hub Cert** configuration.
   - **Enable**: The **Manager** collects the Hub certificate and connects. The **Manager** requires that same certificate from the Hub on future connections.
   - **Disable**: The **Manager** does not collect the Hub's certificate and rejects the connection.
5. Click **Save**.

## Autofind Hubs and Include IPv6 Addrs in Autofind options

The **Autofind Hubs** feature in the **AnywhereUSB Manager** enables the **Manager** to automatically create a list of Hubs found on on the same network segment.

- When the **Autofind Hubs** option is enabled, the **Manager** repeatedly reaches out to your network and looks for Hubs, based on the interval specified in the **Preferences** dialog. Each Hub has its own certificate that the **Manager** uses to authenticate the Hub. When a Hub found on your network has a certificate that matches a certificate in the **Manager**, the **Manager** attempts to connect to the Hub. In addition to matching certificates, the Hub also needs a configured client ID.
- When the **Autofind Hubs** option is disabled, only the Hubs included in the **Manager**'s Known Hubs list are allowed to connect. The Hub configuration controls the connections from **Managers**.

### *Include IPv6 Addrs in Autofind option*

The **Autofind Hubs** feature works with the **Include IPv6 Addrs in Autofind** option. This option determines whether IPv6 addresses found during the Autofind process are used to attempt to connect to the Hub. See Configure the Include IPv6 Addrs in Autofind option for details.

The table below shows how the **Autofind Hubs** and **Include IPv6 Addrs in Autofind** options work together to influence which Hubs can connect to the **Manager**.

| Autofind Hubs | Does the Manager have a certificate for the Hub? | Does the Manager have the correct Hub certificate? | Include IPv6 Addrs in Autofind | Outcome |
|---|---|---|---|---|
| **Enabled** | Yes | Yes | **Enabled** | A Hub with either a IPv6 and IPv4 address can connect to the **Manager**. |
| **Enabled** | Yes | Yes | **Disabled** | Only Hubs with an IPv4 address can connect to the **Manager**. |
| **Enabled** | Yes | No | N/A | The connection between the Hub and **Manager** fails and the **Invalid Hub Certificate** message displays in the **Manager**. |
| **Enabled** | No | N/A | N/A | The **Manager** rejects the connection. |
| **Disabled** | N/A | N/A | N/A | The Autofind feature is not used and Hubs are not found automatically. |

### Disable Autofind Hubs option after initial connection

After the initial Autofind connection, you can add the Hubs that were automatically found to your list of Known Hubs, which is a list of Hub IP addresses that your **AnywhereUSB Manager** is allowed to connect to when you open the **Manager**.

Digi recommends that after your Hubs have made the initial connection to the **AnywhereUSB Manager** and you have added the Hubs that were automatically found to the list of Known Hubs, you should disable the **Autofind Hubs** feature. This reduces your network traffic and duplicate Hub connection attempts.

---

**Note** You can manually add Hubs to the Known Hubs list. This can include Hubs that are on the same network as your computer, or on a different network. You can also manually add Hubs with an IPv6 or an IPv4 address, regardless of how the **Include IPv6 Addrs in Autofind** option is configured.

---

After you have added your Hubs to the known Hubs list, you should disable **Autofind Hubs**.

For an overview of this process, see Create initial list of Known Hubs.

### Configure the Autofind Hubs option

The **Autofind Hubs** feature in the **AnywhereUSB Manager** enables the **Manager** to create a list of Hubs to which the **Manager** may be able to connect. The **Manager** repeatedly reaches out to the network to create this list, based on the interval specified in the **Preferences** dialog.

In some cases the **Manager** discovers multiple addresses for one Hub and makes duplicate connection attempts. The **Manager** will not connect twice to a Hub. When the **Manager** discovers it is already connected to a Hub and connects a second time, it disconnects the second connection.

---

**Note** For detailed information about the **Autofind Hubs** option, see Autofind Hubs and Include IPv6 Addrs in Autofind options.

---

The status of the **Autofind Hubs** option determines which Hubs can automatically connect to the **Manager**.

To configure the **Autofind Hubs** option:

1. Open the **AnywhereUSB Manager**.
2. Choose **File > Preferences**. The **Preferences** dialog appears.
3. Click the **Setup** tab.
4. Determine the **Autofind Hubs** configuration.
    - **Enable**: Hubs are found automatically. This is the default.

      **Note** The list of Hubs that is automatically found is influenced by the configuration of the **Include IPv6 Addrs in Autofind** option. Verify the status of the Include IPv6 Addrs in Autofind option.

    - **Disable**: Hubs are not found automatically.
5. Click **Save**.

### Configure the Include IPv6 Addrs in Autofind option

When a Hub is discovered by the Autofind feature, the **AnywhereUSBManager** receives multiple addresses for that Hub. The first IP address that successfully completes a connection will be the one used for the duration of that connection.

The **Include IPv6 Addrs in Autofind** option works with the **Autofind Hubs** option to determine whether IPv6 addresses received are used to attempt connection to that Hub. If IPv6 addresses will not be used, only IPv4 addresses received will be tried.

**Note** You can manually add IPv6 addresses to the the Known Hubs list and these are able to connect to the **Manager**, regardless of the status of the **Include IPv6 Addrs in Autofind** option.

IPv6 addresses may fail to connect to Hubs if:

- The Hub does not have IPv6 enabled.
- The PC running the **Manager** does not have IPv6 transport enabled on the interface that would be used to connect to that Hub.
- A router or firewall in between the Hub and the **Manager** is blocking IPv6 traffic.

**Note** The status of the **Include IPv6 Addrs in Autofind** option is considered only if the **Autofind Hubs** option is enabled.

| Autofind Hubs | Included IPv6 Addrs in Autofind | Outcome |
|---|---|---|
| **Enabled** | **Enabled** | Connection attempts using all discovered IPv4 and IPv6 addresses for Hub. This is the default. |
| **Enabled** | **Disabled** | Connection attempts using all discovered IPv4 addresses for Hub, if any. |
| **Disabled** | N/A | The Autofind feature is not used. The only connection attempts are from the Known Hubs list. |

To enable or disable the **Include IPv6 Addrs in Autofind** option:

1. Open **AnywhereUSB Manager**.
2. Choose **File > Preferences**. The **Preferences** dialog appears.
3. Click the **Setup** tab.
4. Determine the **Include IPv6 Addrs in Autofind** configuration.

   **Note** This option is considered only if the **Autofind Hubs** option is enabled.

   - **Enable**: Both IPv4 and IPv6 addresses of Hubs discovered by Autofind are used to attempt connections to the **Manager**.

     This is the default.
   - **Disable**: Only IPv4 addresses of Hubs discovered by Autofind are used to attempt connections to the **Manager**.
5. Click **Save**.

## Rename AnywhereUSB Hubs, groups, and USB devices

Each AnywhereUSB Hub and group has a default name that displays in the **AnywhereUSB Manager**. You can also assign a local name to each Hub, group, or USB device that displays in the **AnywhereUSB Manager**, which can help you to uniquely identify your local Hubs, groups, and USB devices.

The local name is local to the computer on which the **AnywhereUSB Manager** is running. No other user can see the local name.

- Assign a local name to a Hub
- Assign a local name to a group
- Assign a local name to a USB device

### *Assign a local name to a Hub*

You can give an AnywhereUSB Hub a local name. The name displays in the Hub Status pane in the **AnywhereUSB Manager** and also in the tree view. The local name is local to the computer on which the **AnywhereUSB Manager** is running. No other user can see the local name.

---

**Note** The Hub local name is different from the default Hub name. For detailed information about the default name, see Rename a Hub and the groups in a Hub.

---

1. Open the **AnywhereUSB Manager**.
2. Expand **AnywhereUSB Hubs** to display the Hubs.
3. Right-click on the Hub towhich you want to give a local name.
4. Select the **Assign Local Name** menu option. A dialog appears.
5. In the field, enter a local name for the Hub.
6. Click **OK**.

### *Assign a local name to a group*

You can give a group a descriptive local name. The local name can be seen only on the computer on which the **AnywhereUSB Manager** is running. The name assigned to the group (default or local) displays in the Group Status pane in the **AnywhereUSB Manager** and also in the tree view.

---

**Note** The group local name is different from the default group name. For detailed information about the default name, see Rename a Hub and the groups in a Hub.

---

1. Open the **AnywhereUSB Manager**.
2. Expand **AnywhereUSB Hubs** to display the Hubs.
3. Expand the Hub that has the group you want to give a local name.
4. Right-click on the group that you want to rename.
5. Select the **Assign Local Name** menu option. A dialog appears.
6. Enter a local name for the group.
7. Click **OK**.

### *Assign a local name to a USB device*

You can assign a local name to a USB device. The local name is local to the computer on which the **AnywhereUSB Manager** is running.

The name assigned to a USB device (default or local) displays in the in the Device Status pane and also in the tree view.

1. Open the **AnywhereUSB Manager**.
2. Expand **AnywhereUSB Hubs** to display the Hubs.

3. Expand the Hub that has the group to which the to USB device is attached.
4. Expand the appropriate group to display the USB devices in the group.
5. Right-click on the USB device to which you want to give a local name.
6. Select the **Assign Local Name** menu option. A dialog appears.
7. In the field, enter a local name for the USB device.
8. Click **OK**.

## Disconnect from a group or a USB device

You can disconnect from a group or a USB device in a group to which you no longer need access.

**Disconnect from a group**

- Disconnect from a group

**Disconnect from a USB device:**

- Disconnect a USB device from a group. This process is done from the **AnywhereUSB Manager**, and can only be done if you are running the **Manager** as a stand-alone. See Disconnect from a USB device in a group.
- Move the port to a group on the Hub to which you are not connected. See Step 3: Name groups and assign ports to a group.

### *Disconnect from a group*

You can disconnect from a group that has ports you no longer need access to. You are disconnected from all USB devices and ports in that group. Any other user can then connect to that group.

**Warnings**

- **Auto-connect**: If you have auto-connect enabled for the group, you are not allowed to disconnect from the group. You have to first disable auto-connect, and then disconnect from the group. The next time you log in to your computer, you will not be automatically connected to this group.
- **Power cycle on disconnect**: The power cycle on disconnect feature ensures that when a group is disconnected from a Hub, the Hub turns off power to all of the USB ports in the group and then one second later turns it back on. This feature is globally enabled by default on the Hub, so to be able to disconnect from a group, you need to globally disable the power cycle on disconnect feature.

To disconnect from a group:

1. Open **AnywhereUSB Manager**.
2. Ensure you are able to disconnect from a group.
   a. Disable auto-connect for a group.
   b. Disable the power cycle on disconnect feature.
3. Expand **AnywhereUSB Hubs** to display the Hubs.
4. Expand a Hub to display the groups in the Hub.
5. Right-click on the group from which you want to disconnect.

6. Select **Disconnect from Group**. A note appears in the Group Status pane to show that the group is not being used.

### *Disconnect from a USB device in a group*

You can disconnect from a USB device that is in a group.

---

**Note** To ensure that you can no longer connect to a USB device in a group, the best method is to move the port to a group on the Hub to which you are not connected. See Step 3: Name groups and assign ports to a group.

---

**Warnings**

- **Auto-connect**: If you have auto-connect enabled for the group, you are not allowed to disconnect from a USB device in the group until you disable auto-connect. If the USB device is in a group to which you are connected, other users cannot connect the USB device after you have disconnected from it, since you still own the group that the USB device is in. See Disable auto-connect for a group.
- **Power cycle on disconnect**: If you have the power cycle on disconnect feature enabled, the Hub automatically cycles the power to each USB device when it disconnects. To ensure that a USB device remains disconnected, you must disable this feature. See Cycle the power to a device when it disconnects from a PC.

To disconnect from a device in a group:

1. Open **AnywhereUSB Manager**.
2. Ensure you are able to disconnect from a group.
   a. Disable auto-connect for a group.
   b. Disable the power cycle on disconnect feature.
3. Expand **AnywhereUSB Hubs** to display the Hubs.
4. Expand a Hub to display the groups in the Hub.
5. Expand a group to display the USB devices in the group.
6. Right-click on the USB device from which you want to disconnect.
7. Select **Disconnect from Device**. A note appears in the Device Status pane to show that the device is not being used.

## Configure the auto-connect feature for a group

You can enable the auto-connect feature for a group (or multiple groups). This feature ensures that whenever you open the **AnywhereUSB Manager**, you are automatically connected to all of the groups to which you are allowed access that have auto-connect enabled.

---

**Note** When you open the **AnywhereUSB Manager**, the **Manager** attempts to connect to the groups to which you are allowed access. If someone else already owns the group, you will not be connected to that group.

---

If you have auto-connect enabled for the group, it controls how you can disconnect:

- If auto-connect is enabled, you are not allowed to disconnect from the group. The **Disconnect from Group** option cannot be selected. You have to first disable auto-connect, and then

disconnect from the group.

- You can disconnect from a USB device in the group, but if auto-connect is enabled, the device is immediately re-connected.

For this to work as expected, you should also choose to automatically start the **AnywhereUSB Manager** each time you start your computer. For example, you can enable auto-connect for a group that has a camera connected to a port in the group. Every time the computer starts, the **AnywhereUSB Manager** starts and automatically connects the camera to your computer.

### *Enable auto-connect for a group*

You can choose to automatically connect to a selected group each time you open the **AnywhereUSB Manager**.

**Note** You can disable auto-connect at any time.

1. Open **AnywhereUSB Manager**.
2. Expand **AnywhereUSB Hubs** to display the Hubs.
3. Expand a Hub to display the groups in the Hub.
4. Right-click on the group to which you want to automatically connect.
5. Select **Enable Auto Connect**. If you were not already connected to the group, you are immediately connected to the group. A note appears next to the group name and in the Group Status pane to show that you are connected to the group.

### *Disable auto-connect for a group*

When auto-connect is disabled, the Hub no longer automatically connects to this group when you open the **AnywhereUSB Manager**.

1. Open the **AnywhereUSB Manager**.
2. Expand **AnywhereUSB Hubs** to display the Hubs.
3. Expand a Hub to display the groups in the Hub.
4. Right-click on the group to which you no longer want to automatically connect at start up.
5. Select **Disable Auto Connect** to turn off the auto connect feature for the group.

## Manage the list of known Hubs

You can create a list of Hubs to which your **AnywhereUSB Manager** is allowed to connect when you open it. The Hubs you add to the list can be on the same network as your computer, or on a different network.

Hubs that you have added to the known Hubs list display when you open the **AnywhereUSB Manager**. These Hubs are in addition to any Hubs that are automatically discovered if you have enabled the **Autofind Hubs feature**.

### *Add a Hub to the known Hub list*

You can use one of two methods to manually add a Hub to the known Hubs list:

- Right-click method
- Known Hubs dialog

The Hubs can be on the same network as your computer, or on a different network.

**Right-click Hub menu option**

When you use this method, a duplicate connection for this Hub is made until you disable the Autofind Hubs feature in the **Preferences** dialog.

1. Open the **AnywhereUSB Manager**.
2. Right-click on a Hub name in the **AnywhereUSB Manager**. A short cut menu displays.
3. Click **Add to Known Hubs**. The Hub is added to the known hubs list.
4. To ensure that you don't have a duplicate connection for this Hub, you should navigate to **File** > **Preferences** and disable the Autofind Hubs feature.

**(Optional) You can verify that the Hub was added to the list**

1. Select the Hub and make a note of the IP address in the Hub status pane.
2. Select **Configure > Known Hubs**. The **Known Hubs** dialog appears.
3. Verify that the IP address for the Hub is in the list.

**Known Hubs dialog**

1. Open the **AnywhereUSB Manager**.
2. Select **Configure > Known Hubs**. The **Known Hubs** dialog appears.
3. Click **Add**. The **Add Known Hub** dialog appears.
4. In the **Hub Address** field, enter the Hub IP address or a network name, such as a DNS name, for the Hub.
5. If you want to update the TCP port number, click **Advanced**. The **Hub TCP port (most systems should leave at default)** field displays.
   a. In the **Hub TCP port (most systems should leave at default)** field, a TCP port number is entered by default. You can change this entry, but it is not recommended.
   b. Click **Standard** to hide the **Hub TCP port (most systems should leave at default)** field.
6. Click **OK**. The Hub appears in the Hub list in the **Known Hubs** dialog.
7. Click **Close** to close the **Known Hubs** dialog. The **AnywhereUSB Manager** attempts to connect to the new Hub.

### *Remove a Hub from the known Hub list*

You can remove a known Hub that was added to the known Hubs list.

1. Open the **AnywhereUSB Manager**.
2. Select **Configure > Known Hubs**. The **Known Hubs** dialog appears.
3. From the list of known Hubs, select the Hub you want to remove.
4. Click **Remove**.
5. Click **Close** to close the **Known Hubs** dialog.

### *Working with the known Hubs list and the Autofind Hubs option*

You should be aware of how the **Autofind Hubs** option works with the Hubs you add to the known Hubs list.

If you have the **Autofind Hubs option** selected for the Hub, when you open the **AnywhereUSB Manager**, all Hubs connected to the same network as your computer are

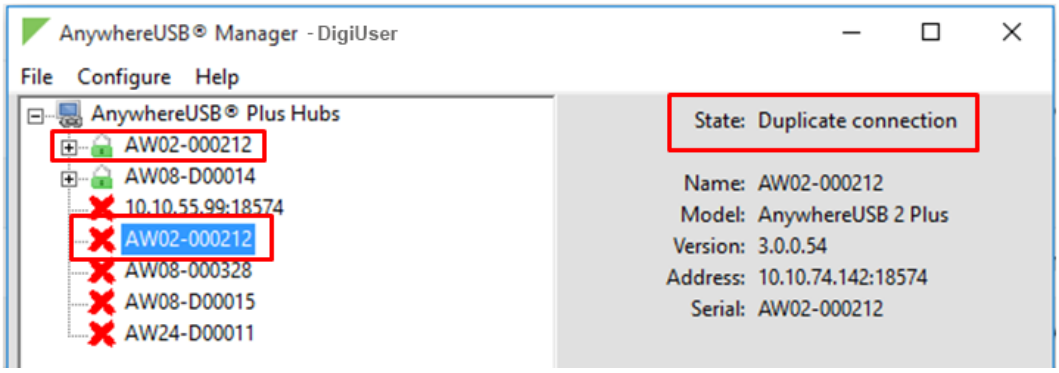
automatically found and appear in the **AnywhereUSB Manager**. In addition, any Hubs you have added to the known Hubs list are found and also appear.

**Duplicate Connection**

The "Duplicate Connection" message displays if a Hub is found twice and appears twice in the **AnywhereUSB Manager**.

This occurs if you have added a Hub to the known Hub list that is on same network as your computer, and you have the **Autofind Hubs** feature enabled. The **AnywhereUSB Manager** attempts both connections, and the first one to connect will connect as expected. The second connection is discovered as a duplicate, and the **Manager** closes that connection and red X displays.

In this situation, the Hub added to the known Hubs list is considered a duplicate Hub, and should be removed from the known Hubs list.




**Considerations for removing a Hub on the same network as your computer**

If you have the **Autofind Hubs** feature enabled and then remove a Hub from the known Hubs list that was on the same network as your computer, the Hub will still be automatically found and connected to your computer when you open the **AnywhereUSB Manager**.

If you do not want the computer to be able to connect this Hub, you must de-select the **Autofind Hubs** option. Note, however, that if this option is de-selected, Hubs on the same network as your computer will not be automatically found. Only the Hubs in the list of known Hubs will be available when you open the **AnywhereUSB Manager**.

Note As an alternative, you can choose to hide a Hub that is automatically found. This ensures that while the Hub is still automatically found, it does not appear in the **AnywhereUSB Manager**.

## Hide an individual Hub

You can choose to hide an individual Hub so that it does not appear in the **AnywhereUSB Manager**. For example, you can hide an unauthorized Hub, or a Hub which users shouldn't access.

- **Hide any Hub displayed in the Manager**: You can hide Hubs that currently display in the **AnywhereUSB Manager**, such as an unauthorized Hub (which displays with a red X next to the Hub name), or a Hub which users shouldn't access. See Hide a Hub that displays in the AnywhereUSB Manager.
- **Hide any Hub that is not currently displayed in the Manager**: You can hide Hubs that don't currently display in the **AnywhereUSB Manager**, but the client ID may have access in the future, such as a Hub on another network. See Hide a Hub that does not currently display in the AnywhereUSB Manager.

- **Hide unauthorized Hubs**: You can choose to automatically hide all unauthorized Hubs, which is a Hub that has failed to connect to your computer. See Hide all unauthorized Hubs.

### Hide a Hub that displays in the AnywhereUSB Manager

**Note** After you have hidden a Hub, you can choose to re-display it. See Display a hidden Hub.

1. Open **AnywhereUSB Manager**.
2. Right-click on the Hub that you want to hide. The shortcut menu appears.
3. Click **Hide Hub**. The next time the **AnywhereUSB Manager** updates, the hidden Hub is removed from the Hub list and no longer displays.
4. You can display a hidden Hub when needed.

### Hide a Hub that does not currently display in the AnywhereUSB Manager

**Note** After you have hidden a Hub, you can choose to re-display it. See Display a hidden Hub.

1. Open the **AnywhereUSB Manager**.
2. Select **Configure > Hidden Hubs**. The **Hidden Hubs** dialog appears.
3. Click **Add**. The **Add Hidden Hub** dialog appears.
4. In the **Hub Address** field, enter the Hub IP address.
5. If you want to update the TCP port number, click **Advanced**. The **Hub TCP port (most systems should leave at default)** field displays.
   a. In the **Hub TCP port (most systems should leave at default)** field, a TCP port number is entered by default. You can change this entry, but it is not recommended.
   b. Click **Standard** to hide the **Hub TCP port (most systems should leave at default)** field.
6. Click **OK**. The Hub appears in the Hub list in the **Hidden Hubs** dialog.
7. Click **Close** to close the **Hidden Hubs** dialog.

### Display a hidden Hub

You can display any Hub that was hidden using the **Hide Hub** menu option.

1. Open **AnywhereUSB Manager**.
2. Choose **Configure > Hidden Hubs**. The **Hidden Hubs** dialog appears.
3. Click on the Hub that you no longer want to hide. To select more than one Hub, press CTRL as you select Hub.
4. Click **Remove**. The selected Hubs are removed from the list.
5. Click **Close**. The next time the **AnywhereUSB Manager** updates, the hidden Hubs appear in the list of Hubs.

## Hide all unauthorized Hubs

You can choose to automatically hide all unauthorized Hubs, so they do not display in the **AnywhereUSB Manager**. An unauthorized Hub is a Hub that has failed to connect to your computer. A red X appears next to the Hub name.

- Automatically hide unauthorized Hubs
- Display unauthorized Hubs

**Note** You can choose to automatically hide any individual Hub. See Hide an individual Hub.

### *Automatically hide unauthorized Hubs*

You can choose to automatically hide all unauthorized Hubs, which is a Hub that has failed to connect to your computer. An unauthorized Hub appears with a red X next to it in the list of Hubs in the **AnywhereUSB Manager**.

**Note** After you have hidden unauthorized Hubs, you can choose to re-display unauthorized, hidden Hubs. See Display unauthorized Hubs.

1. Open **AnywhereUSB Manager**.
2. Choose **File > Preferences**. The **Preferences** dialog appears.
3. Select the **Hide unauthorized Hubs** option.
4. Click **Save**. Hubs that have failed to connect no longer display in the **AnywhereUSB Manager**.

### *Display unauthorized Hubs*

You can display the unauthorized Hubs that were hidden using the **Hide unauthorized Hubs** option.

1. Open **AnywhereUSB Manager**.
2. Choose **File > Preferences**. The **Preferences** dialog appears.
3. De-select the **Hide unauthorized Hubs** option.
4. Click **Save**. Hubs that have failed to connect now display in the **AnywhereUSB Manager**.

## Use all Hub IPv4 addresses

The AnywhereUSB Hub may have default IPv4 IP addresses that are reported by mDNS to the **AnywhereUSB Manager**, but in many network environments, the **Manager** cannot connect to them. As part of normal operation, the **Manager** tries to sequentially connect to all of the Hub IPv4 IP addresses, so if it starts trying these extra default IPv4 IP addresses, it may take extra time (minutes) for the **Manager** to connect or reconnect.

You can use the **Use All Hub Addresses** option to determine whether the **AnywhereUSB Manager** is allowed to connect to extra default IPv4 IP addresses. By default, this option is deselected and the **Manager** does not attempt to connect to these addresses.

**Note** This can also be done using a CLI command: use all hub addresses

1. Open **AnywhereUSB Manager**.
2. Choose **File** > **Preferences**. The **Preferences** dialog appears.
3. Determine your connection option:
   - **Not selected**: When **Use All Hub IPv4 Addresses** is not selected, the **AnywhereUSB Manager** does not attempt to connect to the extra IPv4 IP addresses. This is the default.
   - **Selected**: When **Use All Hub IPv4 Addresses** is selected, the **AnywhereUSB Manager** attempts to connect to the extra IPv4 IP addresses.

4. Click **Save** to save your change and close the dialog.

## Specify search, response, and keepalive intervals for a Hub

You can specify the search and response time for Hubs on the network, and the keepalive intervals for the connection between the Hub and the **AnywhereUSB Manager**.

1. Open **AnywhereUSB Manager**.
2. Choose **File > Preferences**. The **Preferences** dialog appears.
3. Click the **Advanced** tab.
4. Enter the following:
   - **Search for Hubs every .... sec**: Specifies how often the **AnywhereUSB Manager** searches the local network to discover Hubs and refresh the **AnywhereUSB Manager** display. Default and minimum values are both 30 seconds.

     Note You cannot manually perform a refresh of the Hubs displayed in the **AnywhereUSB Manager**.

   - **Wait for Hub response for .... sec**: Specifies the time interval from the last discovery refresh that the **AnywhereUSB Manager** will stop looking for more Hubs. Default and minimum values are both 4 seconds.
   - **Send Keep-Alive every ... sec**: Specifies how often the **AnywhereUSB Manager** sends a keepalive request to the Hubs connected to the network. This impacts network utilization because each **AnywhereUSB Manager** will send one packet at this interval to each Hub to which it is connected. Default is 3 seconds. The minimum value is 1 second.
   - **Keep-Alive Timeout ... sec**: Specifies how long the **AnywhereUSB Manager** should wait for a keepalive response. When the value of the response time is reached, the Manager decides that a Hub is no longer available, and the computer is disconnected from all groups and devices on that Hub. The default value is 20 seconds. The minimum value is 15 seconds.
     - The keepalive timeout value would need to be longer if the network has more latency (such as a cellular or satellite link), or an internet link with unreliable packet delivery.
     - If the value is too short, devices will be disconnected, which may have an adverse affect on some devices, such as USB memory.
     - If the value is too long, Hubs that are removed from the network will not be noticed as gone for a long time, and devices that are no longer connected will be unresponsive for a long time.
   - **Power cycle off time**: This option is not used, and any value in the field is ignored. The power cycle off time configured for the Hub is 1 second.
5. Click **Save**.

## Configure the minimum TLS version

You can specify the minimum TLS version that the AnywhereUSB service will accept. The default is **TLS version 1.3**.

**Note** You can also configure the minimum TLS version in the Hub's web UI. See Configure AnywhereUSB services.

1. Open the AnywhereUSB Manager.
2. Choose **File > Preferences**. The **Preferences** dialog displays.
3. Click the **Setup** tab.
4. From the **Minimum TLS version** list box, select the minimum TLS version that the AnywhereUSB service will accept. The default is **TLS version 1.3**.
5. Click **Save**.

## Manage Hub credentials

You can manually add, update, or remove the certificate associated with a Hub on the **AnywhereUSB Manager**. The Hub and the **AnywhereUSB Manager** must have matching certificates to be able to communicate.

### Auto-register Hub Cert option

The **Auto-register Hub Cert** option determines whether a Hub's certificate is automatically registered with a **Manager**. When the **Manager** attempts to connect to a Hub in the list, the Hub provides a certificate. If the **Manager** doesn't have the Hub's certificate, the **Manager**'s connection outcome depends on the status of the **Auto-register Hub Cert** option.

- If **Auto-register Hub Cert** is enabled, the **Manager** stores the Hub certificate and connects to the Hub.
- If **Auto-register Hub Cert** is disabled, the **Manager** rejects the connection the Hub.

For detailed information, see Configure the Auto-register Hub Cert feature.

### Manually manage the Hub certifications

For more control over the Hub certificates, you can also manually add, remove, and update them.

- Add a Hub certificate
- Remove a Hub certificate
- Update a Hub certificate

### *Add a Hub certificate*

You can manually add a Hub certificate to the **AnywhereUSB Manager**.

#### *Before you begin*

Make sure that the Auto-register Hub Cert option is enabled, which ensures that the Hub automatically gets a new certificate on the next connection attempt. Otherwise, if you have the Hub certificate, you can manually add it in the Manage Hub Credentials dialog.

1. Open **AnywhereUSB Manager**.
2. Choose **Configure** > **Manage Hub Credentials**. The **Manage Hub Credentials** dialog appears.
3. In the **Serial number** field, enter the Hub's serial number.
4. Click **Add**. The **Choose a credential file** window appears.
5. Browse for the new certificate file and click **Open**. The file should have a .pem extension.

6. An update message displays in the **Manage Hub Credentials** dialog.
7. Click **Close**.

### *Update a Hub certificate*

You can choose to manually update a Hub's certificate and register a new certificate with the **AnywhereUSB Manager**.

1. Open **AnywhereUSB Manager**.
2. Choose **Configure** > **Manage Hub Credentials**. The **Manage Hub Credentials** dialog appears.
3. Select the Hub for which you want to update the certificate.
4. Click **Update**. The **Choose a credential file** window appears.
5. Browse for the new certificate file and click **Open**. The file should have a .pem extension.
6. An update message displays in the **Manage Hub Credentials** dialog.
7. Click **Close**.

### *Remove a Hub certificate*

If needed, you can remove a Hub certificate from the **AnywhereUSB Manager**. After the Hub's certificate is removed, the **Manager** will not be able to connect to the Hub.

Note that if you the **Auto-register Hub Cert** option is enabled, which is the default, a new certificate for the Hub is automatically registered with the **AnywhereUSB Manager** the next time the **Manager** attempts to connect to the Hub.

You can disable the **Auto-register Hub Cert** option to ensure that a Hub certificate is not automatically registered with the **Manager**. You can manually add the Hub to register a new certificate if desired.

1. Open **AnywhereUSB Manager**.
2. Choose **Configure** > **Manage Hub Credentials**. The **Manage Hub Credentials** dialog appears.
3. Select the Hub that you want to remove.
4. Click **Remove**.
5. Click **Close**.

## Assign Device Address (use the same virtual port number)

The **Assign Device Address** feature allows you to use the same virtual port number every time the user connects to the device group.

When you connect to a group that has USB devices, the **AnywhereUSB Manager** assigns a virtual port number to each device. When the **AnywhereUSB Manager** announces a device to Windows, Windows assigns an identifier to the device. By using the same virtual port, Windows usually sees it as the same device after a reboot.

In some situations after a reboot, Windows may give a device a different identifier, which causes Windows applications to see it as a different device. If this situation occurs, this feature can help Windows use the same identifier.

**Note** This feature is only available for Windows 10 and newer, and Windows Server 2016 and newer.

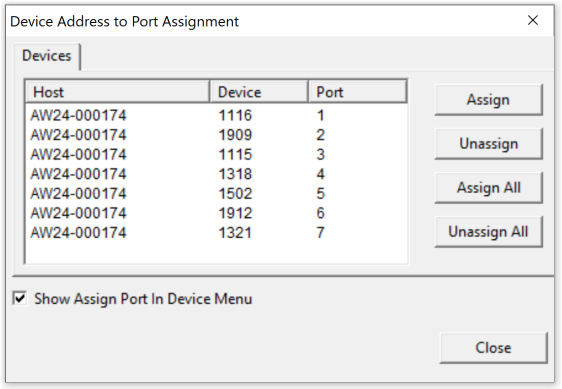
### *Configure the Hub to assign a device address*

You can configure the Hub to retain the Windows address for the ports in a group. You must connect to the group before you can assign a port address to a device address.

**Note** You must restart your PC after configuration is complete to apply the configuration changes.

1. Power on the Hub and connect the USB device (or devices) to the desired USB ports.

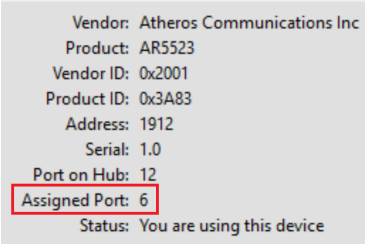
   For best results, you should connect all of the devices that you want to use.
2. Open the **AnywhereUSB Manager**.
3. Expand the Hub that has the group or groups that contain the USB ports to which you have connected devices.
4. Connect to the group or groups that contain the connected devices.
   a. Right-click on the group name.
   b. Click **Connect to the Group**.
   c. Repeat for all groups.
5. Choose **Configure** > **Device to Port Assignment**. The **Device Address to Port Assignment** dialog displays. A list of the devices connected to the groups displays.
   - **Host**: The name of the Hub.
   - **Device**: The identifier assigned to the device by the Hub.
   - **Port**: Virtual port number assigned internally by the **AnywhereUSB Manager**. The assign device address feature allows you to use the same virtual port number on every connect.




6. Select the devices that you want to pin to a virtual port number.

   Click on one port, or press the CTRL key to select multiple ports. When selections are complete, click **Assign**. To select all of the ports, click **Assign All**. The assigned ports are bolded.
7. To remove a selected port from the list:

   Click on the port that you want to unassign, or press the CTRL key to select multiple ports. When selections are complete, click **Unassign**. To de-select all of the ports, click **Unassign All**.
8. Select the **Show Assign Port in Device Menu** option to display the assigned virtual port number in the **AnywhereUSB Manager** USB Device Status pane.




9. Click **Close** to close the dialog.
10. Restart your PC to apply the configuration changes.

## View the AnywhereUSB Manager system messages

You can view the system message log of the **AnywhereUSB Manager** events. The date and time at which an event occurred is listed, as well as the event type and additional information. A new log is created each time you start the **AnywhereUSB Manager**.

The system message log is used for troubleshooting.

1. Open the **AnywhereUSB Manager**.
2. Select **Help > System Messages**. The **System Messages** dialog appears.
   - Click **Refresh** to update the system messages.
   - Click **Clear Log** to clear the system messages from the log.
   - Click **Copy to Clipboard** to copy the messages to the Windows clipboard. You can then paste the messages into another application or document.
3. Click **Close** to close the **System Messages** dialog.

## Restore AnywhereUSB Manager default configuration

You can restore the **AnywhereUSB Manager** to the default settings. During this process, you have the option to keep your currently configured client ID and credentials during this process. See Client ID overview for more information about how the client ID is used by your computer and the Hub to create a connection.

- Keep the current client ID
- Change the client ID

### *Keep the current client ID*

To restore the Hub's default settings and keep your currently configured client ID and identity certificate:

1. Open the **AnywhereUSB Manager**.
2. Select **File > Preferences**. The **Preferences** dialog appears.
3. Click the **Setup** tab.
4. Click **Restore default settings**. A dialog appears.
5. Select the **Keep Client ID** option. This is selected by default.
6. Click **OK**. The **AnywhereUSB Manager** closes automatically. The next time you launch the **AnywhereUSB Manager**, the default settings will be restored.

### Change the client ID

To restore the Hub's default settings and change your currently configured client ID and credentials:

1. Open the **AnywhereUSB Manager**.
2. Select **File > Preferences**. The **Preferences** dialog appears.
3. Click **Restore default settings**. A pop-up dialog appears.
4. De-select the **Keep Client ID** option.
5. Click **OK**. The pop-up dialog closes and the **Preferences** dialog is available.
6. In the **Client ID** field, enter a new, unique client ID.
7. Click **Save**.

## Manage USB isochronous transfers for audio and video streams

Isochronous USB device transfer is used to transfer audio and video streams. Generally, Isoch devices are cameras, microphones, speakers, and other data-streaming devices. A High performance Isochronous feature is available with **AnywhereUSB**.

The High performance Isochronous USB feature is enabled in the **AnywhereUSB Manager** by default, and should remain enabled unless your Isochronous USB device does not function correctly with it enabled. You can disable this feature to attempt to allow older Isochronous USB data-streaming devices to operate when connected to a Hub over a network.

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**Note** If you change any options in the **Performance** tab, you must restart the **AnywhereUSB Manager** to apply the change.

---

1. Open **AnywhereUSB Manager**.
2. Choose **File > Preferences**. The **Preferences** dialog appears.
3. Click the **Performance** tab.
4. De-select the **High performance Isoch** option.
5. Click **Save**.
6. To apply the change, you must restart the **AnywhereUSB Manager**. The process depends on the mode.
    - **Standalone** mode
        a. From the **AnywhereUSB Manager**, click **File > Exit** to disconnect all USB devices connected to your computer, close all connections, and close the **AnywhereUSB Manager**.
        b. To restart the **AnywhereUSB Manager**, double-click the **Anywhere USB Manager** shortcut on your desktop.
    - **Service** mode
        a. If the **AnywhereUSB Manager** is running, you have to close it. From the **AnywhereUSB Manager**, click **File > Exit** to disconnect all USB devices connected to your computer, close all connections, and close the **AnywhereUSB Manager**.
        b. In the Windows search field, enter: **services.msc**
        c. The **Services** dialog displays. Scroll through the list to find the Digi AnywhereUSB Manager service.

d. Right-click on the service to display the shortcut menu, and click **Stop**.

e. Right-click on the service to display the shortcut menu, and click **Start**.

## Create support log file

You can use the **Create Support File** feature in the **AnywhereUSB Manager** when you need to collect logs and other information for Digi Technical Support. The information is saved to a .bin file which you can send to technical support.

The location in which the file is saved depends on whether the **Manager** was installed in service or stand-alone mode. After you have created the file, a dialog displays the location in which the .bin file was saved.

The file is overwritten each time you create a file. If you want to save a file before it is overwritten, rename the file or move it to a different location.

---

**Note** You can also create a debug log file using the **USB Debug Logging Wizard**, which is accessed from the web UI. See Create a debug log file with the USB Debug Logging Wizard.

---

1. Open **AnywhereUSB Manager**.
2. Choose **Help** > **Create Support File**. The support file is created. When complete, a dialog displays, showing you the location of the file.
3. Make a note of the file location.
4. Click **OK** to close the dialog.
5. Navigate to the file location and copy it. You can then email the copy to Digi Technical Support.

   ---

   **Note** If you installed the **AnywhereUSB Manager** in service mode, you must have Administrator rights on the computer to copy the file.

   ---

## Access the online help from the AnywhereUSB Manager

1. Open the **AnywhereUSB Manager**.
2. Click **Help > Online Manual** to launch the online help file.

## Always display the AnywhereUSB Manager on top

You can choose to always display the **AnywhereUSB Manager** on top of all open windows. This feature is disabled by default.

1. Open the **AnywhereUSB Manager**.
2. Select **Help > Always on top**. This option toggles between disabled and enabled, and is disabled by default. When it is enabled, a check mark displays next to the option.

## Minimize the AnywhereUSB Manager when launched

You can choose to automatically minimize the **AnywhereUSB Manager** when it launches.

1. Open **AnywhereUSB Manager**.
2. Choose **File > Preferences**. The **Preferences** dialog appears.

3. Click the **Setup** tab.
4. Determine whether you want to automatically minimize the **AnywhereUSB Manager** when it launches.
    - Select **Start Manager minimized** to automatically minimize the **AnywhereUSB Manager** when it launches.
    - De-select **Start Manager minimized** to open the **AnywhereUSB Manager** when it launches.
5. Click **Save**.

## View AnywhereUSB Manager version and license information

You can view version and license information about the Hub.

The version numbers for the currently installed version of the **AnywhereUSB Manager**, the driver, and the installer are listed at the top of the screen.

1. Open the **AnywhereUSB Manager**.
2. Select **Help > About**. The **License** dialog appears.
3. View the version numbers at the top of the screen.
    - **Manager Version**: The currently installed version of the **AnywhereUSB Manager**.
    - **Driver Version**: The version of the Windows driver installed when the **Manager** was installed.
    - **Installer Version**: The version of the AnywhereUSB installer that was used to install the **Manager** and the Windows driver.
4. In the **License** window, scroll down to review the license information.
5. Click **Close** to close the dialog.

## View latency graph

You can review the relative latency of all of the Hubs connected to the network.

---

**Note** The **Latency Graph** menu item is not available when the **AnywhereUSB Manager** is installed in service mode.

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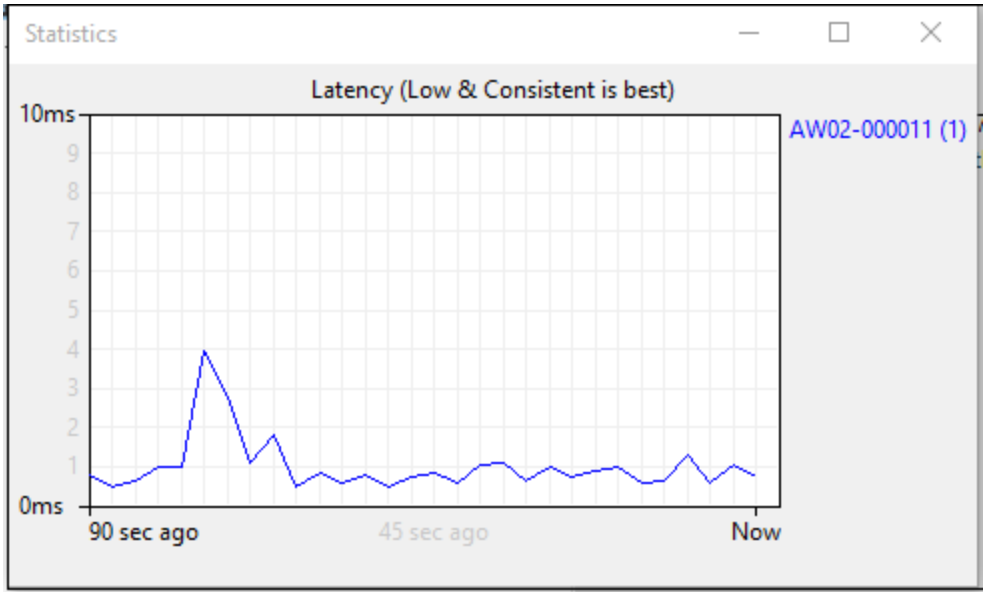
1. Open the **AnywhereUSB Manager**.
2. Select **Help > Latency graph** to display the latency graph.




## Stop and start the AnywhereUSB Manager Windows service

If you have installed the **AnywhereUSB Manager** in service mode, you may need to stop and restart the Digi AnywhereUSB Manager service.

### *Stop the service*

When the Digi AnywhereUSB Manager service is stopped, you cannot access the **AnywhereUSB Manager**.

1. In the Windows search field, enter: **services.msc**
2. The **Services** dialog displays. Scroll through the list to find the Digi AnywhereUSB Manager service.
3. Right-click on the service to display the shortcut menu, and click **Stop**. The **Status** for the service becomes blank.

### *Start the service*

1. In the Windows search field, enter: **services.msc**
2. The **Services** dialog displays. Scroll through the list to find the Digi AnywhereUSB Manager service.
3. Right-click on the service to display the shortcut menu, and click **Start**. The **Status** for the service changes to **Running**.

## Stop and start the Linux headless AnywhereUSB Manager

If you have installed the Linux headless **Manager**, you may need to stop and restart it.

**Stop the headless Manager**

Stopping the headless manager can take up to one minute, depending whether the **Manager** is connected to USB devices.

```
$ anywhereusb-headless stop
```

**Start the headless Manager**

```
$ anywhereusb-headless
```

**Note** To start the awusbmanager-headless at boot, you will need to create and add a **systemd** startup script.

## Power loss and Hub configuration

The Hub retains its configuration if power is lost and then power is restored when the Hub is plugged into a main power supply, or if the device is commanded to restart automatically or interactively.

## Exit the AnywhereUSB Manager

You can log out of the AnywhereUSB Manager close the dialog.

1. Open the **AnywhereUSB Manager**.
2. Click **File > Exit** to disconnect all USB devices connected to your computer, close all connections, and close the **AnywhereUSB Manager**.
3. If you are connected to any USB devices, a confirmation dialog appears.

4. Click **Yes** to exit the **AnywhereUSB Manager**.

## Power cycle feature

You can cycle the power to the devices connected to an AnywhereUSB Hub using one of the following methods. When the power is cycled, the power is turned off for 1 second and then turned back on.

Review the details of each method to determine which one you can use cycle the power.

| Power cycle action | User type | | Tool | | |
|---|---|---|---|---|---|
| | Admin | Non-Admin | Web UI | AnywhereUSB Manager Service Mode | AnywhereUSB Manager Standalone Mode |
| Cycle the power to all of the devices connected to one selected port.<br>See Cycle the power to a port on a Hub from the web UI. | X | | X | | |
| Cycle the power to one selected device.<br>See Cycle the power to a USB device connected to the Hub from the AnywhereUSB Manager. | X | | | X | |
| | X | X | | | X |
| Cycle the power to all devices in a group on a disconnect. Enabled by default.<br>See Cycle the power to a device when it disconnects from a PC.<br>To disable this feature:<br>See Disable the power cycle on disconnect feature. | Automatic if Enabled | | | | |
| | X | | X | | |
| Disconnects happen when: | | | | | |
| ▪ A device is manually disconnected from the **Manager** | X | | | X | |
| | X | X | | | X |
| ▪ A group is manually disconnected from the Hub | X | | | X | |
| | X | X | | | X |

| Power cycle action | User type | | Tool | | |
|---|---|---|---|---|---|
| | Admin | Non-Admin | Web UI | AnywhereUSB Manager Service Mode | AnywhereUSB Manager Standalone Mode |
| ■ PC and/or Hub reboots | Automatic if Enabled | | | | |
| ■ PC and/or Hub loses connection to the network | Automatic if Enabled | | | | |

## Cycle the power to a USB device connected to the Hub from the AnywhereUSB Manager

This feature enables you to cycle the power to a selected USB device from the **AnywhereUSB Manager**.

The USB device can be connected directly to the AnywhereUSB Hub or to a downstream USB hub. Cycling the power has the same effect as removing the USB device from the Hub and then reconnecting it. When you use this feature, the power supplied by the port to the USB device is turned off for 1 second and then turned on. The USB device you choose to power cycle must be assigned to a group that you are allowed to access.

If an externally powered USB device (one that is not powered by the Hub) is connected to the Hub, the power cycle feature may have no effect on the USB device.

**Note** You can also cycle the power to a selected USB device using the power cycle CLI command.

**Note** Additional power cycle methods are available. See Power cycle feature.

1. Open **AnywhereUSB Manager**.
2. Expand the Hub and group to which the USB device is connected.
3. Right-click on the USB device and click **Power Cycle Device**. The power supplied to the port to the USB device is turned off for 1 second and then turned on.

## Cycle the power to a port on a Hub from the web UI

This feature enables you to power cycle a port on an AnywhereUSB Hub from the web UI.

When you power cycle the port, the port is powered off for 1 second and then powered on.

If a USB device is connected to the port, the USB device is powered off and then powered back on, which has the same effect as removing the USB device from the Hub and then reconnecting it.

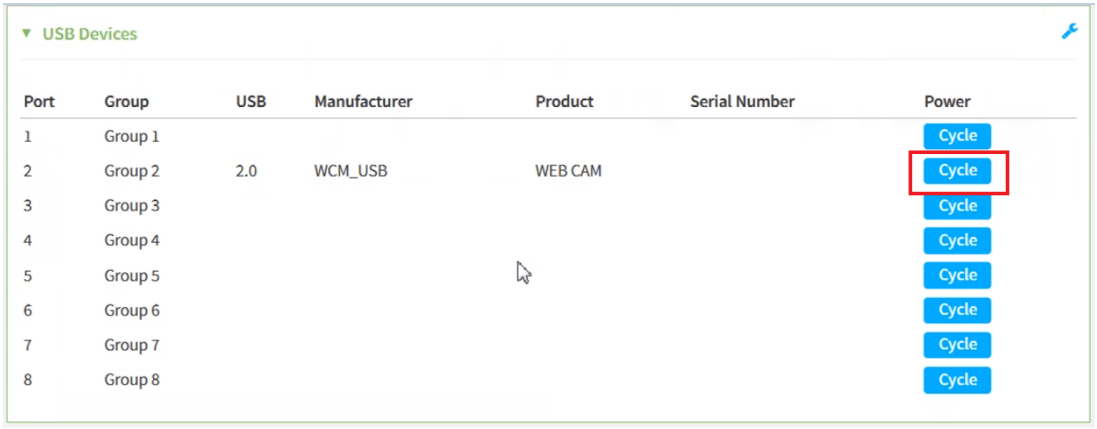
If an externally powered USB device (one that is not powered by the Hub) is connected to the Hub, the power cycle feature may have no effect on the USB device.

**Note** You can also power cycle a port using the powercycle port CLI command.

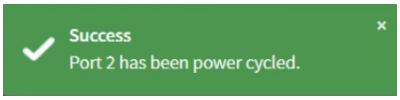
**Note** Additional power cycle methods are available. See Power cycle feature.

1. Open the web UI.
2. Click **Status** > **AnywhereUSB**. The **AnywhereUSB Status** page displays.

3. Expand **USB Devices**.
4. Click **Cycle** for the port that you want power off and then on.




5. When the power cycle is complete, a success message displays.




## Cycle the power to a device when it disconnects from a PC

The power cycle on disconnect feature cycles the power to each USB device when it disconnects from a PC. The power is turned off for 1 second and then turned on. This is useful for security devices that may refuse to reconnect to a PC without a power cycle, virtual machines that reboot, and devices left in an unexpected state.

This feature is globally enabled by default on the Hub. You can choose to globally disable it.

**Note** This feature is disabled by default on the AnywhereUSB Plus 24 variant without Wi-Fi. If your device has a serial number greater than or equal to AW24-010000, this feature can be enabled. Otherwise, the feature does not work as expected and should not be enabled.

When a disconnect occurs, the Hub turns off power to the device and then one second later turns it back on. The re-powered device is then ready to make a new connection to the same or a different PC. Note that if the PC is connected to the group, the USB device can only reconnect to that same PC.

Disconnects happen when:

- A device is manually disconnected from the PC.
- From the **AnywhereUSB Manager**, expand a Hub to display the groups connected to the PC. Right-click on a device in a group and select **Disconnect Device** to disconnect the device from the PC. This menu option is not available if a PC is not connected to the group. The power to the device is cycled and the device reconnects to the same PC.
- A group of devices is disconnected from the Hub

  From the **AnywhereUSB Manager**, expand a Hub to display the groups. Right-click on a group and select **Disconnect from Group**. The power to all of the USB devices in the group is cycled and the group waits to be connected to the same or a different PC.

- PC and/or the Hub reboots

  If the PC and/or the Hub reboots, then after the keepalive timeout occurs, all of the USB devices that were connected to that PC are power cycled.

- PC and/or the Hub loses connection to the network

  If the PC and the Hub lose network connectivity, then the USB devices that were connected to that Hub are power cycled if the connectivity is not restored before the keepalive timeout occurs. The groups are then ready to connect to the same or a different PC.

**Considerations**

The following examples explain situations in which this feature does not work as expected.

- If you have self-powered USB devices, then this feature will not be able to power cycle this device. An example is a hard drive with a power cord plugged into a power source other than the Hub.
- If you have devices connected on a downstream USB hub and the hub does not support USB power control, then the feature will not cycle those devices.

**Note** Additional power cycle methods are available. See Power cycle feature.

### *Disable the power cycle on disconnect feature*

The power cycle on disconnect feature is globally enabled by default on the Hub. You can choose to globally disable this feature if desired.

When enabled, the power is cycled by default to each USB device when the device disconnects from a PC.

**Note** This feature is disabled by default on the AnywhereUSB Plus 24 variant without Wi-Fi. If your device has a serial number greater than or equal to AW24-010000, this feature can be enabled. Otherwise, the feature does not work as expected and should not be enabled.

**Note** You can also disable this feature using the power_cycle_on_unbind CLI command.

1. Open the web UI.
2. Select **System** > **Device Configuration** > **Services** > **AnywhereUSB**.
3. Expand **Power cycle on disconnect**. The feature is enabled by default.
4. Click **Enable** to disable the feature.
5. Click **Apply** to save the changes.

# Configure and manage the AnywhereUSB Hub in the web user interface

You can configure the AnywhereUSB Hub from the web user interface. You can access the web UI from the **AnywhereUSB Manager** or from a browser window. See Open the web UI to manage the AnywhereUSB ports.

## AnywhereUSB Configuration page

The **AnywhereUSB Configuration** page consists of all configuration options related to a AnywhereUSB Hub.

To access this page, open the web UI and click **System** > **Configuration** > **AnywhereUSB Configuration**.

### Service Settings

Click **Service Settings** to expand this section.

| Item | Description |
|---|---|
| **Enable** | Click **Enable** to enable the AnywhereUSB service. |
| **Port** | Specify the port number that is used to access the Hub. The default value is 18574. If you change the port number you must also change the corresponding port number on your computer. |
| **Enable USB debug logging** | Select this option to enable USB debug logging. This feature should only be used when working with Digi Technical Support to debug an issue. |

### Group Settings

Click **Group Settings** to expand this section. In this section you can name groups and assign USB ports to the groups.

For instructions, see Step 3: Name groups and assign ports to a group.

| Item | Description |
|---|---|
| **Group Description** | A free-form description of a group. You can type over the default description.<br>One row displays for each group, and 2 groups are available.<br>The **Unassigned** group row is used for any port that is not assigned to a group. |

| Item | Description |
|---|---|
| **Port Assignments** | Specify the USB ports in each group. Each port on a Hub can be assigned to only one group. Ports that are not assigned to a group can be put in the **Unassigned** group. |

**Client Settings**

Click **Client Settings** to expand this section and display information about the clients that can connect to the Hub.

For more information, see Configure and manage client IDs.

| Item | Description |
|---|---|
| **Select a client to configure** | Select the existing client that you want to update or remove.<br>■ **Edit**: Click **Edit** to update the selected client.<br>■ **Remove**: Click **Remove** to remove the selected client. |
| **Client ID** | The client ID is a unique identifier assigned to a user account the first time a user logs in to a computer and opens the **AnywhereUSB Manager**. During this process, the **AnywhereUSB Manager** creates a secure identity certificate that is associated with the client ID. This certificate is used to validate your user account with the Hub.<br>See Configure and manage client IDs. |
| **Certificate** | The status of the certificate associated with the client ID. This certificate is used to validate your user account with the Hub. The **Certificate** value is **Unavailable** until certificates have been exchanged between the computer and the Hub. After this occurs, the **Certificate** value is updated to **Available**.<br>See Configure a client ID. |
| **Description** | A free-form description of the client. |
| **Group Access** | The groups that this client is allowed to access. The USB ports in the group can be accessed by this user account.<br>See Configure a client ID. |
| **Add Client** | Click **Add Client** to manually add a new client ID.<br>See Manually add a client ID. |
| **Automatically Register Unknown Clients** | This feature is not currently implemented. |
| **Group Access** | This section is related to the **Automatically Register Unknown Clients** option, which is not currently implemented. |

## AnywhereUSB Status page

The **AnywhereUSB Status** page contains status information about the USB devices and groups connected to the AnywhereUSB Hub.

You can access this page in two ways from the web UI:

- Click **Dashboard**, and then click **Show Details** in the **AnywhereUSB Service** pane.
- Click **Status** > **Services** > **AnywhereUSB**.

### USB Devices

Click **USB Devices** to expand this section and display information about the USB devices connected to the AnywhereUSB Hub.

| Item | Description |
|---|---|
| configuration icon | Click the (configuration) icon in the upper right corner of the page to access the **AnywhereUSB Configuration** page. See AnywhereUSB Configuration page for more information. |
| **Port** | The number of the USB port to which the USB device is connected. |
| **Group** | The group to which the USB port is assigned. |
| **USB** | The USB technology of the connected device. |
| **Manufacturer** | Name of the USB device manufacturer, if supplied by the device. |
| **Product** | Name of the USB product, if supplied by the device. |
| **Serial number** | The serial number of the USB device, if supplied by the device. |
| **Cycle** button in **Power** column | Click **Cycle** to power off the port for 3 seconds, and then power it back on. For more information, see Cycle the power to a port on a Hub from the web UI. |

### Groups in Use

Click to expand this section and display information about the groups connected to the AnywhereUSB Hub.

| Item | Description |
|---|---|
| configuration icon | Click the (configuration) icon in the upper right corner of the page to access the **AnywhereUSB Configuration** page. See Configure and manage the AnywhereUSB Hub in the web user interface for more information. |
| **Group** | The group to which the client has connected or an **AnywhereUSB Manager**. See Connect to a group or USB device in the AnywhereUSB Manager. |
| **Description** | The description of the group. |
| **Client ID** | The unique identifier of the client that has connected to this group. For more information, see Client ID overview. |

| Item | Description |
|---|---|
| **IP Address** | The network address of the client's computer. |

**Client Connections**

Click to expand this section and display information about the **AnywhereUSB Managers** connected to the AnywhereUSB Hub. This display does not include any **Managers** that are attempting to connect.

| Item | Description |
|---|---|
| configuration icon | Click the (configuration) icon in the upper right corner of the page to access the **AnywhereUSB Configuration** page. See Configure and manage the AnywhereUSB Hub in the web user interface for more information. |
| **Client ID** | The unique identifier of the client that has connected to this group. For more information, see Client ID overview. |
| **IP Address** | The network address of the client's computer. |
| **Status** | The current connection status. |
| **Groups** | The groups to which the client has connected. See Connect to a group or USB device in the AnywhereUSB Manager. |

**Blocked Client**

Click to expand this section and display a list of the client IDs that are currently blocked.

In the **Block a Client** section, you can block a client ID from connecting to a device group or groups.

| Item | Description |
|---|---|
| **Client ID** | A client ID that is currently blocked. |
| **Blocked Groups** | The number of groups from which the client ID is blocked. |
| **Expiration** | The remaining time for the block. |
| **Unblock** | When a client ID is blocked, the **Unblock** button displays. Click **Unblock** to remove the block before the default time period. For more detailed information, see Unblock a client ID. |
| configuration icon | Click the (configuration) icon in the upper right corner of the page to access the **AnywhereUSB Configuration** page. See AnywhereUSB Configuration page for more information. |

**Block a Client section**

The fields and options in this section are used to block a client ID. For more detailed information, see Block a client ID.

| Item | Description |
|---|---|
| **Client ID** | From the **Client ID** list box, select the client ID that you want to block. |
| **Block Groups** | Select the group(s) that you want to block for the client ID. All of the groups are selected by default.<br>You can enter the groups in the **Block Groups** field, or click on a group from the group options below the field to deselect it. |
| **Apply** | Click **Apply** to the block the selected client ID from the selected group(s). |

**Debug Logging**

Click **Debug Logging** to expand this section and access the **USB Debug Logging Wizard**.

| Item | Description |
|---|---|
| **Debug Logging Wizard** | Click Debug Logging Wizard to launch the **USB Debug Logging Wizard**. See Create a debug log file with the USB Debug Logging Wizard. |

## Open the web UI to manage the AnywhereUSB ports

You can open the web user interface to configure the USB ports on the Connect EZ 16/32 from the **AnywhereUSB Manager** or the Connect EZ 16/32 web UI.

### *Open the web UI from the AnywhereUSB Manager*

1. Open the **AnywhereUSB Manager**.
2. Expand **AnywhereUSB Hubs** to display the Hub.
3. Right-click on the Hub to display the shortcut menu.
4. Click **Open Web UI**.
   - If you are currently logged into the Connect EZ 16/32, the web UI **Dashboard** displays.
   - If you are not currently logged into the Connect EZ 16/32, the login page displays. Enter the device's user name and password and click **Login**. The web UI **Dashboard** displays.

### *Open the web UI from a browser window*

Before you begin, make sure you know the following information.

- IP address for the Connect EZ 16/32
- User name and password for the Connect EZ 16/32

To open the web UI from a browser window:

1. Open a browser window.
2. Enter the IP address for the Connect EZ 16/32. A login screen displays.

3. Enter the user name and password.
4. Click **Login**. The web UI **Dashboard** displays by default.

## Rename a Hub and the groups in a Hub

A default name is assigned to an AnywhereUSB Hub and to the groups in the Hub. These names are associated with the physical Hub and groups on the Hub, and can be changed in the web user interface.

**Note** A USB device does not have a name that can be changed. However, a local name can be assigned to a USB device in the **AnywhereUSB Manager**. See Assign a local name to a USB device.

The default Hub name and group name can be seen by every user that connects to the Hub. You can also give a Hub and groups a local name that can be see only by the user that assigns the name. See Assign a local name to a Hub and Assign a local name to a group.

**Note** Only administrators can rename the Hubs and the groups.

- Rename the AnywhereUSB Hub
- Rename a group

### *Rename the AnywhereUSB Hub*

You can rename the AnywhereUSB Hub in the **Ethernet Network Configuration** page.

**Note** The name can consist of the following characters: 0-9, A-Z, a-z, dash (-), or period (.). You cannot use spaces, underscores (_), comma (,), forward slash (/), or ampersand (&).

1. Open the web UI.
2. Select **System** > **Configuration** > **Device Configuration**.
3. Expand **System**.
4. In the **Name** field, enter a descriptive name for the Hub. The name cannot have spaces or underscores.
5. Click **Apply**.

### *Rename a group*

You can rename a group in the **AnywhereUSB** page in the web UI.

By default, a group is named "Group" appended by a consecutive number, such as Group 1. The group name displays in the **Group Name** field in the Group Status pane in the **AnywhereUSB Manager**.

1. Open the web UI.
2. Select **System** > **AnywhereUSB Configuration**.
3. Expand **Group Settings**.
4. Enter a new name for a group in the desired **Group Description** field.
5. Click **Apply** to save the changes.

## Configure and manage client IDs

The client ID is a unique identifier assigned to a user account the first time a user logs in to a computer and opens the **AnywhereUSB Manager**. During this process, the **AnywhereUSB Manager** creates a secure identity certificate that is associated with the client ID. This certificate is used to validate your user account with the Hub. For more information, see Client ID overview.

**Manage the client IDs**

For each Hub, you can view a list of client IDs that are allowed to connect to the Hub. You can manually add client IDs or choose to automatically add client IDs to the list.

**Note** You can have up to 255 client IDs in the client list.

**Assign client IDs to USB ports on the Hub**

The client IDs are assigned to groups of USB ports on the Hub. When a computer connects to a group in the **AnywhereUSB Manager**, the computer has access to all of the ports in the group and the devices connected to those ports. No other computer is allowed to access any of the devices in the group. A computer can connect to more than one group at a time.

- Configure a client ID
- Manually add a client ID
- Remove a client ID
- Automatically register or reject unknown clients
- Client ID overview

### *Configure a client ID*

You can assign a descriptive name to a client ID in the client list, and update the groups the client ID is allowed to access. The client ID can access all of the ports in the specified groups, as defined in the Group Settings section.

**Note** If needed, you can also add additional client IDs to the list.

1. Open the web UI.
2. Select **System** > **Configuration** > **AnywhereUSB Configuration**. The **AnywhereUSB Configuration** page appears.
3. Expand the **Client Settings** section.
4. From the client list, select the client ID that you want to configure. Information about the selected client ID displays in the **Settings for Client** section.
5. Click **Edit**.
6. In the **Description** field, enter a descriptive name for the client ID.
7. Click the check box next to a group to which the computer is allowed access. As you select groups, the selected group numbers appear in the **Group Access** field in the **Settings for Client** section. You can also manually enter group numbers in the **Group Access** field.

   **Note** The **Certificate** value is **Unavailable** until certificates have been exchanged between the computer and the Hub. After this occurs, the **Certificate** value is updated to **Available**.

8. Click **Apply** to save the changes.

### Manually add a client ID

You can manually add client IDs to the client list. When a computer searches for Hubs, any computer with a client ID on the client list can connect to the Hub.

**Note** You can have up to 255 client IDs in the client list.

After you have added a client ID, the certificate is unavailable until the first time a computer with the new client ID connects to the Hub. For more information about client IDs, see Client ID overview.

When the computer connects to the Hub for the first time, the credentials are exchanged between the computer and the Hub. After the initial connection, only that computer with the client ID and unique identity certificate is able to connect to the Hub. Any other computer with the same client ID will be rejected. For information about computers with the same client ID, see AnywhereUSB Manager client ID is not unique.

**WARNING!** Digi recommends that you use a private network to connect the computer to the Hub. This ensures that only clients IDs with known user credentials can connect to the Hub. The first time that a client ID on a computer connects to the Hub, the unique credentials for this known user are stored in your Hub. If you do not use a private network, an unknown computer with the same client ID may happen to connect to the Hub before the known computer connects. In this case, the known computer will not be able to connect and authenticate.

**Note** Digi recommends disabling the **Automatically Register Unknown Clients** option if you choose to manually add multiple client IDs to the client list. See Automatically reject unknown clients.

1. Open the web UI.
2. Select **System** > **Configuration** > **AnywhereUSB Configuration**. The **AnywhereUSB Configuration** page appears.
3. Expand the **Client Settings** section.
4. Click **Add Client**. A new row labeled "New Client" is added to the client list and the **Settings for Client** section is populated for the new client.
5. Enter information about the client ID in the **Settings for Client "New Client"** section.
   a. In the **Client ID** field, enter the client ID for the computer.
   b. In the **Description** field, enter a descriptive name for the client ID.
   c. Click the check box next to a group to which the computer is allowed access. As you select groups, the selected group numbers appear in the **Group Access** field in the **Settings for Clients** section.

   **Note** The **Certificate** value is **Unavailable** until certificates have been exchanged between the computer and the Hub. After this occurs, the **Certificate** value is updated to **Available**.
6. Click **Apply**. The client ID is added to the client list.

### Remove a client ID

You can remove a client ID from the client list when a user logged in to a computer should no longer have access to the Hub.

**Note** If you have selected the **Automatically Register Unknown Clients** option, any client ID removed from the list is automatically added to the client list again the next time the computer tries to connect.

1. Open the web UI.
2. Select **System** > **Configuration** > **AnywhereUSB Configuration**. The **AnywhereUSB Configuration** page appears.
3. Expand the **Client Settings** section.
4. In the **Select a client to configure** section, select the client ID you want to remove from the list.
5. Click **Remove**. A confirmation dialog appears.
6. Click **Apply**.

### *Client ID overview*

The client ID is a unique identifier for the computer that you assign when you initially install the **Anywhere USB Manager**. When you launch the **Manager** for the first time and log in, the **Manager** creates a secure identity certificate that is associated with the client ID. This certificate is used to validate your account with the Hub.

- **Stand-alone**: If you installed the **Manager** as a stand-alone, the client ID and the certificate identify the user on the computer.
- **Service**: If you installed the **Manager** as a service, the client ID and the certificate identify the computer.

When the client ID and certificate have been created, the computer is able to connect to the Hubs that recognize that client ID. Any other computer with the same client ID will be rejected.

**Note** In some cases, multiple computers may inadvertently be used by multiple users that have the same client ID. To fix this issue, see AnywhereUSB Manager client ID is not unique.

#### Client ID must be unique

The client ID **must** be unique for every computer or VM (virtual machine). If the same client ID is assigned to more than one computer or VM, and both attempt to connect to the same Hub, the first computer to associate itself with the Hub will be able to connect to the Hub. Subsequent computers will not be able to connect that Hub.

#### Client ID length

The number of characters allowed in the **Client ID** field is variable and is dependent on UTF-8 encoding of the characters. Note that some characters are multi-byte characters, which reduces the number of characters that are allowed in the field. Currently, the **Client ID** field is a maximum of 63 bytes encoded in UTF-8.

#### Assign a client ID to a user account

A client ID is assigned to user credentials the first time a user logs into a computer and launches the **AnywhereUSB Manager**.

**WARNING!** Digi recommends that you use a private network to connect the computer to the Hub. This ensures that only clients IDs with known user credentials can connect to the Hub. The first time that a client ID on a computer connects to the Hub, the unique credentials for this known user are stored in your Hub. If you do not use a private network, an unknown computer with the same client ID may happen to connect to the Hub before the known computer connects. In this case, the known computer will not be able to connect and authenticate.

***Step 1: Create a client ID during initial launch of the AnywhereUSB Manager***

The **AnywhereUSB Manager** can be initially opened by a user in one of the following ways:

- **Installation**: When the AnywhereUSB Hub software is installed, the **Launch AnywhereUSB Manager** option is selected by default. When the installation completes, the client ID confirmation dialog appears. The user enters a client ID, and then the **AnywhereUSB Manager** is automatically launched.

  Note If the user deselects the **Launch AnywhereUSB Manager** option during installation, the **AnywhereUSB Manager** does not automatically open after the installation process completes. In this case, the client ID dialog does not display.

- **New user logs in**: After the AnywhereUSB Hub software is installed, any user can log into that computer and open the **AnywhereUSB Manager**. The first time a new user opens the **AnywhereUSB Manager**, the client ID dialog appears. The user must enter a client ID before the **AnywhereUSB Manager** will open.

After the initial launch of the **AnywhereUSB Manager**, the next time the user logs in, the computer is able to connect to the Hubs that recognize that client ID.

***Step 2: Manually add a client ID to the client ID list in the Hub***

You can manually add a client ID to the client list before a new user launches the **AnywhereUSB Manager** for the first time. In this situation, the certificate is unavailable until the first time a computer with the new client ID connects to the Hub. The new client ID is associated with the credentials for the user currently logged on to the computer.

When the computer connects to the Hub for the first time, the identity certificates are exchanged between the computer and the Hub. After the initial connection, only that computer with the client ID and unique identity certificate is able to connect to the Hub.

## Automatically register or reject unknown clients

In the **AnywhereUSB Configuration** page, you have the choice to automatically register or reject computers that have not previously connected to the Hub. The **Automatically Register Unknown Clients** option is disabled by default, meaning that computers that have not previously connected to the Hub are rejected, and cannot connect to the Hub.

You can enable this feature so that client IDs for an unknown computer are automatically added to the client list for the Hub. When any **AnywhereUSB Manager** starts (stand-alone) or is running as service and the Hub is visible, that **Manager**'s client ID is added to the Hub's configuration.

- Disable (this is the default): Automatically reject unknown clients
- Enable: Automatically register unknown clients

**Additional considerations**

**Specify groups for an automatically registered client**

You can specify the groups which the automatically registered clients can access. By default, when the client connects to the Hub, that user has access to the ports in those groups. If you do not specify groups, the user can connect to the Hub but does not have access to any ports on the Hub until you manually assign groups to that client ID.

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If the auto-register feature is enabled on any network (secure or insecure), be aware that any client that has the **AnywhereUSB Manager** installed is able to connect to the Hub and access all USB devices in the groups that allow access to automatically registered clients.

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**Using this feature on secure and insecure (public) networks**

**Note** This feature is inherently insecure. Digi recommends that you disable the **Automatically Register Unknown Clients** option and manually add client IDs to the list. See Manually add a client ID.

- **Secure network**: If the Hub is on a secure network, you may want to enable this feature for the initial set up, when many clients are connecting to the Hub. Once initial set up is complete, you can disable this feature and then manually add client IDs to the Hub. This method gives you more control over the clients that can connect to the Hub.

  If you choose to not disable this feature after initial set up, any new clients that install the **AnywhereUSB Manager** are able to automatically connect to the Hub.
- **Insecure (public) network**: If the Hub is on an insecure or a public network, you should keep the auto-register feature disabled, to ensure that you have control over the clients that connect to the Hub. This method helps to eliminate access from an unwanted client to your Hub and any devices connected to the Hub.

### *Automatically reject unknown clients*

You can choose to have the Hub automatically reject any client ID that is not on the Hub's registered client list. This is the default.

When you open the **AnywhereUSB Manager**, if the **Manager**'s client ID is not included in the Hub's registered client list, a red X displays next to the Hub name. The client ID is not able to connect to the Hub.

**Note** A red X may display in other situations as well. See Red X icon next to a Hub in the AnywhereUSB Manager.

1. Open the web UI.
2. Select **System** > **AnywhereUSB Configuration**. The **AnywhereUSB Configuration** page appears.
3. Scroll down to the **Client Settings** section. Expand the section if it is not already expanded.
4. Scroll down to the **Settings for Unknown Clients** section.
5. De-select the **Automatically Register Unknown Clients** option so the Hub rejects any client ID that is not on the Hub's registered client list. In this case, a red X displays next to the name of the Hub in the **AnywhereUSB Manager**.
6. Click **Apply** to save the changes.

### Automatically register unknown clients

When you enable the **Automatically Register Unknown Clients** feature, any client that has the **AnywhereUSB Manager** can automatically connect to your Hub. When this happens, the client ID is added to the Hub's client list in the Hub's configuration.

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**Note** This feature is inherently insecure. Digi recommends that you disable the **Automatically Register Unknown Clients** option and manually add client IDs to the list. See Manually add a client ID.

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To confirm that a client ID has been added automatically, you can review the client ID list.

**Specify groups for an automatically registered client**

You can specify the groups which the automatically-registered clients can access. If you do not specify groups in the auto-register feature, you can manually configure group access to the client.

By default, the client will have access to the ports in the groups specified in the **Group Access** field. To ensure that the automatically registered clients are given access to the desired ports, you should verify which ports are assigned to each group.

If needed, you can change the groups for the client in the Hub configuration after the client ID has been registered.

1. Open the web UI.
2. Select **System** > **AnywhereUSB Configuration**. The **AnywhereUSB Configuration** page appears.
3. Scroll down to the **Client Settings** section. Expand the section if it is not already expanded.
4. Scroll down to the **Settings for Unknown Clients** section.
5. Enable **Automatically Register Unknown Clients**.
6. Determine whether groups should automatically be assigned to the automatically registered users.

   Click the check box next to the group(s) to which the computer is allowed access. As you select groups, the selected group numbers appear in the **Group Access** field in the

   **Settings for Unknown Clients** section. You can also manually enter group numbers in the **Group Access** field.

   ---

   **Note** If you do not specify groups you can manually give that client access to selected groups after they have been registered with the Hub. See Configure a client ID.

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7. Click **Apply** to save the changes.

## Block a client ID from connecting to groups

You can temporarily block a client ID from connecting to a group or a set of groups for a specified time period. This allows a different client ID to access the devices in a group.

For example, User A has left work for the day, and remains connected to a group that User B needs to access. The Hub administrator can block the User A's client ID from the group that is needed by User B. User A is disconnected from the group, which allows User B to connect.

**Blocking a client ID**

When you apply a block to a group or groups, the client ID is automatically disconnected from the devices in the group(s). During the block time period, the client ID can't manually reconnect to the devices in the blocked group, and auto-connect is suspended. This enables another client ID to connect to the group(s).

When the blocked time period limit is reached or if the client ID is manually unblocked, and if no other client ID has connected to the group, any group that has auto-connect enabled automatically reconnects and the client ID is able to use the devices in those groups. The client ID can also manually reconnect to devices in the previously blocked groups.

### Block a client ID

You can temporarily block a client ID from being able to connect to the devices in a group or a set of groups. This feature is useful if you need to control which client IDs can access the devices in a group or groups. The client ID is blocked for the default time period.

When you apply a block, the client ID is automatically disconnected from the devices in the group(s) selected for the block. During the block time period, the client ID can't manually reconnect to the devices in the blocked group, and auto-connect is suspended. Another client ID can connect to the group during the block time period.

You can block a client ID that is already blocked. Any existing block is replaced by the new block, and the default block time period starts over. This is useful if you need to change the groups included in the block or if you need to extend the block time period.

**Note** Only a Hub administrator can access the **AnywhereUSB Status** page and block a client ID.

1. Open the web UI.
2. Select **Status** > **Services** > **AnywhereUSB**. The **AnywhereUSB Status** page displays.
3. (Optional) Expand the **Groups in Use** section to review the groups used by each client ID.
4. Expand the **Blocked Clients** section.
5. From the **Client ID** list box, select the client ID that you want to block.
6. Select the group(s) that you want to block for the client ID. All of the groups are selected by default.

   To change the default list of groups, enter the desired groups in the **Block Groups** field, or click on a group from the group options below the field to deselect it.
7. Click **Apply** to block the selected client ID from the selected group(s).
   - The **Blocked Clients** section is updated to display the blocked client ID in the blocked client list.
   - The **Groups in Use** section is updated to show that the client ID is no longer connected to the blocked groups.
   - In the **AnywhereUSB Manager**, the message **Temporarily Blocked** displays as the group **Status** in the status pane. See AnywhereUSB Manager Group Status pane.

### Unblock a client ID

You can unblock a client ID before the default block client ID time limit is reached.

When a client ID is unblocked, any group that has auto-connect enabled automatically reconnects. The client ID can also manually reconnect to devices in the previously blocked groups.

**Note** Only a Hub administrator can access the **AnywhereUSB Status** page and unblock a client ID.

1. Open the web UI.
2. Select **Status** > **Services** > **AnywhereUSB**. The **AnywhereUSB Status** page displays.
3. Expand the **Blocked Clients** section.

4. In the **Client ID** list, find the the client you want to unblock and click **Unblock** in that row. The client ID is removed from the list of blocked clients.

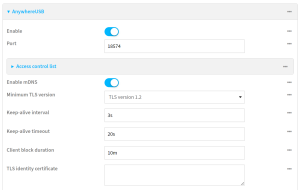
### Configure the block client ID time limit

You can configure the default time limit for the client ID block. The default is 10 minutes.

When you apply a block, the client ID is automatically disconnected from the devices in the group(s) for the default time period. The client ID can't manually reconnect to the devices in the blocked group, and auto-connect is suspended.

When the blocked time period limit is reached, any group that has auto-connect enabled automatically reconnects. The client ID can also manually reconnect to devices in the previously blocked groups.

1. Open the web UI.
2. Select **System** > **Configuration** > **Device Configuration** > **Services** > **AnywhereUSB**.



3. In the **Client block duration** field, enter the default time period.
   - Default: 10 minutes
   - Maximum: 100 hours
   - Minimum: 30 seconds
4. Click **Apply** to save the changes.

## View Hub system information

You can view current status information about the Hub in the **Dashboard**. This page appears by default when you launch the web UI.

1. Open the web UI.
2. In the **AnywhereUSB Service** pane, click **Show Details** to display additional information in the AnywhereUSB Status page.

#### USB Devices

Click **USB Devices** to expand this section and display information about the USB devices connected to the AnywhereUSB Hub.

| Item | Description |
|---|---|
| configuration icon | Click the (configuration) icon in the upper right corner of the page to access the **AnywhereUSB Configuration** page. See AnywhereUSB Configuration page for more information. |
| **Port** | The number of the USB port to which the USB device is connected. |

| Item | Description |
|---|---|
| **Group** | The group to which the USB port is assigned. |
| **USB** | The USB technology of the connected device. |
| **Manufacturer** | Name of the USB device manufacturer, if supplied by the device. |
| **Product** | Name of the USB product, if supplied by the device. |
| **Serial number** | The serial number of the USB device, if supplied by the device. |
| **Cycle** button in **Power** column | Click **Cycle** to power off the port for 3 seconds, and then power it back on. For more information, see Cycle the power to a port on a Hub from the web UI. |

**Groups in Use**

Click to expand this section and display information about the groups connected to the AnywhereUSB Hub.

| Item | Description |
|---|---|
| configuration icon | Click the (configuration) icon in the upper right corner of the page to access the **AnywhereUSB Configuration** page. See Configure and manage the AnywhereUSB Hub in the web user interface for more information. |
| **Group** | The group to which the client has connected or an **AnywhereUSB Manager**. See Connect to a group or USB device in the AnywhereUSB Manager. |
| **Description** | The description of the group. |
| **Client ID** | The unique identifier of the client that has connected to this group. For more information, see Client ID overview. |
| **IP Address** | The network address of the client's computer. |

**Blocked Client**

Click to expand this section and display a list of the client IDs that are currently blocked.

In the **Block a Client** section, you can block a client ID from connecting to a device group or groups.

| Item | Description |
|---|---|
| **Client ID** | A client ID that is currently blocked. |
| **Blocked Groups** | The number of groups from which the client ID is blocked. |

| Item | Description |
|---|---|
| **Expiration** | The remaining time for the block. |
| **Unblock** | When a client ID is blocked, the **Unblock** button displays. Click **Unblock** to remove the block before the default time period. For more detailed information, see Unblock a client ID. |
| configuration icon | Click the (configuration) icon in the upper right corner of the page to access the **AnywhereUSB Configuration** page. See AnywhereUSB Configuration page for more information. |

**Block a Client section**

The fields and options in this section are used to block a client ID. For more detailed information, see Block a client ID.

| Item | Description |
|---|---|
| **Client ID** | From the **Client ID** list box, select the client ID that you want to block. |
| **Block Groups** | Select the group(s) that you want to block for the client ID. All of the groups are selected by default. You can enter the groups in the **Block Groups** field, or click on a group from the group options below the field to deselect it. |
| **Apply** | Click **Apply** to the block the selected client ID from the selected group(s). |

**Debug Logging**

Click **Debug Logging** to expand this section and access the **USB Debug Logging Wizard**.

| Item | Description |
|---|---|
| **Debug Logging Wizard** | Click Debug Logging Wizard to launch the **USB Debug Logging Wizard**. See Create a debug log file with the USB Debug Logging Wizard. |

## Configure device identity settings

You can configure the device description, contact, and location information for the Hub in the **Configuration** page. This feature is useful to identify a specific Hub when working with a large number of Hubs in multiple locations. See Configure system information.

## View current connections to the Hub

You can view information about current connections to the Hub in the **AnywhereUSB Status** page. For more information, see AnywhereUSB Status page.

1. Open the web UI.
2. Select **Status** > **Services** > **AnywhereUSB**. The **AnywhereUSB Status** page appears.
   - **USB Devices**: Expand the **USB Devices** section to display information about the devices connected to the Hub.
   - **Client Connections**: Expand the **Client Connection** section to display information about the computers connected to the Hub.

## Manually configure the PC and assign an IP address to a Hub

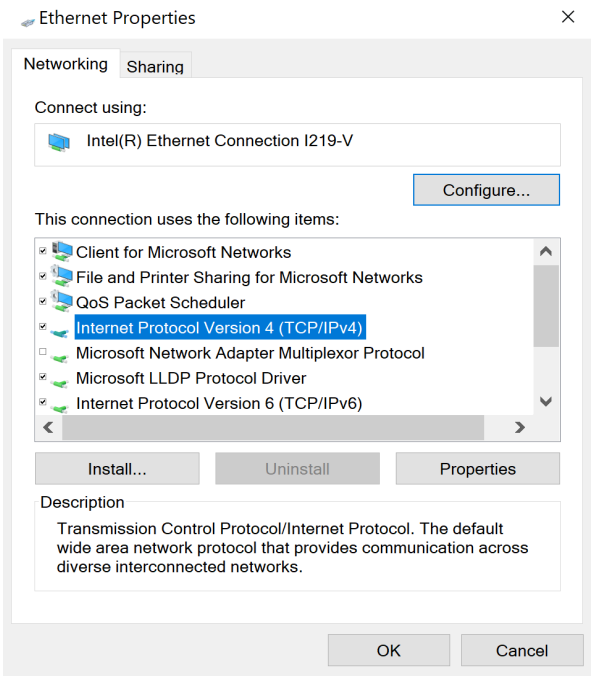
You can manually assign an IP address to the Hub. You would need to do this when your computer and the Hub are both connected to a private network and you do not have a DHCP server.

### Prerequisites

- Access to the Hub from your computer using one of these options:
  - An Ethernet cable must be connected to the Hub and your computer.
  - Both your computer and Hub must be connected to your private network.
- A power supply must be connected to the Hub and the Hub powered on.
- Determine the IP address that you want to assign to the Hub.

To configure your laptop and assign an IP address to the Hub:

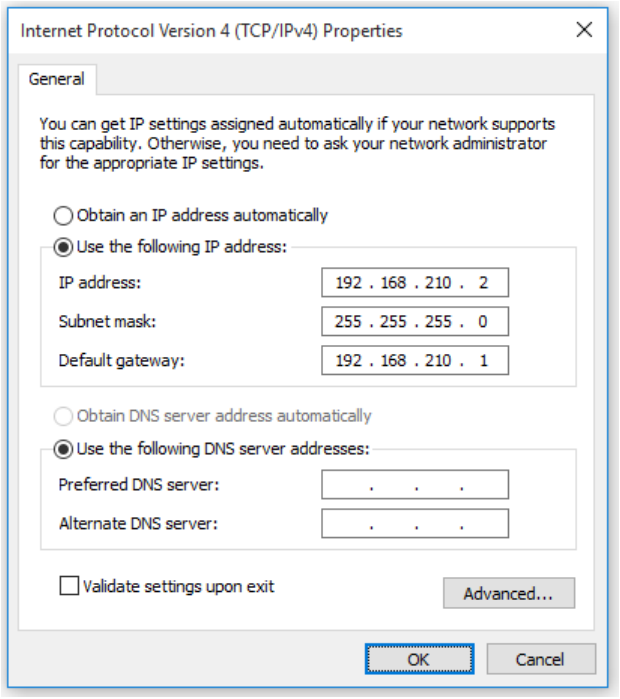
1. On your PC, navigate to the Ethernet network settings dialog.
2. Click the **Internet Protocol Version 4 (TCP/IPv4)** parameter.




3. Click **Properties**. The **Internet Protocol Version 4 (TCP/IPv4) Properties** dialog appears.
4. Select **Use the following IP address**.

**Note** **IMPORTANT**: Make note of the current IP address entries for **IP address**, **Subnet mask**, and **Default gateway**. You will need this information to complete the final step of the process.

5. Configure with the following details:
   - **IP address** for PC: 192.168.210.2
   - **Subnet**: 255.255.255.0
   - **Gateway**: 192.168.210.1




6. Click **OK**.
7. Open a browser window.
8. Enter the default gateway IP address to access the Hub: **192.168.210.1**. The Hub login screen displays.
9. Log into the Hub using the default user name and password. The default user name is **admin** and the default password is printed on the bottom label of the device and on the loose label included in the package. If the defaults to not work, they may have been changed. Confirm this information with your system administrator.
10. Update the IP address for the device.
11. On your PC, revert the IP address information to the original entries.
    a. Return to the **Internet Protocol Version 4 (TCP/IPv4) Properties** dialog.
    b. Enter the original IP address entries for **IP address**, **Subnet mask**, and **Default gateway**.
    c. Click **OK**.

## Create a debug log file with the USB Debug Logging Wizard

You can use the **USB Debug Logging Wizard** to help you collect debug logs when you are having issues with a USB device connected to a Hub. When the wizard process is complete, you can send the debug logs to Digi Technical Support.

**Note** You should create a debug log file only at the direction of Digi Tech Support.

During the process, the **Enable USB debug logging** option is temporarily enabled to allow USB debug logging. When the wizard is completed, the option is disabled. For information about this option, see AnywhereUSB Configuration page.

During the process, two log files are created, and you should send both of these to Digi Tech Support.

- **USB Debug Log**: The USB debug log file is created by running the **USB Debug Logging Wizard** from the Hub's web UI: **usbtrace.tar.gz**
- **AnywhereUSB Manager Support Log**: The support log is created from the **AnywhereUSB Manager**: **awusbmanager_support.bin**.

**Note** The location of the saved files displays in a dialog after the files have been completed and downloaded. The file is overwritten each time you create a new log file. If you want to save a file before it is overwritten, rename the file or move it to a different location.

### *Step 1: Prepare the Hub*

In this step, you prepare the Hub to collect the debug log.

1. Physically unplug all of the USB devices connected to the Hub.

   **Note** Be sure to note which USB device(s) are currently plugged into which USB port(s) of the Hub as you unplug the devices. This ensures that you can plug each device into the same USB port when the testing procedure is complete.

2. Reboot the Hub. This ensures that the log files are as helpful as possible.

### *Step 2: Run the USB Debug Logging Wizard*

This step explains how to run the **USB Debug Logging Wizard** to create both of the debug log files that you will send to Digi Tech Support.

1. Open the web UI.
2. Click **Status** > **Services** > **AnywhereUSB**. The **AnywhereUSB Status** page displays.
3. Click **Debug Logging Wizard** to display the **USB Debug Logging Wizard** page.
4. Click **Next** three times through three pages and review information about preparing your Hub, which you completed in Step 1.
5. Click **Start Logging** to start collecting debug logging information. The **Debug logging has been started** page displays.
6. Connect to the Hub the fewest USB devices that are needed to reproduce the issue.
7. Open the AnywhereUSB Manager and connect to the groups that allow you to access the USB ports you are using for debug logging.
8. Use the USB devices connected to the Hub and recreate the issue you want to debug.
9. When the issue with the Hub occurs, quickly perform these tasks:
   a. IMMEDIATELY click **Stop Logging** to stop the USB debug logging.
   b. Manually note the time of the occurrence using a wall clock. You will share that information with Dig Tech Support in Step 3.

c. Quickly create a support file from the **AnywhereUSB Manager**.
   - Choose **Help** > **Create Support File**. The support file is created: **awusbmanager_support.bin**
   - When complete, a dialog displays, showing you the location of the file. Make a note of the file location and click **OK** to close the dialog.

10. Download the debug logging file from the **USB Debug Logging Wizard**.
    a. Click **Next** to move to the next page of the **USB Debug Logging Wizard**.
    b. Click **Download Logs** to download the debug log file: **usbtrace.tar.gz**
11. Click **Next** in the **USB Debug Logging Wizard** to review the final instructions. You will do these in Step 3.
12. Click **Finish** to close the **USB Debug Logging Wizard**.
13. Copy the files created in step 9 (support file from the **Manager**) and step 10 (debug log file from the **USB Debug Logging Wizard**) to a known location.

### *Step 3: Send log files to Digi Tech Support and reconnect USB devices to your Hub.*

1. Navigate to the known location where you saved the log files.
2. Combine the **usbtrace.tar.gz** and **awusbmanager_support.bin** files into a .zip file.
3. Email the zipped file to Digi Technical Support.
   a. From the Digi Tech Support case documenting the issue, open an email reply to Digi Technical Support.
   b. In the body of the email, enter the wall clock time of the occurrence that you just collected and your time zone.
   c. Attach the .zip file.

      If the resulting .zip file is too large for email, the Digi Tech Support Engineer you're working with can provide a Box folder so you can upload the files. Please coordinate as necessary.
   d. Send the email reply.
4. Physically reconnect all of the USB devices to the Hub that you had disconnected from the Hub.

> **Note** Be sure to plug each device into the same USB port it originally was plugged into. This ensures that Hub is restored to normal operation.

# AnywhereUSB Manager reference

## User roles

The actions that users can perform in the **AnywhereUSB Manager** and in the AnywhereUSB Hub's web UI are determined by the user's access rights.

- **Windows Administrator**: A user must have Windows administrative rights to be able to install the **AnywhereUSB Manager** in either service or stand-alone mode.
- **Hub Administrator**: A Hub Administrator must have the AnywhereUSB Hub's user name and password to be able to log into the Hub's web UI to configure the Hub.

- **User**: A user can access the **AnywhereUSB Manager** to configure the **Manager** and access devices connected to the Hub. A user does not have the Hub's user name and password and cannot access the Hub's web UI.

### *AnywhereUSB Manager: Stand-alone mode*

This table describes the actions that can be performed in the **AnywhereUSB Manager** by different types of users when the **Manager** is installed in stand-alone mode.

For more information about stand-alone mode, see Service.

| Action | User | Windows Administrator |
|---|---|---|
| Install the **AnywhereUSB Manager** | | X |
| Uninstall the **AnywhereUSB Manager** | | X |
| Launch the **AnywhereUSB Manager** | X | X |
| Configure the **AnywhereUSB Manager** | X | X |
| Manage devices connected to the Hub in the **AnywhereUSB Manager** | X | X |
| In the **AnywhereUSB Manager**, see the devices connected to the Hub that are in the groups to which you have access | X | X |
| In the **AnywhereUSB Manager**, use the devices connected to the Hub that are in the group assigned to your client ID | X | X |
| Send commands using the **AnywhereUSB Manager** command line | X | X |

### *AnywhereUSB Manager: Service mode*

This table describes the actions that can be performed in the **AnywhereUSB Manager** by different types of users when the **Manager** is installed in service mode.
For more information about service mode, see Service.

**Note** When installed in service mode, the **Manager** runs only if the user logged into the computer has Windows Administrator credentials.

| Action | User | Windows Administrator |
|---|---|---|
| Install **AnywhereUSB Manager** | | X |
| Uninstall the **AnywhereUSB Manager** | | X |
| Launch the **AnywhereUSB Manager** | | X |
| Configure the **AnywhereUSB Manager** | | X |
| Manage devices connected to the Hub in the **AnywhereUSB Manager** | | X |
| In the **AnywhereUSB Manager**, see the devices connected to the Hub that are in the groups assigned to your client ID | | X |

| Action | User | Windows Administrator |
|---|---|---|
| In the **AnywhereUSB Manager**, use the devices connected to the Hub that are in the groups assigned to your client ID | | X |
| Send commands using the **AnywhereUSB Manager** command line | | X |
| Start and stop the AnywhereUSB Service from the Windows OS | | X |

### *Configure the AnywhereUSB Hub in the web UI*

This table describes the actions that can be performed in the Hub's web UI by different types of users. The Hub's user name and password is required to log into the Hub's web UI.

**Note** If you need to configure the Hub, see your system administrator for the Hub's login credentials.

| Action | Hub Administrator (user with login access to the Hub's web UI) |
|---|---|
| Log into the Hub web UI | X |
| Configure the Hub in the web UI | X |
| Configure the Hub using the CLI commands | X |

## Terminology

| Role | Description |
|---|---|
| **Computer** | The physical or virtual equipment (such as a PC, laptop, or virtual machine), which is used to remotely access the AnywhereUSB Plus Hub. |
| **Client ID** | The client ID is a unique identifier assigned to a user account the first time a user logs in to a computer and opens the **AnywhereUSB Manager**.<br>During this process, the **AnywhereUSB Manager** creates a secure identity certificate that is associated with the client ID. This certificate is used to validate your user account with the Hub. For more information, see Client ID overview. |
| **Group** | A group is a set of USB ports on an AnywhereUSB Plus Hub with exclusive access to a single user account. Each USB port can be assigned to only one group by the Hub administrator.<br>When you log into the computer and connect to a Hub, you are allowed to connect to any groups assigned to your client ID.<br>See Create groups and assign client IDs to the groups for more information. |

## Client ID overview

The client ID is a unique identifier for the computer that you assign when you initially install the **Anywhere USB Manager**. When you launch the **Manager** for the first time and log in, the **Manager** creates a secure identity certificate that is associated with the client ID. This certificate is used to validate your account with the Hub.

- **Stand-alone**: If you installed the **Manager** as a stand-alone, the client ID and the certificate identify the user on the computer.
- **Service**: If you installed the **Manager** as a service, the client ID and the certificate identify the computer.

When the client ID and certificate have been created, the computer is able to connect to the Hubs that recognize that client ID. Any other computer with the same client ID will be rejected.

---

Note In some cases, multiple computers may inadvertently be used by multiple users that have the same client ID. To fix this issue, see AnywhereUSB Manager client ID is not unique.

---

### *Client ID must be unique*

The client ID **must** be unique for every computer or VM (virtual machine). If the same client ID is assigned to more than one computer or VM, and both attempt to connect to the same Hub, the first computer to associate itself with the Hub will be able to connect to the Hub. Subsequent computers will not be able to connect that Hub.

### *Client ID length*

The number of characters allowed in the **Client ID** field is variable and is dependent on UTF-8 encoding of the characters. Note that some characters are multi-byte characters, which reduces the number of characters that are allowed in the field. Currently, the **Client ID** field is a maximum of 63 bytes encoded in UTF-8.

### *Assign a client ID to a user account*

A client ID is assigned to user credentials the first time a user logs into a computer and launches the **AnywhereUSB Manager**.

---

**WARNING!** Digi recommends that you use a private network to connect the computer to the Hub. This ensures that only clients IDs with known user credentials can connect to the Hub. The first time that a client ID on a computer connects to the Hub, the unique credentials for this known user are stored in your Hub. If you do not use a private network, an unknown computer with the same client ID may happen to connect to the Hub before the known computer connects. In this case, the known computer will not be able to connect and authenticate.

---

**Step 1: Create a client ID during initial launch of the AnywhereUSB Manager**

The **AnywhereUSB Manager** can be initially opened by a user in one of the following ways:

- **Installation**: When the AnywhereUSB Hub software is installed, the **Launch AnywhereUSB Manager** option is selected by default. When the installation completes, the client ID confirmation dialog appears. The user enters a client ID, and then the **AnywhereUSB Manager** is automatically launched.

**Note** If the user deselects the **Launch AnywhereUSB Manager** option during installation, the **AnywhereUSB Manager** does not automatically open after the installation process completes. In this case, the client ID dialog does not display.

- **New user logs in**: After the AnywhereUSB Hub software is installed, any user can log into that computer and open the **AnywhereUSB Manager**. The first time a new user opens the **AnywhereUSB Manager**, the client ID dialog appears. The user must enter a client ID before the **AnywhereUSB Manager** will open.

After the initial launch of the **AnywhereUSB Manager**, the next time the user logs in, the computer is able to connect to the Hubs that recognize that client ID.

#### Step 2: Manually add a client ID to the client ID list in the Hub

You can manually add a client ID to the client list before a new user launches the **AnywhereUSB Manager** for the first time. In this situation, the certificate is unavailable until the first time a computer with the new client ID connects to the Hub. The new client ID is associated with the credentials for the user currently logged on to the computer.

When the computer connects to the Hub for the first time, the identity certificates are exchanged between the computer and the Hub. After the initial connection, only that computer with the client ID and unique identity certificate is able to connect to the Hub.

## Install the AnywhereUSB Manager using Windows 2019 Server Core edition

You can install the **Anywhere USB Manager** software onto a Hub using the Windows 2019 Core edition.

You must first download the **Anywhere USB Manager** software and install it on your computer. After the manager software is installed, the **AnywhereUSB Manager** automatically discovers AnywhereUSB Hubs on the local subnet.

#### Prerequisites

Before you begin, you should decide whether you want to run the **AnywhereUSB Manager** as a stand-alone or as a service. For detailed information, see Service.

---

**CAUTION!** Only a Windows Administrator can perform the software install. If you are logged in as a non-Windows Administrator user and you attempt to install the software, you will be required to enter Windows Administrator login credentials to be able to complete the installation process.

---

1. Download the **AnywhereUSB Manager** installer from the AnywhereUSB **Drivers** section of the support page.
   a. Navigate to the AnywhereUSB Plus support page.
   b. Click the **Product Resources** tab. This should be selected by default.
   c. In the **Drivers & Patches** section, click the **AnywhereUSB Manager** link.
   d. From the drop-down list box, select **Microsoft Windows**.
   e. Click the **download** link for the version of the installer than you want to download. Make a note of the version number for future reference.

> **Note** You should save the downloaded software to your computer before you start the install process. This is useful if you decide to uninstall the **AnywhereUSB Manager** from the original installer in the future.

2. Run the downloaded installer.
   a. Navigate to a command line prompt.
   b. Type: `<version>.exe`

      where `version` is replaced with the version number of the installer that you downloaded, such as `40003045_Win64_x.x.xx.xxx_X.exe`.
   c. Press **Enter**. The **AnywhereUSB Manager** installation wizard launches.
3. Follow the standard Windows installation process to complete the installation of the **AnywhereUSB Manager**. For instructions, see Install the AnywhereUSB Manager: Windows.

## Uninstall the Manager from the Windows Control Panel

Before you install the **AnywhereUSB Manager**, you must uninstall the currently installed version. The preferred method is from the Windows Control Panel.

This method can be used with Windows 10 and Windows 11.

> **Note** You can also uninstall the **AnywhereUSB Manager** using the **AnywhereUSB Manager** installer. See Uninstall the AnywhereUSB Manager on a Windows OS using the original installer.

To uninstall the **Manager** from the Windows Control Panel:

1. If you have a client **AnywhereUSB Manager** window open, you must exit the **Manager**.
   a. Navigate to the **Manager**.
   b. Choose **File > Exit**. The **Manager** closes.
2. Open the Windows Control Panel and select **Programs** > **Progams and Features**.
3. Find **Digi AnywhereUSB Manager** in the list, and right-click on the name to display the shortcut menu.
4. Click **Change**. The **AnywhereUSB Manager** installation wizard appears.
5. Click **Next**. The **Program Maintenance** window appears.
6. Select the **Remove** option.
7. Click **Next**. The **Remove the Program** screen appears.
8. Make sure that **Remove User Configuration** is not selected. This preserves your current configuration.
9. Click **Remove**.
10. Click **Finish**.

## Uninstall the AnywhereUSB Manager on a Windows OS using the original installer

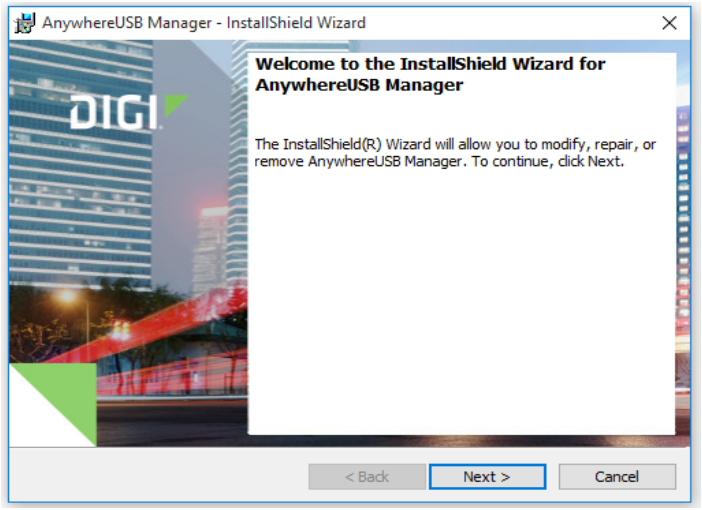
You can uninstall the **AnywhereUSB Manager** when installed on a Windows OS and when you have access to your original installer.

If you can't meet these requirements, other uninstall options are available:

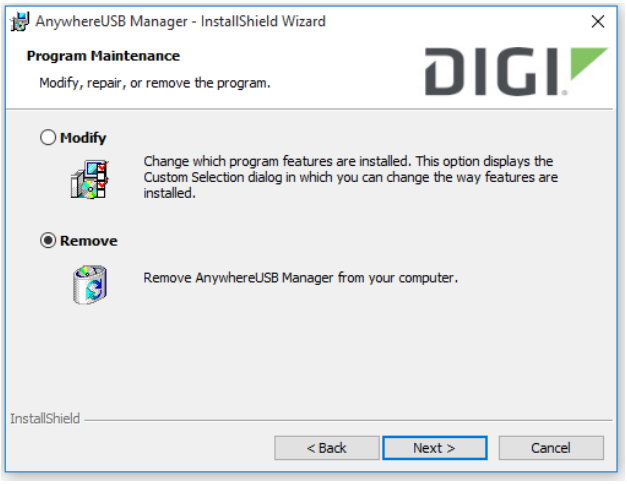
- Windows Control Panel: You can use this process if you don't have access to your original installer. This is the preferred method. This method can be used with Windows 10 and Windows 11.
- Linux
- Windows 2019 Server Core edition

To uninstall the **AnywhereUSB Manager** from a Windows OS:

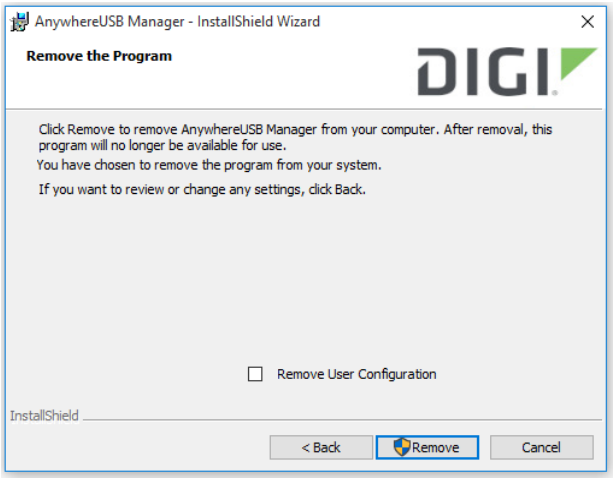
1. Locate the **AnywhereUSB Manager** installer. You must run the same version of the installer to uninstall the **AnywhereUSB Manager** that you used to install it.
   - If you saved the installer when you originally installed the **AnywhereUSB Manager**, navigate to that location on your computer.
   - If you did not, you can download the installer from the Support Tools website.
     a. Navigate to https://www.digi.com/support#support-tools.
     b. From the **Support Downloads** section, click **Drivers**.
     c. Find and select **AnywhereUSB Plus** from the product list.
     d. Select your **AnywhereUSB Plus** model.
     e. Select and download the appropriate software for your operating system.
2. Click on the downloaded software to launch the **AnywhereUSB Manager** installation wizard. The **Welcome** screen appears.



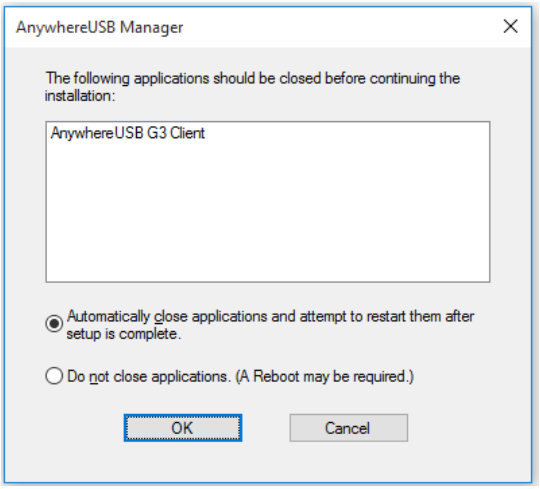
3. Click **Next**. The **Program Maintenance** screen appears.
4. Select **Remove**.




5. Click **Next**. The **Remove the Program** screen appears.
6. Determine whether you want to remove the Connect EZ configuration settings that you have selected.
   - Do not select **Remove User Configuration**: The configuration settings you have made are retained and re-applied the next time you install the **AnywhereUSB Manger**. This is the default.
   - Select **Remove User Configuration**: The configuration settings you have made are not retained and removed with the program.




7. Click **Remove**. If the **AnywhereUSB Manager** is open, the following dialog displays. Do not change the default settings.




8. Click **OK**. A progress bar appears.
9. When the uninstall is complete, the **InstallShield Wizard Completed** screen appears.
10. Click **Finish** to complete the uninstall and close the dialog.

## Uninstall the AnywhereUSB Manager using Windows 2019 Server Core edition

You can uninstall the AnywhereUSB Manager from the Windows 2019 Server Core.

### Prerequisites

- Powershell must be installed on your Windows server. Powershell is used to get the identifying number for the **AnywhereUSB Manager**.
- Make sure that your Windows OS is updated to the latest version available.

To uninstall the **AnywhereUSB Manager**:

1. Get the identifying number for the **AnywhereUSB Manager**.
   a. Navigate to Powershell.
   b. Run the following command to get a list of the installed programs and the associated **IdentifyingNumber** for each program:

      ```
      Get-WmiObject -Class Win32_Product
      ```

   c. From the list, note the **IdentifyingNumber** for the **AnywhereUSB Manager**.
2. Run the uninstall command. You can run the command from Powershell or from a command line.

   ```
   MsiExec.exe /I"{IdentifyingNumber}"
   ```

   Where *IdentifyingNumber* is the **IdentifyingNumber** for the **AnywhereUSB Manager**.

   Example: `MsiExec.exe /I"{2D71XX4E-4CD3-4781-80C6-76CC0210X0X5}"`

   **Note** Be sure to include the double-quotes before and after the bracketed command. The identifying number is an example so do not copy and paste the command.

3. Press **Enter** to launch the **AnywhereUSB Manager** window. The **Welcome** screen displays.

4. Follow the standard Windows uninstall process to complete the removal of the **AnywhereUSB Manager**. For instructions, see Uninstall the AnywhereUSB Manager on a Windows OS using the original installer and begin at Step 3.

## Stop and start the Linux headless AnywhereUSB Manager

If you have installed the Linux headless **Manager**, you may need to stop and restart it.

**Stop the headless Manager**

Stopping the headless manager can take up to one minute, depending whether the **Manager** is connected to USB devices.

```
$ anywhereusb-headless stop
```

**Start the headless Manager**

```
$ anywhereusb-headless
```

**Note** To start the awusbmanager-headless at boot, you will need to create and add a **systemd** startup script.

## Update the AnywhereUSB Manager: Linux

You can update from one release previous to the current release except for installations using the rpm -i.

**Note** For installations using the rpm -i, see /usr/share/doc/awusbmanager/README for more information.

The awusbmanager and awusbmanager-headless packages can be installed over each other and will replace the previously installed package.

### *Troubleshooting an update*

- If the update does not appear to be installed correctly, Digi recommends uninstalling and then installing the awusbmanager package.
- If a newer version of the awusbmanager package is currently installed on your PC, Digi recommends uninstalling any old awusbmanager package before installing this version.
- A reboot may be required after you have installed the awusbmanager package to ensure that the user is able to properly manage AnywhereUSB.

## Uninstall the AnywhereUSB Manager: Linux

In some instances, the awusbmanager package may not install as expected. If this happens, you should uninstall the awusbmanager package and then install it again.

In addition, if you have previously installed an anywhereusb package on your PC, Digi recommends uninstalling the existing package before installing the desired version.

### Uninstall the awusbmanager package

1. The awusbmanager package can be uninstalled using the appropriate command.
   - **DEB**: On Debian, Ubuntu, Kubuntu and similar distros:

     ```
     $ sudo apt remove awusbmanager
     ```

   - **RPM**: On RedHat and similar distros:

     ```
     $ sudo dnf remove awusbmanager
     ```

2. Once the uninstall is complete, you can re-install the awusbmanager packagee. See Install the AnywhereUSB Manager: Linux.

## Connect to a group or USB device in the AnywhereUSB Manager

You can connect to a group which has been assigned to your client ID and that is not connected to a different client ID to which the group has been assigned.

When you connect to a group, you are given exclusive access to all of the USB ports in the group to which you are allowed access. All other users are blocked from access to the ports in that group until you disconnect from the group.

A user can connect to more than one group at a time. A group can be connected to only one user at a time.

When a USB device is plugged in to a port on a Hub, the device displays in the list of devices in the group. Note that a group may have ports that do not have a connected device. Only ports with a connected USB device display in the **AnywhereUSB Manager**.

**Auto-connect enabled for a group**

If you have enabled auto-connect for a group, you are automatically connected to those groups when:

- You log in to your computer and **AnywhereUSB Manager** opens automatically
- You manually open and log into **AnyhwereUSB Manager**.
- The **Manager** is running as a service.

See Configure the auto-connect feature for a group for more information.

**Note** When you open the **AnywhereUSB Manager**, the **Manager** attempts to connect to the groups to which you are allowed access. If someone else already owns the group, you will not be connected to that group.

### Connect to a group or a USB device in the AnywhereUSB Manager

You can connect to all of the USB devices and ports in a group, or to one device in a group.

- **Connect to a group**: To connect to a group, right-click on the group name and click Connect to Group.
- **Connect to USB ports in a group**: You can connect to the USB ports in a group depending on whether you are allowed access to the port and if you are connected to the group:
  - If you are connected to the group, right-click on a USB device name and click Connect to Device. You are connected to that USB device and to all of the USB ports in the group.

- If you are not connected to the group, right-click on the USB device name and click Connect to Group to connect to the group and the USB device.
- If the group is owned by another user, you are not allowed to connect to the device.

# Command line interface: AnywhereUSB Manager

You can manage the **AnywhereUSB Manager** features from the command line.

**Prerequisites for the AnywhereUSB Manager commands**

- **Service**: If you run the **AnywhereUSB Manager** as a service, you need to be an Administrator. The service must be running.
- **Stand-alone**: If you run the **AnywhereUSB Manager** as a stand-alone, you need to be the same user that started the **Manager**, or an Administrator. The **AnywhereUSB Manager** must be open and active.

**Get a device or group address, or a Hub name**

For some CLI commands you will need to provide a device address, a group address, or a Hub name. You can use the **list** command to get that information. See the list command for examples.

## Create a new client ID from the CLI

You can create a new client ID from the CLI by adding a new client, assigning a client ID, and then giving permission for this client to use the specified groups.

**Note** Digi recommends that you create new client IDs and assign groups from the web UI. See Manually add a client ID.

**Example: Create a client ID**

This example explains how to create a client ID named "client1" and assign groups "group01" and "group02" to "client1". In this example, the client ID being created is the first client ID on the Hub, so the identifier for this client in the configuration is 0.

```
> config
(config)> service anywhereusb clients
(config service anywhereusb clients)> add end
(config service anywhereusb clients 0)> id client1
(config service anywhereusb clients 0)> descripton "lab computer"
(config service anywhereusb clients 0)> groups
(config service anywhereusb clients 0 groups)> add end group01
(config service anywhereusb clients 0 groups)> add end group02
(config service anywhereusb clients 0 groups)> save
Configuration saved.
```

## autoconnect clear all

Disables the auto-connect feature for all Hubs, groups, and devices. When complete no asterisks or plus signs display next to Hub, group, or device names.

## Syntax

```
>awusbmanager autoconnect clear all
```

**Examples**

Run the list command to verify the current state of the auto-connect feature for the Hubs, groups, and devices. In this example, Group 1 has auto connect enabled, and the device in Group 1 has inherited the auto connect feature.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2)
*  Group 1 (AW02-000001.1) (In-use by you)
+        U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

Run the `autoconnect clear all` command.

```
>awusbmanager autoconnect clear all
```

Run the list command again to verify that the auto connect feature has been disabled. No asterisks or plus signs should display.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2)
   Group 1 (AW02-000001.1) (In-use by you)
        U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

### autoconnect clear group

Disable the auto-connect feature for a specified group.

When you disable auto connect for a group, an asterisk no longer displays next to the group name. In addition, any devices in the group no longer inherit the auto-connect feature, and the plus sign no longer displays next to the device names.

**Note** For more information about auto connect, see Configure the auto-connect feature for a group.

## Syntax

```
>awusbmanager autoconnect clear group,<address>
```

**Parameters**

address: The address of the group for which you want to disable the auto connect feature.

**Examples**

Run the list command to verify the current state of the auto-connect feature for a group and to determine the address for a group. In this example, Group 1 has the auto connect feature enabled, so an asterisk displays next to the group name.

The [*address*] for a group is the name of the Hub appended by the number of the group. In this example, the auto connect feature will be disabled for Group 1, so the group name is highlighted below.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2)
*  Group 1 (AW02-000001.1) (In-use by you)
+       U3 Cruzer Micro (AW02-000001.1101) (In-use by you)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

Run the `autoconnect clear group` command.

```
>awusbmanager autoconnect clear group,AW02-000001.1
```

Run the list command again to verify that the auto connect feature has been disabled. In this example, the auto connect feature has been disabled for Group 1, so an asterisk no longer displays next to the group name. In addition, the plus sign no longer displays next to the devices in Group 1.

**Note** If you were connected to the group and the devices in the group, you will still be connected. If you want do disconnect from them, you can use the `disconnect group` command.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2)
   Group 1 (AW02-000001.1) (In-use by you)
        U3 Cruzer Micro (AW02-000001.1101) (In-use by you)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

## autoconnect group

Enable the auto-connect feature for a specified group. This feature ensures that when you start the **AnywhereUSB Manager** as a stand-alone or when it starts at Windows start-up if installed as a service, you are automatically connected to all of the groups to which you are allowed access that have auto connect enabled.

When you enable auto-connect for a group, an asterisk displays next to the group name. In addition, any devices in the group inherit the auto connect feature, and will also be automatically connected. A plus sign displays next to the devices when the auto-connect feature is inherited.

You can disable the auto-connect feature for the group if needed.

**Note** For more information about auto connect, see Configure the auto-connect feature for a group.

# Syntax

```
>awusbmanager autoconnect group,<address>
```

### Parameters

address: The address of the group for which you want to enable the auto connect feature.

### Examples

Run the list command to verify the current state of the auto-connect feature for a group and to determine the address for a group. In this example, Group 2 has the auto connect feature enabled, so an asterisk displays next to the group name. The auto connect feature is not enabled for Group 1, so an asterisk does not display.

The [*address*] for a group is the name of the Hub appended by the number of the group. In this example, the auto connect feature will be enabled for Group 1, so the group name is highlighted below.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
*  Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

Run the the `autoconnect group` command.

```
>awusbmanager autoconnect group,AW02-000001.1
```

Run the list command again to verify that the auto connect feature has been enabled. An asterisk displays next to the group name. A plus sign displays next to the names of the devices in the group to show that the auto connect feature is inherited from the group.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
*  Group 2 (AW02-000001.2) (In-use by you)
*  Group 1 (AW02-000001.1) (In-use by you)
+      U3 Cruzer Micro (AW02-000001.1101(  (In-use by you)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

### autofind

Enables and disables the autofind feature. When enabled, all Hubs connected to the network when **AnywhereUSB Manager** launches are automatically found. This command works as a toggle, or you can can specify "on" or "off." Before you used the command, you should verify the status of the autofind feature.

The status of the autofind feature is displayed when you run the list command.

**Note** For information about this feature in the **AnywhereUSB Manager**, see Autofind Hubs and Include IPv6 Addrs in Autofind options.

## Syntax

```
>awusbmanager autofind[,on|,off]
```

#### Parameters

on: Enables the autofind feature. When enabled, all Hubs connected to the network when **AnywhereUSB Manager** launches are automatically found. This option is not required.

off: Disables the autofind feature. When disabled, Hubs are not automatically found when **AnywhereUSB Manager** launches. In this case, you must manually add the Hubs to which you want to connect to the known Hubs list. This option is not required.

#### Examples

Run the list command to verify the status of the autofind feature. In this example, the autofind feature is enabled.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

Run the autofind command to disable the feature. You can specify the "off" option, but it is not required.

```
>awusbmanager autofind,off
```

Run the list command again.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: disabled
```

```
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

You can run the autofind command again to enable the feature. You can specify the "on" option, but it is not required.

```
>awusbmanager autofind
```

Run the list command again to verify.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

### connect device

Connect to a USB device in a group to which you have access. You cannot connect to a device in a group that is already in use.

You must be connected to the group before you can connect to a device in that group.

## Syntax

```
>awusbmanager connect device,<address>
```

#### Parameters

address: The address of the device to which you want to connect. Run the list command to get the device address.

#### Examples

If you have connected to a group, and then disconnect from a device in that group, you no longer have access to the device. You can reconnect to that device.

Run the list command to make sure you are connected to the group that the device you want to connect to is in. In this example, the device is in Group 1, so you should be connected to Group 1.

You will need the address for device to which you want to connect.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

Run the `connect device` command. If required to access the device, include the device password.

```
>awusbmanager connect device,AW02-000001.1101
```

Run the list command again to verify that the device is connected.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101) (In-use by you)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

### connect group

You can connect to a group so that you have access to the ports in the group. Once you have connected to a group, no one else can connect to that group. You cannot connect to a group that is already is use.

When you connect to a group, you are automatically connected to all of the ports in the group to which you are allowed access.

## Syntax

```
>awusbmanager connect group,<address>
```

#### Parameters

address: The address of the group to which you want to connect.

#### Examples

Run the list command to determine the address for the group to which you want to connect. In this example, you will connect to Group 1.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

Run the `connect group` command.

```
>awusbmanager connect group,AW02-000001.1
```

Run the list command again to verify that you are connected to the group and to all of the ports in the group to which you are allowed access.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101) (In-use by you)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

### device info

Displays information about a device. For more information, see AnywhereUSB Manager USB Device Status pane.

## Syntax

```
>awusbmanager device info,<address>
```

#### Parameters

address: The address of the device for which you want to display information. The address is required.

#### Examples

Run the list command to determine the device's address.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
*  Group 2 (AW02-000001.2) (In-use by you)
*  Group 1 (AW02-000001.1) (In-use by you)
+      U3 Cruzer Micro "USB stick 1" (AW02-000001.1101)  (In-use by you)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

Run the `device info` command.

```
>awusbmanager device info,AW02-000001.1101
```

Information about the device displays.

```
ADDRESS: AW02-000001.1101
LOCALNAME: USB stick 1
VENDOR: SanDisk
VENDOR ID: 0x0781
PRODUCT: U3 Cruzer Micro
PRODUCT ID: 0x5406
SERIAL: 0770000F0000000C
```

```
PORT ON HUB: 2
AUTOCONNECT: inherited
IN USE BY: YOU
```

### device name

Change or assign the local name of a device.

## Syntax

```
>awusbmanager device name,<address>,<new name>
```

**Parameters**

device name: The device's address.

new name: The new local name for the device.

**Examples**

Run the list command to determine the device's address.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 "Hub 1" (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

Run the `device name` command.

```
>awusbmanager device name,AW02-000001.1101,USB Stick
```

Run the list command again to verify the name change.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 "Hub 1" (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro "USB Stick" (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

### disconnect device

Disconnect from a USB device to which you no longer need access. You will remain connected to the group that the device is in. Other users cannot connect the USB device, since you still own the group that the USB device is in.

**Note** To ensure that you can no longer connect to a USB device in a group, the best method is to move the port to a group on the Hub to which you are not connected. See Step 3: Name groups and assign ports to a group.

**Warnings**

- **Auto-connect**: If you have auto-connect enabled for the group, you are not allowed to disconnect from a USB device in the group until you disable auto-connect. If the USB device is in a group to which you are connected, other users cannot connect the USB device after you have disconnected from it, since you still own the group that the USB device is in. See Disable auto-connect for a group.
- **Power cycle on disconnect**: If you have the power cycle on disconnect feature enabled, the Hub automatically cycles the power to each USB device when it disconnects. To ensure that a USB device remains disconnected, you must disable this feature. See Cycle the power to a device when it disconnects from a PC.

# Syntax

```
>awusbmanager disconnect device,<address>
```

**Parameters**

address: The address of the device from which you want to disconnect.

**Examples**

Run the list command to view the address for device from which you want to disconnect.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101) (In-use by you)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

Run the `disconnect device` command.

```
>awusbmanager disconnect device,AW02-000001.1101
```

Run the list command again to verify that the device is disconnected.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
```

```
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

## disconnect group

You can disconnect from a group that has ports you no longer need access to. You are disconnected from all USB devices and ports in that group. Any other user can then connect to that group.

**Warnings**

- **Auto-connect**: If you have auto-connect enabled for the group, you are not allowed to disconnect from a USB device in the group until you disable auto-connect. If the USB device is in a group to which you are connected, other users cannot connect the USB device after you have disconnected from it, since you still own the group that the USB device is in. See Disable auto-connect for a group.
- **Power cycle on disconnect**: If you have the power cycle on disconnect feature enabled, the Hub automatically cycles the power to each USB device when it disconnects. To ensure that a USB device remains disconnected, you must disable this feature. See Cycle the power to a device when it disconnects from a PC.

# Syntax

```
>awusbmanager disconnect group, [address]
```

**Parameters**

address: The address of the group from which you want to disconnect.

**Examples**

Run the list command to determine the address for the group to which you want to connect.

Make sure that auto connect is disabled for the group. When it is disabled, an asterisk does not display next to the group name. If you need to disable auto connect for the group, see autoconnect clear group.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101) (In-use by you)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

Run the `disconnect group` command.

```
>awusbmanager disconnect group,AW02-000001.1
```

Run the list command again to verify that the group is disconnected.

```
AnywhereUSB Manager, below are the available devices:
```

```
AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

### exit

Shuts down the service. If the **AnywhereUS Manager** is open, it is shut down as well.

## Syntax

```
>awusbmanager exit
```

### group info

Displays information about a group. For more information, see AnywhereUSB Manager Group Status pane.

## Syntax

```
>awusbmanager group info,[address]
```

**Parameters**

address: The address of the group for which you want to display information. The address is required

**Examples**

Run the list command to determine the group's address.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 "HUB-000001" (AW02-000001.local.:18574)
*  Group 2 "Admin group" (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

Run the `group info` command.

```
>awusbmanager group info,AW02-000001.2
```

Information about the group displays.

```
ADDRESS: AW02-000001.2
LOCALNAME: Admin group
GROUP: 2
NAME: Group 2
PORTS: 2
AUTOCONNECT: enabled
IN USE BY: YOU
```

### group name

Change or assign the local name of the group.

## Syntax

```
>awusbmanager group name,<address,<new name>
```

#### Parameters

group name: The group's address.

new name: The new local name for the group.

#### Examples

Run the list command to determine the group's address.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 "Hub 1" (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

Run the `group name` command.

```
>awusbmanager group name,AW02-000001.2,New Group
```

Run the list command again to verify the name change.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 "Hub 1" (AW02-000001.local.:18574)
   Group 2 "New Group" (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

### hidden hub add

Hide a Hub by adding it to the hidden Hubs list.

**Note** For information on hiding Hubs in the AnywhereUSB Manager, see Hide an individual Hub and Hide all unauthorized Hubs.

## Syntax

```
>awusbmanager hidden hub add,<address>[:port]
```

**Parameters**

address: The address of the Hub that you want to hide.

port: The TCP port number for the Hub you want to hide. This is required if the TCP port number is not the default (18574).

**Examples**

Run the `hidden hub add` command to add a Hub to the hidden Hub list.

- Use the default port of 18574:

```
>awusbmanager hidden hub add,10.10.10.34
```

- Change the TCP port number:

```
>awusbmanager hidden hub add,10.10.10.56:5600
```

You can then run the `hidden hub list` command to verify that the Hubs were added to the list of hidden Hubs.

```
10.10.10.34:18574
10.10.10.56:5600
```

### hidden hub list

Displays a list of Hubs that have been added to the hidden Hubs list.

- You can choose to hide Hubs that currently display in the **AnywhereUSB Manager**, such as an unauthorized Hub (which displays with a red X next to the Hub name), or a Hub which users shouldn't access.
- You can also choose to hide Hubs that don't currently display in the **AnywhereUSB Manager**, but the client ID may have access in the future, such as a Hub on another network.

**Note** For information on hiding Hubs in the **AnywhereUSB Manager**, see Hide an individual Hub and Hide all unauthorized Hubs.

## Syntax

```
>awusbmanager hidden hub list
```

#### Examples

Run the `hidden hub list` command.

```
>awusbmanager hidden hub list
```

A list of hidden Hubs is returned.

```
10.10.10.50:18574
10.10.10.21:18574
```

### hidden hub remove

Remove a Hub from the hidden Hubs list.

## Syntax

```
>awusbmanager hidden hub remove,<address>[:port]
```

#### Parameters

address: The address of the hub that you want to remove from the hidden Hub list. This is required.

port: The TCP port number for the Hub you want to remove. This is required if the TCP port number is not the default (18574).

#### Examples

Run the `hidden hub list` command to verify the address and port number of the Hub that you want to remove.

```
10.10.10.21:18574
10.10.10.34:18574
10.10.10.56:5600
```

Run the `hidden hub remove` command.

- If the TCP port number is the default, entering the port number in the command is optional.

```
>awusbmanager hidden hub remove,10.10.10.34
```

- If the TCP port number is not the default, entering the port number in the command is required.

```
>awusbmanager hidden hub remove,10.10.10.56:5600
```

Run the `hidden hub list` command again to verify that the specified Hubs have been removed.

```
10.10.10.21:18574
```

### hidden hub remove all

Remove all the Hubs in the hidden Hubs list.

## Syntax

```
>awusbmanager hidden hub remove all
```

**Examples**

Run the `hidden hub list` command to view the list of hidden Hubs.

```
10.10.10.12:18574
10.10.10.14:18574
10.10.10.15:5600
```

Run the `hidden hub remove all` command.

```
>awusbmanager hidden hub remove all
```

Run the `hidden hub list` command again to verify that the Hubs have been removed.

### help

Displays a list of the CLI commands for the **AnywhereUSB Manager**.

## Syntax

```
>awusbmanager help
```

### hub info

Displays information about the Hubs. For more information, see AnywhereUSB Manager Hub Status pane.

## Syntax

```
>awusbmanager hub info,<hub name>
```

**Parameters**

hub name: The address of the Hub for which you want to display information. The address is required.

**Examples**

Run the list command to determine Hub's address.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 "HUB-000001" (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

Run the `hub info` command.

```
>awusbmanager hub info,AW02-000001
```

Information about the Hub displays.

```
NAME: AW02-000001
LOCALNAME: HUB-000001
MODEL: AnywhereUSB 2 Plus
VERSION: 3.0.0.54 awusb dby-3.0.0.54 01/03/2019 16:44:25 CST 20190103224522
STATE: Active (secure)
ADDRESS: AW02-000001.local. (SSL Subject:/C=US/ST=Minnesota/O=Digi
International Inc/CN=unknown ,Issuer:/C=US/ST=Minnesota/O=Digi International
Inc/CN=unknown) (10.10.74.xxx)
PORT: 18574
CONNECTED FOR: 22115 sec
CONNECTION ID: 1
INTERFACE: eth0
SERIAL NUMBER: AW02-000001
AUTOCONNECT: disabled
```

## hub name

Change or assign the local name of the Hub.

# Syntax

```
>awusbmanager hub name,<address[:port]>,<new name>
```

**Parameters**

address: The Hub's address.

port: The TCP port number for the Hub you want to rename. This is required if the TCP port number is not the default (18574).

new name: The new local name for the Hub.

**Examples**

Run the list command to determine the Hub's address.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

Run the `hub name` command.

```
>awusbmanager hub name,AW02-000001,Hub 1
```

Run the list command again to verify the local name.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 "Hub 1" (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
   Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

## known hub add

Add a Hub to the known Hubs list. The Hubs in this list can be on the same network as your computer, or on a different network. If you add Hubs to the known Hubs list that are on the same network as our computer AND the autofind feature is enabled, duplicate entries display in the Hubs list.

**Note** For information about using this feature in the **AnywhereUSB Manager**, see Manage the list of known Hubs.

# Syntax

```
>awusbmanager known hub add,<address>[:port]
```

### Parameters

address: The address of the Hub or a Hub hostname that can be resolved by your network nameservers. This is required.

port: The TCP port number, which is 18574 by default. You can change the TCP port number if needed.

### Examples

#### Add a known Hub

Run the `known hub add` command to add a Hub to the known Hub list.

- Use and address and the default port of 18574:

```
>awusbmanager known hub add,10.10.56.12
```

- Use a hostname and change the TCP port number:

```
>awusbmanager known hub add,awusb1.work.com:9999
```

- Change the TCP port number:

```
>awusbmanager known hub add,10.10.56.14:5600
```

You can then run the `known hub list` command to verify that the Hub was added to the list.

```
10.10.10.56:18574
awusb1.work.com:9999
10.10.56.14:5600
```

### known hub list

Displays a list of Hubs that have been added to the known Hubs list.

**Note** For more information about known Hubs, see Manage the list of known Hubs.

## Syntax

```
>awusbmanager known hub list
```

**Examples**

Run the `known hub list` command.

```
>awusbmanager known hub list
```

A list of known Hubs is returned.

```
10.10.10.50:18574
10.10.10.12:18574
```

### known hub remove

Remove a Hub from the known Hubs list.

**Note** For information about using this feature in the **AnywhereUSB Manager**, see Manage the list of known Hubs.

## Syntax

```
>awusbmanager known hub remove,<address>[:port]
```

**Parameters**

address: The address of the hub that you want to remove from the known Hub list. This is required.

port: The TCP port number for the Hub you want to remove. This is required if the TCP port number is not the default (18574).

**Examples**

Run the `known hub list` command to verify the address and port number of the Hub that you want to remove.

```
10.10.01.12:18574
10.10.01.14:18574
10.10.01.15:5600
```

Run the `known hub remove` command.

- If the TCP port number is the default, entering the port number in the command is optional.

```
>awusbmanager known hub remove,10.10.01.14
```

- If the TCP port number is not the default, entering the port number in the command is required.

```
>awusbmanager known hub remove,10.10.01.15:5600
```

Run the `known hub list` command again to verify that the Hubs have been removed.

```
10.10.01.12:18574
```

### known hub remove all

Remove all the Hubs in the known Hubs list.

## Syntax

```
>awusbmanager known hub remove all
```

**Examples**

Run the `known hub list` command to view the list of known Hubs.

```
10.10.01.12:18574
10.10.01.14:18574
10.10.01.15:5600
```

Run the `known hub remove all` command.

```
>awusbmanager known hub remove all
```

Run the `known hub list` command again to verify that the Hubs have been removed.

### list

Displays a list of Hubs, groups, and devices on the network as well as any Hubs the **AnywhereUSB Manager** knows about.

**Note** This information is similar to what displays in the **AnywhereUSB Manager**. See AnywhereUSB Manager overview: Status panes, menus, and icons.

If a group has auto-connect enabled, an asterisk displays next to the group name.

Additional information about features displays at the bottom of the list:

- Status of the autofind feature: enabled or disabled.
- Status of the **auto connect all** feature: enabled or disabled.
- Specifies whether the **AnywhereUSB Manager** is running as a service.

## Syntax

```
>awusbmanager list
```

**Examples**

This example shows one Hub: AW02-000001. If assigned, the local name for the Hub displays surrounded by quotes: "Hub 1".

On the Hub, Group 1 has the auto connect feature enabled, as specified by the asterisk next to the group name.

The address for each group is in parentheses after the group name. In this example the address for Group 1 is AW02-000001.1.

The address for a device is in parentheses after the device name. In this example the address for the US Cruzer Micro device is AW02-000001.1101.

```
AnywhereUSB Manager, below are the available devices:

AW02-000001 "Hub 1" (AW02-000001.local.:18574)
   Group 2 (AW02-000001.2) (In-use by you)
* Group 1 (AW02-000001.1) (In-use by you)
       U3 Cruzer Micro (AW02-000001.1101)

* means Autoconnect enabled, + means Autoconnect inherited
Auto-Find: enabled
Autoconnect All: disabled
AnywhereUSB Manager not running as a service
```

### list full

Displays a list of all Hubs, groups, and devices on the network and includes all information about each Hub, group, or device. This command displays the same information retrieved by running these commands: list, hub info, group info, and device info.

If a group has auto-connect enabled, an asterisk displays next to the group name.

Additional information about features displays at the bottom of the list:

- Status of the autofind feature: enabled or disabled.
- Status of the **auto connect all** feature: enabled or disabled.
- Specifies whether the **AnywhereUSB Manager** is running as a service.

## Syntax

```
>awusbmanager list full
```

**Examples**

Run the `list full` command.

```
>awusbmanager list full
```

The example below shows the Hub on the network, and the groups and devices on that Hub. Information about the Hub, group, and device is also returned.

```
AnywhereUSB Manager, below are the available devices:

AW08-D00001 (10.10.12.12:18574)
  NAME: AW08-D00001
  MODEL: AnywhereUSB 8 Plus
  VERSION: 3.0.1.2 awusb
  STATE: Active (secure)
```

```
  ADDRESS: 10.10.12.12
  PORT: 18574
  CONNECTED FOR: 14 sec
  CONNECTION ID: 3
  INTERFACE: eth0
  SERIAL NUMBER: AW08-D00001
  AUTOCONNECT: disabled

   Group  2 (AW08-D00001.2)
     ADDRESS: AW08-D00001.2
     GROUP: 2
     NAME: Group  2
     PORTS: 5 6 7 8
     AUTOCONNECT: disabled
     IN USE BY: NO ONE

      Cruzer (AW08-D00001.1906)
        ADDRESS: AW08-D00001.1906
        VENDOR: SanDisk
        VENDOR ID: 0x0781
        PRODUCT: Cruzer
        PRODUCT ID: 0x5530
        SERIAL: 20040000920A1C707B00
        AUTOCONNECT: disabled
        IN USE BY: NO ONE


*  Group  1 (AW08-D00001.1) (In-use by you)
     ADDRESS: AW08-D00001.1
     GROUP: 1
     NAME: Group  1
     PORTS: 1 2 3 4
     AUTOCONNECT: enabled
     IN USE BY: YOU

+     USB DISK 3.0 (AW08-D00001.1803) (In-use by you)
        ADDRESS: AW08-D00010.1803
        VENDOR:
        VENDOR ID: 0x13fe
        PRODUCT: USB DISK 3.0
        PRODUCT ID: 0x6300
        SERIAL: 070A00376967E000
        AUTOCONNECT: inherited
        IN USE BY: YOU

* means Autoconnect enabled, + means Autoconnect inherited
Autofind: disabled
Autoconnect All: disabled
AnywhereUSB Manager is running as a service
```

## power cycle

This command enables you to power cycle a selected USB device.

The USB device can be connected directly to the AnywhereUSB Hub or to a downstream USB hub. Cycling the power has the same effect as removing the USB device from the Hub and then reconnecting it. When you use this feature, the power supplied by the port to the USB device is turned off for 1 second and then turned on. The USB device you choose to power cycle must be assigned to a group that you are allowed to access.

If an externally powered USB device (one that is not powered by the Hub) is connected to the Hub, the power cycle feature may have no effect on the USB device.

**Note** You can also cycle the power to a selected USB device from the **AnywhereUSB Manager**. See Cycle the power to a USB device connected to the Hub from the AnywhereUSB Manager.

**Note** Additional power cycle methods are available. See Power cycle feature.

# Syntax

```
>awusbmanager power cycle,<device address>
```

**Parameters**

device address: The address of the device that you want power cycle.

**Example**

Run the list command to get the device address. In this example, the device address is AW08-000016.1905.

```
awusbmanager.exe POWER CYCLE,AW08-000016.1905
```

## set clientid

Set the client ID for the **AnywhereUSB Manager** for this computer.

Digi recommends that you set the client ID only when you initially install the **AnywhereUSB Manager**. This is the expected process and after the initial configuration, you should not have to change the client ID.

If you need to set the client ID and the **AnywhereUSB Manager** windows interface is not available, such as when installing the awusbmanager-headless package or a service mode on a virtual machine (VM) without a display, you can use the **set clientid** command to set the client ID for the computer.

The client ID **must** be unique for every computer or VM (virtual machine). If the same client ID is assigned to more than one computer or VM, and both attempt to connect to the same Hub, the first computer to associate itself with the Hub will be able to connect to the Hub. Subsequent computers will not be able to connect that Hub.

# Syntax

```
>awusbmanager set clientid,CLIENTIDNAME
```

**Parameters**

CLIENTIDNAME: The client ID you have chosen for this computer.

# Command line interface: Hub

You can manage the Hub features from the command line.

## config service anywhereusb enable

Allow remote access to USB devices connected to this server.

**Syntax**

```
config service anywhereusb enable <true|false>
```

**Parameters**

true|false: Enter **true** to allow remote access to USB devices connected to this server. Enter **false** to not allow remote access to USB devices connected to this server.

## config service anywhereusb port

Specify the port number that is used to access the Hub. If you change the port number you must also change the corresponding port number on your computer.

# Syntax

```
config service anywhereusb port {1-65535}
```

**Parameters**

port {1-65535}: The port number that is used to access the Hub. The default value is 18574.

## config service anywhereusb groups

Assign a name to each group and specify the ports in each group. When a client connects to a group in the **AnywhereUSB Manager**, the user has access to all of the ports in the group.

You can change the name for a group in the **Group Description** field. By default, a group is named "Group" appended by a consecutive number, such as Group 1, Group 2, and so on. This name displays in the **Group Name** field in the Group Status pane.

For each group, you can specify ports.

**Note** Each port should be assigned to only one group.

You can also do this in the web UI. See Step 3: Name groups and assign ports to a group.

# Syntax

```
config service anywhereusb groups [option]
```

**Options**

group(01-24) description "*string*": Enter a name for the group. Replace *string* with the group name. You must have double quotes around the name.

group(01-24) ports (0-23) (1-24): Specify group number to change and a single port or a range of ports to assign to this group.

**Note** Ports can only be assigned to one group at a time. If a port is assigned to a new group, it is removed from the current group.

**Examples**

**Specify a group name for group 2**

```
config service anywhereusb groups group02 description "Group 2 name"
```

**Replace the group 1 port at index 0 with port 1**

```
config service anywhereusb groups group01 ports 0 1
```

**View current port settings**

In this example, there are three assigned ports: port 1 (occupying index position 0), port 2 (index position 1) and port 3 (index position 2).

```
config show service anywhereusb groups group01 ports
0  1
1  2
2  3
```

**Delete a port from a group**

In the previous example, there are three assigned ports in group 1: port 1 (occupying index position 0), port 2 (index position 1) and port 3 (index position 2). This example shows how to delete ports 2 and 3, leaving only port 1 in this group. Ports are deleted by index number, not port number.

```
config del service anywhereusb groups group01 ports 1
config del service anywhereusb groups group01 ports 2
```

**Add a port to the first available index number**

Add port 1 to the first available index number.

```
config add service anywhereusb groups group01 ports end 1
```

**Reassign ports based on the port's index number**

In this example, one port is defined in the group: port 2 (occupying index position 0):

```
config show service anywhereusb groups group01 ports
0  2
```

You can change this port designation to "1". The syntax here changes the value of the index 0 item to port 1.

```
config service anywhereusb groups group01 ports 0 1
```

## config service anywhereusb clients

Add a client ID to the client list. When a computer searches for Hubs, any computer with a client ID on the client list can connect to the Hub. You can also add client IDs in the web UI. See Manually add a client ID.

# Syntax

```
config service anywhereusb clients [option]
```

**Options**

0-255: Specify the client index.

[id "*string*"]: Specify the client ID for the computer.

[description "*string*]" : Specify a descriptive name for the computer.

groups (0-23) (group01-24): Specify the groups this client ID can access.

**Examples**

You must be in configuration mode to use these commands.

**Show a list of clients**

This command shows the client description, the groups assigned to the client, and the client ID for each client.

```
> config
(config) > show service anywhereusb clients
0
       description Client description
        groups
              0 group01
              1 group02
         id Client_ID
......
```

**Add a new client**

A new elements is added before the given index. You can add "end" with the index to add the new client to the end of the array. Specifying a client ID is required. Other fields are optional.

```
> config
(config)> add service anywhereusb clients (0-254|end)
(config service anywhereusb clients 0)> id "Client_ID"
(config service anywhereusb clients 0)> save
```

**Replace a group**

This example replaces the group at index 0 with group 2. The client must have at least one group already assigned.

```
config service anywhereusb clients 0 groups 0 group02
```

**Delete a client**

You must specify the index of the client (0-254) to delete it.

```
> config
(config)> del service anywhereusb clients (6)
(config)> save
```

### Create a new client ID from the CLI

You can create a new client ID from the CLI by adding a new client, assigning a client ID, and then giving permission for this client to use the specified groups.

**Note** Digi recommends that you create new client IDs and assign groups from the web UI. See Manually add a client ID.

#### Example: Create a client ID

This example explains how to create a client ID named "client1" and assign groups "group01" and "group02" to "client1". In this example, the client ID being created is the first client ID on the Hub, so the identifier for this client in the configuration is 0.

```
> config
(config)> service anywhereusb clients
(config service anywhereusb clients)> add end
(config service anywhereusb clients 0)> id client1
(config service anywhereusb clients 0)> descripton "lab computer"
(config service anywhereusb clients 0)> groups
(config service anywhereusb clients 0 groups)> add end group01
(config service anywhereusb clients 0 groups)> add end group02
(config service anywhereusb clients 0 groups)> save
Configuration saved.
```

## config service anywhereusb autoreg

Automatically register or reject computers that have not previously connected to the Hub. See Automatically register unknown clients for more information.

# Syntax

```
config service anywhereusb autoreg [option]
```

**enable (true|false)**

Determine whether unknown clients should be registered.

**groups (0-23) (group01-24)**

List the group numbers to which an unknown client is allowed access.

**Examples**

**Enable autoregistration for the Hub**

```
config service anywhereusb autoreg enable true
```

**Allow access to an unknown client to group 1**

This example allows unknown clients to access group 1. For this command to be successful, the client must have at least one group already assigned.

```
config service anywhereusb autoreg groups 0 group01
```

## config service anywhereusb client_block_duration

You can configure the default time limit for the client ID block. The default is 10 minutes. See Configure the block client ID time limit for more information.

## Syntax

```
config service anywhereusb client_block_duration [number{w|d|h|m|s}]
```

where *number* is length of time followed by the time measurement.

**Examples**

**Set the default time limit to 15 minutes**

```
config service anywhereusb client_block_duration 15m
```

**Set the default time limit to 2 days**

```
config service anywhereusb client_block_duration 2d
```

### powercycle port

This command enables you to power cycle a port on an AnywhereUSB Hub.

When you power cycle the port, the port is powered off for 1 second and then powered on.

If a USB device is connected to the port, the USB device is powered off and then powered back on, which has the same effect as removing the USB device from the Hub and then reconnecting it.

If an externally powered USB device (one that is not powered by the Hub) is connected to the Hub, the power cycle feature may have no effect on the USB device.

**Note** You can also perform a power cycle a port from the web UI. See Cycle the power to a port on a Hub from the web UI.

**Note** Additional power cycle methods are available. See Power cycle feature.

## Syntax

```
system anywhereusb powercycle <portN>
```

**Parameters**

portN: The port number that you want to power cycle.

**Example**

Run the device info command to get the port number on the Hub to which the USB device is connected. In this example, the USB device is connected to port 2.

```
system anywhereusb powercycle port2
```

### power_cycle_on_unbind

Globally enable and disable the power cycle on disconnect feature. When enabled, the power to each USB device is cycled by default when it disconnects from a PC.

The power cycle on disconnect feature is globally enabled by default for all groups and ports on the Hub. You can choose to globally disable this feature if desired.

**Note** This feature is disabled by default on the AnywhereUSB Plus 24 variant without Wi-Fi. If your device has a serial number greater than or equal to AW24-010000, this feature can be enabled. Otherwise, the feature does not work as expected and should not be enabled.

**Note** You can also disable this feature from the web UI. See Disable the power cycle on disconnect feature.

# Syntax

```
config service anywhereusb power_cycle_on_unbind enable <true|false>
```

**Parameters**

true|false: Enter **false** to disable the feature. Enter **true** to enable the feature.

## use all hub addresses

Enable or disable the **AnywhereUSB Manager** from connecting to extra IPv4 IP addresses.

The AnywhereUSB Hub may have default IP addresses that are reported by mDNS to the **AnywhereUSB Manager**, but in many network environments, the **Manager** cannot connect to them. As part of normal operation, the **Manager** tries to sequentially connect to all of the Hub IP addresses, so if it starts trying these extra default IPv4 IP addresses, it may take extra time (minutes) for the **Manager** to connect or reconnect.

By default, this option is deselected and the **Manager** does not attempt to connect to these addresses.

**Note** This can also be done in the **Preferences** dialog. See Use all Hub IPv4 addresses.

# Syntax

```
USEALLHUBADDRS,[on|off]
```

**Parameters**

off: Disable the feature. The **AnywhereUSB Manager** will not attempt to connect to the extra IPv4 IP addresses. This is the default.

on: Enable the feature. The **AnywhereUSB Manager** will attempt to connect to the extra IPv4 IP addresses.

# Troubleshooting

The following information provides troubleshooting steps for the most common issues. To find information on other issues, visit our Knowledge Base at knowledge.digi.com.

If you need to gather log files and other information, you can use the Create Support File feature.

## AnywhereUSB Manager client ID is not unique

During the initial installation of the **Anywhere USB Manager**, you are required to assign a unique client ID. When you launch the **Manager** for the first time and log in, the **Manager** creates a secure identity certificate that is associated with the client ID. This certificate is used to validate your account with the Hub.

- **Stand-alone**: If you installed the **Manager** as a stand-alone, the client ID and the certificate identify the user's login credentials on the computer.
- **Service**: If you installed the **Manager** as a service, the client ID and the certificate identify the computer.

---

**Note** See Client ID overview for more information about how the client ID is used by your computer and the Hub to create a connection.

---

In some cases, multiple computers may inadvertently be used by multiple users that have the same client ID. When this occurs, and computers with the same client ID attempt to connect with the same Hub, the first computer to associate itself with the Hub will be able to connect to the Hub. Subsequent computers with the same client ID will not be able to connect to that Hub.

You can fix this issue by changing the client ID of your computer to a unique client ID. See Change the client ID.

## No remote Hubs found

When the host computer is unable to discover any AnywhereUSB Hubs on the network, no Hubs are displayed in the **AnywhereUSB Manager**.

#### Firewall software blocks the port used for Hub discovery

When firewall software blocks the port used for Hub discovery, try the following:

- For firewall software, either disable it or add an exception for the port (UDP port 5353).
- Check for a link light on the Ethernet port. If the link light is not lit, connect all of the Hubs to switches using network cables.
- Verify that the **Autofind Hubs** option is selected in the **Preferences** dialog in the **AnywhereUSB Manager**. Start the Manager and choose **File > Preferences** to open the dialog.
- Connect the Hub directly to the host computer.
- Some anti-virus software might block the connection. You can either temporarily disable it or add an exception for the **AnywhereUSB Manager** executable.

- If the Hub is across a switch or router that does not forward mDSN traffic, the **AnywhereUSB Manager** will not be able to discover the Hub. In this case, add the Hub to the known Hubs list. See Manage the list of known Hubs.
- The firewall or router may block access to the AnywhereUSB port, which by default is TCP port 18574. If the Hub can be discovered but the connection fails (the state of the connection is "Unable to connect"), you may need to reopen the AnywhereUSB port.

## Hide a group in the AnywhereUSB Manager

Any group that has ports assigned to it displays in the **AnywhereUSB Manager**, even if no USB devices are connected to a port. If you don't want groups with unused ports to display in the **AnywhereUSB Manager**, you can reassign all of the ports in a group to a different group. Once the group does not have any ports assigned to it, that group will not display.

1. Open the web UI.
2. Click **AnywhereUSB** from the **Configuration** section. The **AnywhereUSB Configuration** page appears.
3. Locate the group that has the unused ports.
4. Reassign each port in the group to a different group, or to the **Unassigned** row.
5. When done, click **Apply** to save the changes.
6. Return to the **AnywhereUSB Manager**. The group no longer appears.

## Microsoft Windows restrictions

**Microsoft Remote Desktop**

Some devices (such as a web camera), and some input devices (such as a USB keyboard or a mouse), are blocked and may not display when Microsoft Remote Desktop is connected to a laptop or a virtual machine.

For example, laptop A is connected to an AnywhereUSB Hub on the network, and a web camera is connected to a port on the Hub. Laptop A is able to see the video feed from the camera.

A user on laptop B can use Microsoft Remote Desktop to gain access to laptop A. In this situation, the video feed for both laptop A and laptop B is restricted by Windows and neither user can view the video feed from the web camera.

## Allow remote access to USB devices

You can configure the Hub to allow remote access to USB devices connected to this server. You must specify the port number that is used to access the Hub.

1. Open the web UI.
2. Select **System** > **Configuration** > **AnywhereUSB Configuration**. The **AnywhereUSB Configuration** page appears.
3. Select **Enable**.
4. Enter the port number in the **Port** field. The default **TCP Port** value is 18574. If you change the port number on this page, you must also change the corresponding port number on your computer.
5. Click **Apply** to apply and save the changes.

## Hub connection is taking too long

The "Attempting to connect" message displays in the **AnywhereUSB Manager** when the **Manager** is trying to connect to the Hub but a connection has not yet been made.

You can troubleshoot a connection if needed using these methods:

- Attempt to ping the Hub IP address from your computer.
- Verify that your firewall is not blocking the TCP port 18574.
- Ensure that Hub is configured correctly and the IP address is in the correct zone, which is generally the **Edge** option. See Review Connect EZ 16/32 default settings.
- Collect a support file from the **AnywhereUSB Manager** and a support_report from the Hub for analysis by Tech Support.

## Red X icon next to a Hub in the AnywhereUSB Manager

In some situations, a red X display next to a Hub in the **AnywhereUSB Manager** when the Hub has failed to connect to your PC or the network. The list below describes situations during which this may occur, and includes a resolution.

---

**Note** If you do not want to display the Hubs that have failed to connect with your computer, you can hide them. See Hide all unauthorized Hubs.

---

- Duplicate Connection
- Multiple user accounts with the same client ID
- Step 1: Remove the Hub certificate
- Problem: TCP port is not configured correctly
- Problem: Client ID has not been added to the Hub

# Command line interface

This chapter contains the following topics: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# Access the command line interface

You can access the Connect EZ 16/32 command line interface using an SSH connection, a telnet connection, or a serial connection. You can use an open-source terminal software, such as PuTTY or TeraTerm, to access the device through one of these mechanisms.

You can also access the command line interface in the WebUI by using the **Terminal**, or the Digi Remote Manager by using the **Console**.

To access the command line, your device must be configured to allow access, and you must log in as a user who has been configured for the appropriate access.

For further information about configuring access to these services, see:

- Serial: Serial port
- WebUI: Configure the web administration service
- SSH: Configure SSH access
- Telnet: Configure telnet access

# Log in to the command line interface

## Command line

1. Connect to the Connect EZ 16/32 device by using a serial connection, SSH or telnet, or the **Terminal** in the WebUI or the **Console** in the Digi Remote Manager. See Access the command line interface for more information.
   - For serial connections, the default configuration is:
     - **9600** baud rate
     - **8** data bits
     - **no** parity
     - **1** stop bit
     - **no** flow control
   - For SSH and telnet connections, the Setup IP address of the device is **192.168.2.1** on the .
2. At the login prompt, enter the username and password of a user with Admin access:

```
login: admin
Password: **********
```

   The default username is **admin**. The default unique password for your device is printed on the device label.
3. Depending on the device configuration, you may be presented with another menu, for example:

```
Access selection menu:

       a: Admin CLI
       q: Quit
```

```
Select access or quit [admin] :
```

Type **a** or **admin** to access the Connect EZ 16/32 command line.

You will now be connected to the Admin CLI:

```
Connecting now...
 Press Tab to autocomplete commands
 Press '?' for a list of commands and details
 Type 'help' for details on navigating the CLI
 Type 'exit' to disconnect from the Admin CLI

>
```

See Command line interface for detailed instructions on using the command line interface.

# Exit the command line interface

### Command line

1. At the command prompt, type **exit**.

```
> exit
```

2. Depending on the device configuration, you may be presented with another menu, for example:

```
Access selection menu:

       a: Admin CLI
       q: Quit

Select access or quit [admin] :
```

Type **q** or **quit** to exit.

# Execute a command from the web interface

Log into the Connect EZ 16/32 WebUI as a user with full Admin access rights.

1. At the main menu, click **Terminal**. The device console appears.

```
Connect EZ 16/32 login:
```

2. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

   The Admin CLI prompt appears.

```
>
```

# Display help for commands and parameters

## The help command

When executed from the root command prompt, **help** displays information about autocomplete operations, how to move the cursor on the Connect EZ 16/32 command line, and other keyboard shortcuts:

```
> help

 Commands
 ------------------------------------------------------------------------------
-
 ?             Show commands help
 <Tab>         Tab completion, displays all valid commands to complete command,
               if only one command is possible, it is used
 <Space>       Like tab except shortest prefix is used if command is valid
 <Enter>       Enter an input. If quoting then a new line is created instead. If
               the input is invalid then characters will be deleted until a
               prefix for a valid command is found.
 Ctrl + A      Move cursor to start of line
 Ctrl + E      Move cursor to end of line
 Ctrl + W      Delete word under cursor until start of line or [\',", ,\,/,.]
 Ctrl + R      If the current input is invalid then characters will be deleted
               until a prefix for a valid command is found.
 Ctrl + left   Jump cursor left until start of line or [\',", ,\,/,.]
 Ctrl + right  Jump cursor right until start of line or [\',", ,\,/,.]

>
```

## The question mark (?) command

When executed from the root command prompt, **?** displays available commands:

```
> ?

 Commands
 ------------------------------------------------------------------------------
-
 config      View and modify the configuration
 exit        Exit the CLI
 analyzer    Analyzer commands.
 cp          Copy a file or directory.
 grep        Grep a file.
 help        Show CLI editing and navigation commands.
 ls          List a directory.
 mkdir       Create a directory.
 modem       Modem commands.
 more        View a file.
 mv          Move a file or directory.
 ping        Ping a host.
 reboot      Reboot the system.
 rm          Remove a file or directory.
 scp         Copy a file or directory over SSH.
 show        Show instance statistics.
```

```
 system      System commands.
 tail        Tail a file.
 traceroute  Print the route packets trace to network host.
 update      Update firmware.

>
```

## Display help for individual commands

When included with a command name, both **?** and **help** provide further information about the command. For example:

1. To display further information about the **show** command, type either **show ?** or **show help**:

```
> show ?

 Commands
 ------------------------------------------------------------------------
--

 arp             Show ARP tables
 cloud           Show drm statistics
 config          Show config deltas.
 containers      Show container statistics.
 dhcp-lease      Show DHCP leases.
 dns             Show DNS servers.
 event           Show event list
 ipsec           Show IPsec statistics.
 l2tp            Show L2TP statistics.
 l2tppeth        Show L2TPv3 ethernet statistics.
 location        Show loction information.
 log             Show syslog.
 manufacture     Show manufacturer information.
 modbus-gateway Show modbus gateway status & statistics.
 modem           Show modem statistics.
 nemo            Show NEMO statistics.
 network         Show network interface statistics.
 ntp             Show NTP information.
 openvpn         Show OpenVPN statistics.
 route           Show IP routing information.
 scep-client     Show SCEP client statistics.
 serial          Show serial statistics.
 surelink        Show Surelink statistics.
 system          Show system statistics.
 version         Show firmware version.

 > show
```

### Use the Tab key or the space bar to display abbreviated help

When executed from the root command prompt, pressing the **Tab** key or the space bar displays an abbreviated list of available commands:

Similar behavior is available with any command name:

```
> config network interface <space>
..                ...               setupip        setuplinklocalip lan
loopback
> config network interface
```

## Auto-complete commands and parameters

When entering a command and parameter, press the **Tab** key to cause the command line interface to auto-complete as much of the command and parameter as possible. Typing the space bar has similar behavior. If multiple commands are available that will match the entered text, auto-complete is not performed and the available commands are displayed instead.

Auto-complete applies to these command elements only :

- Command names. For example, typing **net<Tab>** auto-completes the command as **network**.
- Parameter names. For example:
  - **ping *hostname* int<Tab>** auto-completes the parameter as **interface**.
  - **system b<Tab>** auto-completes the parameter as **backup**.
- Parameter values, where the value is one of an enumeration or an on|off type; for example:

  ```
  (config)> serial port1 enable t<Tab>
  ```

  auto-completes to

  ```
  (config)> serial port1 enable true
  ```

Auto-complete does not function for:

- Parameter values that are string types.
- Integer values.
- File names.
- Select parameters passed to commands that perform an action.

# Available commands

The following commands are available from the Admin CLI prompt:

| Command | Description |
|---|---|
| **config** | Used to view and modify the configuration.<br><br>See Device configuration using the command line interface for more information about using the **config** command. |
| **exit** | Exits the CLI. |
| **analyzer** | Analyzer commands. |
| **cat** | View a file. |
| **clear** | Commands to clear the device's status or systems. |
| **container** | Create, delete, or interact with a container. |
| **cp** | Copies a file or directory. |
| **grep** | Grep a file. |
| **help** | Displays:<br>■ CLI editing and navigation commands, when executed from the root of the Admin CLI prompt.<br>■ Available commands, syntax diagram, and parameter information, when executed in conjunction with another command.<br><br>See Display help for commands and parameters for information about the **help** command. |
| **ls** | Lists the contents of a directory. |
| **mkdir** | Creates a directory. |
| **modem** | Executes modem commands. |
| **monitoring** | Monitoring commands. |
| **more** | Displays the contents of a file. |
| **mv** | Moves a file or directory. |
| **ping** | Pings a remote host using Internet Control Message Protocol (ICMP) Echo Request messages. |
| **poweroff** | Powers off the system. |
| **reboot** | Reboots the Connect EZ 16/32 device. |
| **rm** | Removes a file. |
| **scp** | Uses the secure copy protocol (SCP) to transfer files between the Connect EZ 16/32 |

| Command | Description |
|---|---|
| | device and a remote host.<br><br>See Use the scp command for information about using the **scp** command. |
| **show** | Displays information about the device and the device's configuration.<br><br>See Display status and statistics using the show command for more information about the show command. |
| **iperf** | Perform a speedtest. |
| **ssh** | SSH login to a remote server. |
| **system** | Issues commands related to system functionality. |
| **tail** | Tail a file. |
| **telnet** | Telnet login to a remote server. |
| **traceroute** | Sends and tracks route packets to a destination host. |

Note For commands that operate on the Connect EZ 16/32's file system, such as the **cp**, **ls**, and **mkdir** commands, see File system for information about the file system, including how to copy, move and delete files and directories.

# Use the scp command

The **scp** command uses Secure Copy Protocol (SCP) to transfer files between the Connect EZ 16/32 device and a remote host.

### *Required configuration items*

- The hostname or IP address of the remote host.
- The username and password of the user on the remote host.
- Whether the file is being copied to the Connect EZ 16/32 device from a remote host, or to the remote host from the Connect EZ 16/32 device.
  - If the file is being copied to the Connect EZ 16/32 device from a remote host:
    - The path and filename of the file on the remote host that will be copied to the Connect EZ 16/32 device.
    - The location on the Connect EZ 16/32 device where the file will be copied.
  - If the file is being copied to a remote host from the Connect EZ 16/32 device:
    - The path and filename of the file on the Connect EZ 16/32 device that will be copied to the remote host.
    - The location on the remote host where the file will be copied.

### *Copy a file from a remote host to the Connect EZ 16/32 device*

To copy a file from a remote host to the Connect EZ 16/32 device, use the scp command as follows:

```
> scp host hostname-or-ip user username remote remote-path local local-path to
local
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the path and filename of the file on the remote host that will be copied to the Connect EZ 16/32 device.
- *local-path* is the location on the Connect EZ 16/32 device where the copied file will be placed.

For example:

To copy firmware from a remote host with an IP address of 192.168.4.1 to the /etc/config directory on the Connect EZ 16/32 device, issue the following command:

```
> scp host 192.168.4.1 user admin remote /home/admin/bin/Connect EZ 16/32-
25.2.bin local /etc/config/scripts to local
admin@192.168.4.1's password: adminpwd
Connect EZ 16/32-25.2.bin                          100%    36MB    11.1MB/s        00:03
>
```

### *Transfer a file from the Connect EZ 16/32 device to a remote host*

To copy a file from the Connect EZ 16/32 device to a remote host, use the scp command as follows:

```
> scp host hostname-or-ip user username remote remote-path local local-path to
remote
```

where:

- *hostname-or-ip* is the hostname or IP address of the remote host.
- *username* is the name of the user on the remote host.
- *remote-path* is the location on the remote host where the file will be copied.
- *local-path* is the path and filename on the Connect EZ 16/32 device.

For example:

To copy a support report from the Connect EZ 16/32 device to a remote host at the IP address of 192.168.4.1:

1. Use the **system support-report** command to generate the report:

   ```
   > system support-report path /var/log/
   Saving support report to /var/log/support-report-0040D0133536-24-01-12-
   12:10:00.bin
   Support report saved.
   >
   ```

2. Use the **scp** command to transfer the report to a remote host:

   ```
   > scp host 192.168.4.1 user admin remote /home/admin/temp/ local
   /var/log/support-report-00:40:D0:13:35:36-24-01-12-12:10:00.bin to remote
   admin@192.168.4.1's password: adminpwd
   ```

```
support-report-0040D0133536-24-01-12-12:10:00.bin
>
```

# Display status and statistics using the show command

The Connect EZ 16/32 **show** command display status and statistics for various features.

For example:

## show config

The show config command displays all the configuration settings for the device that have been changed from the default settings. This is a particularly useful when troubleshooting the device.

```
> show config

auth tacacs+ service "login"
auth user admin password
"$2a$05$WlJQhquI7BgsytkpobKhaeLPtWraGANBcrlEaJX/wJv63JENW/HOu"
add auth user test
add auth user test group end "admin"
add auth user test group end "serial"
auth user test password
"$2a$05$RdGYz1sLKbWrqe6cZjlsd.otg03JZR6n9939XV6EYWUSP0tMAzO5W"
network interface lan ipv4 type "dhcp"
network interface lan zone "external"
network interface modem modem apn 0 apn "00000.000"
network interface modem modem apn_lock "true"
schema version "445"

>
```

## show system

The show system command displays system information and statistics for the device, including CPU usage.

```
> show system

  Model                     : Digi Connect EZ 16/32
  Serial Number             : Connect EZ 16/32xxxxxxxxyyyyxx
  SKU                       : Connect EZ 16/32
  Hostname                  : Connect EZ 16/32
  MAC Address               : DF:DD:E2:AE:21:18

  Hardware Version          : 50001947-01 1P
  Firmware Version          : 25.2
  Alt. Firmware Version     : 25.2
  Alt. Firmware Build Date  : Fri, Jan 12, 2024 12:10:00
  Bootloader Version        : 19.7.23.0-15f936e0ed

  Current Time              : Thu, Jan 11, 2024 12:10:00 +0000
  CPU                       : 1.4%
  Uptime                    : 6 days, 6 hours, 21 minutes, 57 seconds (541317s)
  Temperature               : 40C
  Location                  :
```

```
  Contact                 :

>
```

### show network

The show network command displays status and statistics for network interfaces.

```
> show network

 Interface          Proto  Status   Address
 ----------------   -----  -------  --------------------------------
 setupip          IPv4   up       192.168.210.1/24
 setuplinklocalip  IPv4    up       169.254.100.100/16
 lan               IPv4   up       192.168.2.1
 lan               IPv6   up       0:0:0:0:0:ffff:c0a8:301
 loopback           IPv4    up       127.0.0.1/8
 wan               IPv4   up       192.168.3.1/24
 wan               IPv6   up       fd00:2704::240:ffff:fe80:120/64

>
```

## Device configuration using the command line interface

The **config** command allows for device configuration from the command line. All configuration tasks that can be performed by using the WebUI can also be performed by using the **config** command.

There are two ways to invoke the **config** command from the CLI:

- Execute the **config** command and parameters at the root prompt. See Execute configuration commands at the root Admin CLI prompt for more information.
- Enter configuration mode by executing the **config** command without any parameters. See Configuration mode for more information.

## Execute configuration commands at the root Admin CLI prompt

You can execute the **config** command at the root Admin CLI prompt with any appropriate parameters. When the **config** command is used in this way, changes to the device's configuration are automatically saved when the command is executed.

For example, to disable the SSH service from the root prompt, enter the following command:

```
> config service ssh enable false
>
```

The Connect EZ 16/32 device's ssh service is now disabled.

**Note** When the **config** command is executed at the root prompt, certain configuration actions that are available in configuration mode cannot be performed. This includes validating configuration changes, canceling and reverting configuration changes, and performing actions on elements in lists. See Configuration mode for information about using configuration mode.

## Display help for the config command from the root Admin CLI prompt

Display additional configuration commands, as well as available parameters and values, by entering the question mark (?) character after the **config** command.

1. For example:

```
> config ?
```

Will display the following help information:

```
> config ?

Additional Configuration
------------------------------------------------------------------------------
-
application               Custom scripts
auth                      Authentication
cloud                     Central management
firewall                  Firewall
monitoring                Monitoring
network                   Network
serial                    Serial
service                   Services
system                    System
vpn                       VPN

Run "config" with no arguments to enter the configuration editing mode.

> config
```

2. You can then display help for the additional configuration commands. For example, to display help for the **config service** command:

```
> config service ?
Services

Additional Configuration
------------------------------------------------------------------------------
-
dns                       DNS
mdns                      Service Discovery (mDNS)
multicast                 Multicast
ntp                       NTP
remote_control            Remote control
snmp                      SNMP
ssh                       SSH
telnet                    Telnet
web_admin                 Web administration

> config service
```

3. Next, display help for the **config service ssh** command:

```
> config service ssh ?

SSH: An SSH server for managing the device.

Parameters                Current Value
--------------------------------------------------------------------------
-
enable                    true           Enable
key                       [private]      Private key
port                      22             Port

Additional Configuration
--------------------------------------------------------------------------
-
acl                       Access control list
mdns

> config service ssh
```

4. Lastly, display the allowed values and other information for the **enable** parameter:

```
> config service ssh enable ?

Enable: Enable the service.
Format: true, false, yes, no, 1, 0
Default value: true
Current value: true

> config service ssh enable
```

# Configuration mode

Configuration mode allows you to perform multiple configuration tasks and validate the changes prior to saving them. You can cancel all changes without saving them at any time. Configuration changes do not take effect until the configuration is saved.

## Enable configuration mode

To enable configuration mode, at the root prompt, enter the **config** command without any parameters:

```
> config
(config)>
```

When the command line is in configuration mode, the prompt will change to include **(config)**, to indicate that you are currently in configuration mode.

## Enter configuration commands in configuration mode

There are two ways to enter configuration commands while in configuration mode:

- Enter the full command string from the config prompt.

  For example, to disable the ssh service by entering the full command string at the config prompt:

```
(config)> service ssh enable false
(config)>
```

- Execute commands by moving through the configuration schema.

  For example, to disable the ssh service by moving through the configuration and then executing the **enable false** command:

  1. At the **config** prompt, enter **service** to move to the **service** node:

```
(config)> service
(config service)>
```

  2. Enter **ssh** to move to the **ssh** node:

```
(config service)> ssh
(config service ssh)>
```

  3. Enter **enable false** to disable the **ssh** service:

```
(config service ssh)> enable false
(config service ssh)>
```

  See Move within the configuration schema for more information about moving within the configuration.

## Save changes and exit configuration mode

To save changes that you have made to the configuration while in configuration mode, use **save**. The save command automatically validates the configuration changes; the configuration will not be saved if it is not valid. Note that you can also validate configuration changes at any time while in configuration mode by using the **validate** command.

```
(config)> save
Configuration saved.
>
```

After using **save** to save changes to the configuration, you will automatically exit configuration mode. To return to configuration mode, type **config** again.

## Exit configuration mode without saving changes

You can discard any unsaved configuration changes and exit configuration mode by using the **cancel** command:

```
(config)> cancel
>
```

After using **cancel** to discard unsaved changes to the configuration, you will automatically exit configuration mode.

## Configuration actions

In configuration mode, configuration actions are available to perform tasks related to saving or canceling the configuration changes, and to manage items and elements in lists. The commands can be listed by entering a question mark (**?**) at the **config** prompt.

The following actions are available:

| Configuration actions | Description |
|---|---|
| **cancel** | Discards unsaved configuration changes and exits configuration mode. |
| **save** | Saves configuration changes and exits configuration mode. |
| **validate** | Validates configuration changes. |
| **revert** | Reverts the configuration to default settings. See The revert command for more information. |
| **show** | Displays configuration settings. |
| **add** | Adds a named element, or an element in a list. See Manage elements in lists for information about using the **add** command with lists. |
| **del** | Deletes a named element, or an element in a list. See Manage elements in lists for information about using the **del** command with lists. |
| **move** | Moves elements in a list. See Manage elements in lists for information about using the **move** command with lists. |

## Display command line help in configuration mode

Display additional configuration commands, as well as available parameters and values, by entering the question mark (?) character at the **config** prompt. For example:

1. Enter **?** at the **config** prompt:

```
(config)> ?
```

This will display the following help information:

```
(config)> ?

 Additional Configuration
 ------------------------------------------------------------------------
--
 application               Custom scripts
```

```
 auth                        Authentication
 cloud                       Central management
 firewall                    Firewall
 monitoring                  Monitoring
 network                     Network
 serial                      Serial
 service                     Services
 system                      System
 vpn                         VPN

(config)>
```

2. You can then display help for the additional configuration commands. For example, to display help for the **config service** command, use one of the following methods:
   - At the **config** prompt, enter **service ?**:

     ```
     (config)> service ?
     ```

   - At the **config** prompt:
     a. Enter **service** to move to the **service** node:

        ```
        (config)> service
        (config service)>
        ```

     b. Enter **?** to display help for the **service** node:

        ```
        (config service)> ?
        ```

   Either of these methods will display the following information:

```
config> service ?

Services

 Additional Configuration
 ------------------------------------------------------------------------
--
 dns                         DNS
 mdns                        Service Discovery (mDNS)
 multicast                   Multicast
 ntp                         NTP
 remote_control              Remote control
 snmp                        SNMP
 ssh                         SSH
 telnet                      Telnet
 web_admin                   Web administration

(config)> service
```

3. Next, to display help for the **service ssh** command, use one of the following methods:
   - At the **config** prompt, enter **service ssh ?**:

     ```
     (config)> service ssh ?
     ```

   - At the **config** prompt:
     a. Enter **service** to move to the **service** node:

        ```
        (config)> service
        (config service)>
        ```

     b. Enter **ssh** to move to the **ssh** node:

        ```
        (config service)> ssh
        (config service ssh)>
        ```

     c. Enter **?** to display help for the **ssh** node:

        ```
        (config service ssh)> ?
        ```

   Either of these methods will display the following information:

```
(config)> service ssh ?

SSH: An SSH server for managing the device.

 Parameters                Current Value
 ------------------------------------------------------------------------
--
 enable                    true           Enable
 key                       [private]      Private key
 port                      22             Port

 Additional Configuration
 ------------------------------------------------------------------------
--
 acl                       Access control list
 mdns

(config)> service ssh
```

4. Lastly, to display allowed values and other information for the **enable** parameter, use one of the following methods:
   - At the **config** prompt, enter **service ssh enable ?**:

     ```
     (config)> service ssh enable ?
     ```

   - At the **config** prompt:
     a. Enter **service** to move to the **service** node:

        ```
        (config)> service
        (config service)>
        ```

b. Enter **ssh** to move to the **ssh** node:

```
(config service)> ssh
(config service ssh)>
```

c. Enter **enable ?** to display help for the **enable** parameter:

```
(config service ssh)> enable ?
(config service ssh)>
```

Either of these methods will display the following information:

```
(config)> service ssh enable ?

 Enable: Enable the service.
 Format: true, false, yes, no, 1, 0
 Default value: true
 Current value: true

(config)> service ssh enable
```

## Move within the configuration schema

You can perform configuration tasks at the CLI by moving within the configuration.

- Move forward one node in the configuration by entering the name of an Additional Configuration option:
  1. At the **config** prompt, type **service** to move to the **service** node:

     ```
     (config)> service
     (config service)>
     ```

  2. Type **ssh** to move to the **ssh** node:

     ```
     (config service)> ssh
     (config service ssh)>
     ```

  3. Type **acl** to move to the **acl** node:

     ```
     (config service ssh)> acl
     (config service ssh acl)>
     ```

  4. Type **zone** to move to the **zone** node:

     ```
     (config service ssh acl)> zone
     (config service ssh acl zone)>
     ```

  You can also enter multiple nodes at once to move multiple steps in the configuration:

  ```
  (config)> service ssh acl zone
  (config service ssh acl zone)>
  ```

- Move backward one node in the configuration by entering two periods (**..**):

```
(config service ssh acl zone)> ..
(config service ssh acl)>
```

You can also move back multiples nodes in the configuration by typing multiple sets of two periods:

```
(config service ssh acl zone)> .. .. ..
(config service)>
```

- Move to the root of the config prompt from anywhere within the configuration by entering three periods (**...**):

```
(config service ssh acl zone)> ...
(config)>
```

## Manage elements in lists

While in configuration mode, you can use the **add**, **del**, and **move** action commands to manage elements in a list. When working with lists, these actions require an index number to identify the list item that will be acted on.

### *Add elements to a list*

When used with parameters that contains lists of elements, the **add** command is used to add an element to the list.

For example, to add an authentication method:

1. Display current authentication method by using the **show** command:

```
(config)> show auth method
0 local
(config)>
```

2. Add an authentication method by using the **add** ***index_item*** command. For example:
   - To add the TACACS+ authentication method to the beginning of the list, use the index number **0**:

```
(config)> add auth method 0 tacacs+
(config)> show auth method
0 tacacs+
1 local
(config)>
```

   - To add the TACACS+ authentication method to the end of the list, use the **end** keyword:

```
(config)> add auth method end tacacs+
(config)> show auth method
0 local
1 tacacs+
(config)>
```

**The end keyword**

As demonstrated above, the **end** keyword is used to add an element to the end of a list. Additionally, the **end** keyword is used to add an element to a list that does not have any elements.

For example, to add an authentication group to a user that has just been created:

1. Use the **show** command to verify that the user is not currently a member of any groups:

```
(config)> show auth user new-user group
(config)>
```

2. Use the **end** keyword to add the admin group to the user's configuration:

```
(config)> add auth user new-user group end admin
(config)>
```

3. Use the **show** command again to verify that the admin group has been added to the user's configuration:

```
(config)> show auth user new-user group
0 admin
(config)>
```

### *Delete elements from a list*

When used with parameters that contains lists of elements, the **del** command is used to delete an element in the list.

For example, to delete an authentication method:

1. Use the **show** command to display current authentication method configuration:

```
(config)> show auth method
0 local
1 tacacs+
2 radius
(config)>
```

2. Delete one of the authentication methods by using the **del *index_number*** command. For example:
   a. To delete the local authentication method, use the index number **0**:

```
(config)> del auth method 0
(config)>
```

   b. Use the **show** command to verify that the local authentication method was removed:

```
(config)> show auth method
0 tacacs+
1 radius
(config)>
```

### *Move elements within a list*

Use the **move** command to reorder elements in a list.

For example, to reorder the authentication methods:

1. Use the **show** command to display current authentication method configuration:

```
(config)> show auth method
0 local
1 tacacs+
2 radius
(config)>
```

2. To configure the device to use TACACS+ authentication first to authenticate a user, use the **move *index_number_1 index_number_2*** command:

```
(config)> move auth method 1 0
(config)>
```

3. Use the **show** command again to verify the change:

```
(config)> show auth method
0 tacacs+
1 local
2 radius
(config)>
```

## The revert command

The **revert** command is used to revert changes to the Connect EZ 16/32 device's configuration and restore default configuration settings. The behavior of the revert command varies depending on where in the configuration hierarchy the command is executed, and whether the optional **path** parameter is used. After executing the revert command, you must save the configuration changes by using the **save** command. You can also discard the configuration changes by using the **cancel** command.

**CAUTION!** The **revert** command reverts all changes to the default configuration, not only unsaved changes.

### *Revert all configuration changes to default settings*

To discard all configuration changes and revert to default settings, use the **revert** command at the config prompt without the optional **path** parameter:

1. At the config prompt, enter **revert**:

```
(config)> revert
(config)>
```

2. Set the password for the admin user prior to saving the changes:

```
(config)> auth user admin password pwd
(config)>
```

3. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

4. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

### *Revert a subset of configuration changes to the default settings*

There are two methods to revert a subset of configuration changes to the default settings.

- Enter the **revert** command with the **path** parameter. For example, to revert all changes to the authentication methods configuration:
  1. Enter the **revert** command with the **path** set to **auth method**:

```
(config)> revert auth method
(config)>
```

  2. Save the configuration and apply the change.

```
(config)> save
Configuration saved.
>
```

  3. Type **exit** to exit the Admin CLI.

     Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

- Move to the location in the configuration and enter the **revert** command without the **path** parameter. For example:
  1. Change to the auth method node:

```
(config)> auth method
(config auth method)>
```

  2. Enter the **revert** command:

```
(config auth method)> revert
(config auth method)>
```

  3. Save the configuration and apply the change.

```
(config auth method)> save
Configuration saved.
>
```

  4. Type **exit** to exit the Admin CLI.

     Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

- You can also use a combination of both of these methods:
  1. Change to the **auth** node:

     ```
     (config)> auth
     (config auth)>
     ```

  2. Enter the **revert** command with the **path** set to **method**:

     ```
     (config auth)> revert method
     (config auth)>
     ```

  3. Save the configuration and apply the change.

     ```
     (config auth)> save
     Configuration saved.
     >
     ```

  4. Type **exit** to exit the Admin CLI.

     Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

## Enter strings in configuration commands

For string parameters, if the string value contains a space, the value must be enclosed in quotation marks. For example, to assign a descriptive name for the device using the **system** command, enter:

```
(config)> system description "Digi Connect EZ 16/32"
```

## Example: Create a new user by using the command line

In this example, you will use the Connect EZ 16/32 command line to create a new user, provide a password for the user, and assign the user to authentication groups.

1. Select the device in Remote Manager and click **Actions** > **Open Console**, or log into the Connect EZ 16/32 local command line as a user with full Admin access rights.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **admin** to access the Admin CLI.

2. At the command line, type **config** to enter configuration mode:

   ```
   > config
   (config)>
   ```

3. At the config prompt, create a new user with the username **user1**:
   - Method one: Create a user at the root of the config prompt:

     ```
     (config)> add auth user user1
     (config auth user user1)>
     ```

- Method two: Create a user by moving through the configuration:
  a. At the config prompt, enter **auth** to move to the **auth** node:

```
(config)> auth
(config auth)>
```

  b. Enter **user** to move to the **user** node:

```
(config auth)> user
(config auth user)>
```

  c. Create a new user with the username **user1**:

```
(config auth user)> add user1
(config auth user user1)>
```

4. Configure a password for the user:

```
(config auth user user1)> password pwd1
(config auth user user1)>
```

5. List available authentication groups:

```
(config auth user user1)> show .. .. group

admin
    acl
        admin
            enable true
        nagios
            enable false
        openvpn
            enable false
            no tunnels
        portal
            enable false
            no portals
        serial
            enable false
            no ports
        shell
            enable false

serial
    acl
        admin
            enable true
        nagios
            enable false
        openvpn
            enable false
            no tunnels
```

```
        portal
            enable false
            no portals
        serial
            enable true
                ports
                    0 port1
        shell
            enable false
(config auth user user1)>
```

6. Add the user to the admin group:

```
(config auth user user1)> add group end admin
(config auth user user1)>
```

7. Save the configuration and apply the change.

```
(config auth user user1)> save
Configuration saved.
>
```

8. Type **exit** to exit the Admin CLI.

   Depending on your device configuration, you may be presented with an **Access selection menu**. Type **quit** to disconnect from the device.

# Command line reference

## ain calibrate

Measure current value of analog input, and set it as zero offset.

### *Syntax*

```
ain calibrate <name> <type> <setpoint>
```

**Parameters**

name: Name of the analog input.

type: Calibrate low or high-end of analog input range.

setpoint: Reference voltage/current connected on the analog input (in mV/uA). (Minimum: 0)

## ain calibration-reset

Reset both voltage and current calibration of analog input.

### *Syntax*

```
ain calibration-reset <name>
```

**Parameters**

name: Name of the analog input.

## analyzer clear

Clears the traffic captured by the analyzer.

### *Syntax*

```
analyzer clear <name>
```

**Parameters**

name: Name of the capture filter to use.

## analyzer save

Saves the current captured traffic to a file.

### *Syntax*

```
analyzer save <name> <path>
```

**Parameters**

name: Name of the capture filter to use.

path: The path and filename to save captured traffic to. If a relative path is provided, /etc/config/analyzer will be used as the root directory for the path and file.

## analyzer start

Start a capture session of packets on this devices interfaces.

### *Syntax*

```
analyzer start <name>
```

**Parameters**

name: Name of the capture filter to use.

## analyzer stop

Stops the traffic capture session.

### *Syntax*

```
analyzer stop <name>
```

**Parameters**

name: Name of the capture filter to use.

## cat

View the contents of a file.

### *Syntax*

```
cat <path>
```

**Parameters**

path: The file to view.

## clear dhcp-lease ip-address

Clear the DHCP lease for the specified IP address.

### *Syntax*

```
clear dhcp-lease ip-address <address>
```

**Parameters**

address: An IPv4 or IPv6 address.

## clear dhcp-lease mac

Clear the DHCP lease for the specified MAC address.

### *Syntax*

```
clear dhcp-lease mac ADDRESS
```

**Parameters**

address: 12-digit, colon-delimited MAC address [00:11:22:AA:BB:CC]

## config system storage mount

Enable or disable automount.

### *Syntax*

```
config system storage sd mount [true|false]
```

**Parameters**

mount: Enable automount (true) or disable automount (false)

## config system storage partition

Automount a partition on an SD card.

### *Syntax*

```
config system storage sd partition [1-N]
```

**Parameters**

partition: Specify the partition number to be automounted.

## config system storage used percent

Generate an event when a specified percent of space is used on an SD card.

### *Syntax*

```
config system storage [sd|nfs] used_percent [1-N]
```

**Parameters**

system storage: Specify the storage device (sd, nfs).

used-percent: Specify a percent value of the used storage. When this percent value is met, a system event is generated.

## cp

Copy a file or directory.

### *Syntax*

```
cp <source> <destination> [force]
```

**Parameters**

source: The source file or directory to copy.

destination: The destination path to copy the source file or directory to.

force: Do not ask to overwrite the destination file if it exists.

## dio state

Set digital I/O.

### *Syntax*

```
dio state <name> <state>
```

**Parameters**

name: Name of the digital I/O.
state: State of the digital I/O.

## grep

Grep the contents of a file.

### *Syntax*

```
grep <match> <path>
```

**Parameters**

match: Output all lines in file matching string.
path: The file to grep.

## help

Show CLI editing and navigation commands.

### *Syntax*

```
help
```

**Parameters**

None

## ls

List a directory.

### *Syntax*

```
ls <path> [show-hidden]
```

**Parameters**

path: List files and directories under this path.

show-hidden: Show hidden files and directories. Hidden filenames begin with '.'.

## mkdir

Create a directory. Parent directories are created as needed.

### *Syntax*

```
mkdir <path>
```

**Parameters**

path: The directory path to create.

## modem at

Send an AT command to the modem and display the response.

### *Syntax*

```
modem at <cmd> [name STRING] [imei STRING]
```

**Parameters**

cmd: The AT command string.

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

## modem at-interactive

Start an AT command session on the modem's AT serial port.

### *Syntax*

```
modem at-interactive [name STRING] [imei STRING]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

## modem firmware bundle ota check

Query the Digi firmware server for the latest remote modem firmware version.

### *Syntax*

```
modem firmware bundle ota check [name STRING]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

## modem firmware bundle ota download

Downloads modem firmware from the server. The firmware will be downloaded on the device but the modem won't be updated.

### Syntax

```
modem firmware bundle ota download [name STRING] [version STRING] [binary STRING]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

version: Firmware version name.

binary: Firmware binary position.

## modem firmware bundle ota list

Query the Digi firmware server for a list of modem firmware versions.

### Syntax

```
modem firmware bundle ota list [name STRING]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

## modem firmware bundle ota update

Perform FOTA (firmware-over-the-air) update. The modem will be updated to the latest modem firmware image unless a specific firmware version is specified.

### Syntax

```
modem firmware bundle ota update [name STRING] [version STRING]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

version: Firmware version name.

## modem firmware check

Inspect /opt/[MODEM_MODEL]/Custom_Firmware/ directory for new modem firmware file.

### Syntax

```
modem firmware check [name STRING] [imei STRING]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

## modem firmware list

List modem firmware files found in the /opt/[MODEM_MODEL]/ directory.

### *Syntax*

```
modem firmware list [name STRING] [imei STRING]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

## modem firmware ota check

Query the Digi firmware server for the latest remote modem firmware version.

### *Syntax*

```
modem firmware ota check [name STRING] [imei STRING]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

## modem firmware ota download

Downloads modem firmware from the server. The firmware will be downloaded on the device but the modem won't be updated.

### *Syntax*

```
modem firmware ota download [name STRING] [imei STRING] [version STRING]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

version: Firmware version name.

## modem firmware ota list

Query the Digi firmware server for a list of modem firmware versions.

### *Syntax*

```
modem firmware ota list [name STRING] [imei STRING]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

## modem firmware ota update

Perform FOTA (firmware-over-the-air) update. The modem will be updated to the latest modem firmware image unless a specific firmware version is specified.

### *Syntax*

```
modem firmware ota update [name STRING] [imei STRING] [version STRING]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

version: Firmware version name.

## modem firmware update

Update modem firmware using local firmware file. The modem will be updated to the firmware specified in the /opt/[MODEM_MODEL]/Custom_Firmware/ directory unless a specific firmware version is specified.

### *Syntax*

```
modem firmware update [name STRING] [imei STRING] [version STRING]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

version: Firmware version name.

## modem pin change

Change the SIM's PIN code.

**Warning**: Attempting to use an incorrect PIN code may PUK lock the SIM.

### *Syntax*

```
modem pin change <old-pin> <new-pin> [name STRING] [imei STRING]
```

**Parameters**

old-pin: The SIM's PIN code.

new-pin: The PIN code to change to.

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

## modem pin disable

Disable the PIN lock on the SIM card that is active in the modem.

**Warning**: Attempting to use an incorrect PIN code may PUK lock the SIM.

### *Syntax*

```
modem pin disable <pin> [name STRING] [imei STRING]
```

**Parameters**

pin: The SIM's PIN code.

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

## modem pin enable

Enable the PIN lock on the SIM card that is active in the modem. The SIM card will need to be unlocked before each use.

**Warning**: Attempting to use an incorrect PIN code may PUK lock the SIM.

### *Syntax*

```
modem pin enable <pin> [name STRING] [imei STRING]
```

**Parameters**

pin: The SIM's PIN code.

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

## modem pin status

Print the PIN lock status and the number of PIN enable/disable/unlock attempts remaining. The SIM will be PUK locked when there are no remaining retries.

### *Syntax*

```
modem pin status [name STRING] [imei STRING]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

## modem pin unlock

Temporarily unlock the SIM card with a PIN code. Set the PIN field in the modem interface's configuration to unlock the SIM card automatically before use.

**Warning**: Attempting to use an incorrect PIN code may PUK lock the SIM.

### *Syntax*

```
modem pin unlock <pin> [name STRING] [imei STRING]
```

**Parameters**

pin: The SIM's PIN code.

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

## modem puk status

Print the PUK status and the number of PUK unlock attempts remaining.

### *Syntax*

```
modem puk status [name STRING] [imei STRING]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

## modem puk unlock

Unlock the SIM with a PUK code from the SIM provider.

### *Syntax*

```
modem puk unlock <puk> <new-pin> [name STRING] [imei STRING]
```

**Parameters**

puk: The SIM's PUK code.

new-pin: The PIN code to change to.

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

## modem reset

Reset the modem hardware (reboot it). This can be useful if the modem has stopped responding to the network or is behaving inconsistently.

### *Syntax*

```
modem reset [name STRING] [imei STRING]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

## modem scan

List of carriers present in the network.

### *Syntax*

```
modem scan [name STRING] [imei STRING] [timeout INTEGER]
```

**Parameters**

name: The configured name of the modem to execute this CLI command on.

imei: The IMEI of the modem to execute this CLI command on.

timeout: The amount of time in seconds to wait for modem scan to complete. (Default: 300)

## modem sim-slot

Show or change the modem's active SIM slot. This applies only to modems with multiple SIM slots.

### *Syntax*

```
modem sim-slot <slot> [name STRING] [imei STRING]
```

**Parameters**

slot: The SIM slot to change to.
name: The configured name of the modem to execute this CLI command on.
imei: The IMEI of the modem to execute this CLI command on.

## modem sms send

Send an SMS message to the provided phone number (MSISDN).

### *Syntax*

```
modem sms send <msisdn> <message> [name STRING] [imei STRING]
```

**Parameters**

msisdn: Destination phone number (MSISDN).
message: Message to send.
name: The configured name of the modem to execute this CLI command on.
imei: The IMEI of the modem to execute this CLI command on.

## modem sms send-binary

Send a binary SMS message to the provided phone number (MSISDN).

### *Syntax*

```
modem sms send-binary <msisdn> <message> [name STRING] [imei STRING]
```

**Parameters**

msisdn: Destination phone number (MSISDN).
message: Message to send.
name: The configured name of the modem to execute this CLI command on.
imei: The IMEI of the modem to execute this CLI command on.

## monitoring metrics upload

Immediately upload current device health metrics. Functions as if a scheduled upload was triggered.

### *Syntax*

```
monitoring metrics upload
```

**Parameters**

None

## monitoring

Commands to clear the device's status or systems.

### *monitoring metrics*

Device metrics commands.

#### uplaod

Immediately upload current device health metrics. Functions as if a scheduled upload was triggered.

#### *Parameters*

None

## monitoring metrics upload

Immediately upload current device health metrics. Functions as if a scheduled upload was triggered.

### *Syntax*

```
monitoring metrics upload
```

#### Parameters

None

## more

View a file.

### *Syntax*

```
more <path>
```

#### Parameters

path: The file to view.

## mv

Move a file or directory.

### *Syntax*

```
mv <source> <destination> [force]
```

#### Parameters

source: The source file or directory to move.
destination: The destination path to move the source file or directory to.
force: Do not ask to overwrite the destination file if it exists.

## ping

Ping a host using ICMP echo.

### *Syntax*

```
ping <host> [interface STRING] [source STRING] [ipv6] [size INTEGER] [count
INTEGER] [broadcast]
```

**Parameters**

host: The name or address of the remote host to send ICMP ping requests to. If broadcast is enabled, can be the broadcast address.

interface: The network interface to send ping packets from when the host is reachable over a default route. If not specified, the system's primary default route will be used.

source: The ping command will send a packet with the source address set to the IP address of this interface, rather than the address of the interface the packet is sent from.

ipv6: If a hostname is defined as the value of the 'host' parameter, use the hosts IPV6 address.

size: The number of bytes sent in the ICMP ping request. (Minimum: 0, Default: 56)

count: The number of ICMP ping requests to send before terminating. (Minimum: 1, Default: 100)

broadcast: Enable broadcast ping functionality.

## poweroff

Power off the system.

### *Syntax*

```
poweroff
```

**Parameters**

None

## pyinstall

Pyinstall commands.

### *Syntax*

```
pyinstall <package>
```

**Parameters**

package: Path and filename of the package to install (.zip, .whl).

## reboot

Reboot the system.

### *Parameters*

None

## rm

Remove a file or directory.

### *Syntax*

```
rm <path> [force]
```

**Parameters**

path: The path to remove.

force: Force the file to be removed without asking.

## scp

Copy a file or directory over SSH.

### *Syntax*

```
scp <local> <remote> <host> <user> <to> [port INTEGER]
```

**Parameters**

local: The path and name of the file on the local device to copy to or from.

remote: The path and name of the file on the remote host to copy to or from.

host: The hostname or IP address of the remote host.

user: The username to use when connecting to the remote host.

to: Determine whether to copy the file from the local device to the remote host, or from the remote host to the local device.

port: The SSH port to use to connect to the remote host. (Minimum: 1, Maximum: 65535, Default: 22)

## config directory: show command

Show a summary of changes made to the default configuration in a format that can be copied and pasted.

**Note** This same information can be displayed using the show config command, but the display is not suitable for copying and pasting.

### *Syntax*

```
> config
(config)> show
```

**Parameters**

None

## show ain

Show analog input status.

### *Syntax*

```
show ain [name STRING]
```

**Parameters**

name: Name of the analog input.

## show analyzer

Show packets from a specified analyzer capture.

### *Syntax*

```
show analyzer <name>
```

**Parameters**

name: Name of the capture filter to use.

## show arp

Show ARP tables. If no IP version is specified IPv4 & IPV6 will be displayed.

### *Syntax*

```
show arp [ipv4] [ipv6] [verbose]
```

**Parameters**

ipv4: Display IPv4 routes. If no IP version is specified IPv4 & IPV6 will be displayed.

ipv6: Display IPv6 routes. If no IP version is specified IPv4 & IPV6 will be displayed.

verbose: Display more information (less concise, more detail).

## show bluetooth-scanner log

Show the Bluetooth scanner output log.

### *Syntax*

```
show bluetooth-scanner log
```

**Parameters**

None

## show bluetooth-scanner nearby

Show Bluetooth devices detected during the most recent update interval.

### *Syntax*

```
show bluetooth-scanner nearby
```

**Parameters**

None

## show bluetooth-scanner static-candidate

Show Bluetooth devices detected during the most recent observation period but not evaluated as static.

### *Syntax*

```
show bluetooth-scanner static-candidate
```

**Parameters**

None

## show bluetooth-scanner static-confirmed

Show Bluetooth devices that have been evaluated as static.

### *Syntax*

```
show bluetooth-scanner static-confirmed
```

**Parameters**

None

## show cloud

Show drm status & statistics.

### *Syntax*

```
show cloud
```

**Parameters**

None

## show config

Show a summary of changes made to the default configuration. The changes shown are not suitable for pasting into a CLI session.

### *Syntax*

```
show config [cli_format]
```

**Parameters**

cli_format: Show the exact CLI commands required to configure the device from a default configuration. The changes shown are suitable for pasting into a CLI session, although individual output lines maybe context sensitive and unable to be entered in isolation.

## show containers

Show container status & statistics.

### *Syntax*

```
show containers [container STRING]
```

**Parameters**

container: Display more details and config data for a specific container.

## show dhcp-lease

Show DHCP leases.

### *Syntax*

```
show dhcp-lease [all] [verbose]
```

**Parameters**
all: Show all leases (active and inactive (not in etc/config/dhcp.*lease)).
verbose: Display more information (less concise, more detail).

## show dio

Show digital I/O status.

### *Syntax*

```
show dio [name STRING]
```

**Parameters**
name: Name of the digital I/O.

## show dns

Show DNS servers and associated domains.

### *Syntax*

```
show dns
```

**Parameters**
None

## show eth

Show ethernet status & statistics.

### *Syntax*

```
show eth [name STRING]
```

**Parameters**
name: Display more details and configuration data for a specific ethernet instance.

## show event

Show event list (high level).

### *Syntax*

```
show event [table <status|error|info>] [number INTEGER]
```

**Parameters**
table: Type of event log to be displayed (status, error, info).
number: Number of lines to retrieve from log. (Minimum: 1, Default: 20)

## show hotspot

Show hotspot statistics.

### *Syntax*

```
show hotspot [name STRING] [ip STRING]
```

**Parameters**
name: The configured instance name of the hotspot.
ip: IP address of a specific client, to limit the status display to only this client.

## show ipsec

Show IPsec status & statistics.

### *Syntax*

```
show ipsec [tunnel STRING] [all] [verbose]
```

**Parameters**
tunnel: Display more details and config data for a specific IPsec tunnel.
all: Display all tunnels including disabled tunnels.
verbose: Display status of one or all tunnels in plain text.

## show l2tp lac

Show L2TP access concentrator status & statistics.

### *Syntax*

```
show l2tp lac [name STRING]
```

**Parameters**
name: Display more details for a specific L2TP access concentrator.

## show l2tp lns

Show L2TP network server status & statistics.

### *Syntax*

```
show l2tp lns [name STRING]
```

**Parameters**
name: Display more details for a specific L2TP network server.

## show l2tpeth

Show L2TPv3 ethernet tunnel session status and statistics.

### Syntax

```
show l2tpeth [name STRING]
```

**Parameters**

name: Display more details for a specific L2TPv3 ethernet tunnel session.

## show location

Show location information.

### Syntax

```
show location [geofence]
```

**Parameters**

geofence: Show geofence information.

## show log

Show system log (low level).

### Syntax

```
show log [number INTEGER] [filter <critical|warning|debug|info>]
```

**Parameters**

number: Number of lines to retrieve from log. (Minimum: 1, Default: 20)

filter: Filters for type of log message displayed (critical, warning, info, debug). Note, filters from the number of messages retrieved not the whole log (this can be very time consuming). If you require more messages of the filtered type, increase the number of messages retrieved using 'number'.

## show manufacture

Show manufacturer information.

### Syntax

```
show manufacture [verbose]
```

**Parameters**

verbose: Display more information (less concise, more detail).

## show modbus-gateway

Show modbus gateway status & statistics.

### Syntax

```
show modbus-gateway [verbose]
```

**Parameters**
verbose: Display more information (less concise, more detail).

## show modem

Show modem status & statistics.

### *Syntax*

```
show modem [name STRING] [imei STRING] [verbose]
```

**Parameters**
name: The configured name of the modem to execute this CLI command on.
imei: The IMEI of the modem to execute this CLI command on.
verbose: Display more information (less concise, more detail).

## show nemo

Show NEMO status and statistics.

### *Syntax*

```
show nemo [name STRING]
```

**Parameters**
name: Display more details and configuration data for a specific NEMO instance.

## show network

Show network interface status & statistics.

### *Syntax*

```
show network [interface STRING] [all] [verbose]
```

**Parameters**
interface: Display more details and config data for a specific network interface.
all: Display all interfaces including disabled interfaces.
verbose: Display more information (less concise, more detail).

## show ntp

Show NTP status & statistics.

### *Syntax*

```
show ntp
```

**Parameters**
None

## show openvpn client

Show OpenVPN client status & statistics.

### *Syntax*

```
show openvpn client [name STRING] [all]
```

**Parameters**

name: Display more details and config data for a specific OpenVPN client.
all: Display all clients including disabled clients.

## show openvpn server

Show OpenVPN server status & statistics.

### *Syntax*

```
show openvpn server [name STRING] [all]
```

**Parameters**

name: Display more details and config data for a specific OpenVPN server.
all: Display all servers including disabled servers.

## show route

Show IP routing information.

### *Syntax*

```
show route [ipv4] [ipv6] [verbose]
```

**Parameters**

ipv4: Display IPv4 routes.
ipv6: Display IPv6 routes.
verbose: Display more information (less concise, more detail).

## show scep-client

Show SCEP client status and statistics.

### *Syntax*

```
show scep-client [name STRING]
```

**Parameters**

name: Display more details and configuration data for a specific SCEP client instance.

## show scripts

Show scheduled system scripts.

### *Syntax*

```
show scripts
```

**Parameters**

None

## show serial

Show serial status and statistics.

If the

### *Syntax*

```
show serial [port STRING]
```

**Parameters**

port: Display more details and configuration data for a specific serial port.

## show surelink interface

Show SureLink status & statistics for network interfaces.

### *Syntax*

```
show surelink interface [name STRING] [all]
```

**Parameters**

name: The name of a specific network interface.

all: Show all network interfaces.

## show surelink ipsec

Show SureLink status & statistics for IPsec tunnels.

### *Syntax*

```
show surelink ipsec [tunnel STRING] [all]
```

**Parameters**

tunnel: The name of a specific IPsec tunnel.

all: Show all IPsec tunnels.

## show surelink openvpn

Show SureLink status & statistics for OpenVPN clients.

### *Syntax*

```
show surelink openvpn [client STRING] [all]
```

**Parameters**
client: The name of the OpenVPN client.
all: Show all OpenVPN clients.

## show surelink state

Show SureLink state & fail counts for each network interfaces.

### *Syntax*

```
show surelink state
```

**Parameters**
None

## show system

Show system status & statistics.

### *Syntax*

```
show system [verbose]
```

**Parameters**
verbose: Display more information (disk usage, etc).

## show version

Show firmware version.

### *Syntax*

```
show version [verbose]
```

**Parameters**
verbose: Display more information (build date).

## show vrrp

Show VRRP status & statistics.

### *Syntax*

```
show vrrp [name STRING] [all] [verbose]
```

**Parameters**
name: Display more details and config data for a specific VRRP instance.
all: Display all VRRP instances including disabled instances.
verbose: Display all VRRP status and statistics including disabled instances.

## show web-filter

Show web filter status & statistics.

### *Syntax*

```
show web-filter
```

**Parameters**

None

## iperf

Perform a speedtest to a remote host using nuttcp or iPerf. The system's primary default route will be used. The speed test will take approximately 30 seconds to complete.

### *Syntax*

```
iperf <host> [size INTEGER] [mode <nuttcp|iperf>] [output <text|json>]
```

**Parameters**

host: The name or address of the remote speed test host/server.

size: The number of kilobytes sent in the speed test packets. (Minimum: 0, Default: 1000)

mode: The type of speed test protocol to run. (Default: nuttcp)

output: The format of output to display the speed test results as. (Default: text)

## ssh

Use SSH protocol to log into a remote server.

### *Syntax*

```
ssh <host> <user> [port INTEGER] [command STRING]
```

**Parameters**

host: The hostname or IP address of the remote host.

user: The username to use when connecting to the remote host.

port: The SSH port to use to connect to the remote host. (Minimum: 1, Maximum: 65535, Default: 22)

command: The command that will be automatically executed once the SSH session to the remote host is established.

## system backup

**CAUTION!** This CLI command is obsolete in DAL OS firmware 24.12.x and newer versions. Use the **system custom-default-config** command.

Save the device's configuration to a file. Archives are full backups including generated SSH keys and dynamic DHCP lease information. Command backups are a list of CLI commands required to build the device's configuration.

### *Syntax*

```
system backup [type <custom-defaults|cli-config|archive>] [path STRING]
[passphrase STRING] [remove <custom-defaults>]
```

**Parameters**

type: The type of backup file to create. Archives are full backups including generated SSH keys and dynamic DHCP lease information. CLI configuration backups are a list of CLI commands used to build the device's configuration. (Default: archive)

path: The file path to save the backup to. (Default: /var/log/)

passphrase: Encrypt the archive with a passphrase.

remove: Remove a backup file.

## system cloud register

Register with Digi Remote Manager account.

### *Syntax*

```
system cloud register <username> <password> [group STRING]
```

**Parameters**

username: Digi Remote Manager username.

password: Digi Remote Manager password.

group: Group to add device in Digi Remote Manager.

## system custom-default-config current

Install the current configuration as a custom-default-config.bin file and generates the SHA file.

### *Syntax*

```
system custom-default-config current
```

**Parameters**

None

## system custom-default-config file

Sets up a backup file as a custom-default-config.bin file and generates the SHA file.

### *Syntax*

```
system custom-default-config file <path>
```

**Parameters**

path: Backup file to set up as a custom-default-config.bin file.

## system custom-default-config remove

Removes the current custom-default-config.bin and SHA file.

### *Syntax*

```
system custom-default-config remove
```

**Parameters**

None

## system disable-cryptography

Erase the device's configuration and reboot into a limited mode with no cryptography available. The device's shell will be accessible over Telnet (port 23) at IP address 192.168.210.1. To return the device to normal operation, perform the configuration erase procedure with the device's ERASE button twice consecutively.

### *Syntax*

```
system disable-cryptography
```

**Parameters**

None

## system duplicate-firmware

Duplicate the running firmware to the alternate partition so that the device will always boot the same firmware version.

### *Syntax*

```
system duplicate-firmware
```

**Parameters**

None

## system factory-erase

Erase the device to restore to factory defaults. All configuration and automatically generated keys will be erased.

### *Syntax*

```
system factory-erase
```

**Parameters**

None

## system find-me

Find Me function to flash LEDs on this device to help users locate the unit.

### *Syntax*

```
system find-me <state>
```

**Parameters**

state: Find Me control to flash cellular-related LEDs.

## system firmware ota check

Query the Digi firmware server for the latest device firmware version.

### *Syntax*

```
system firmware ota check
```

**Parameters**

None

## system firmware ota list

Query the Digi firmware server for a list of device firmware versions.

### *Syntax*

```
system firmware ota list
```

**Parameters**

None

## system firmware ota update

Perform FOTA (firmware-over-the-air) update. The device will be updated to the latest firmware version unless the version argument is used to specify the firmware version.

### *Syntax*

```
system firmware ota update [version STRING]
```

**Parameters**

version: Firmware version name.

## system firmware update

Update the current firmware image. Upon reboot the new firmware will be run.

### *Syntax*

```
system firmware update <file>
```

**Parameters**

file: Firmware filename and path.

## system power ignition off_delay

Update the current ignition off delay without changing the configuration.

### *Syntax*

```
system power ignition off_delay <off_delay>
```

**Parameters**

off_delay: Ignition power off delay. Format: number{h|m|s}, Max: 18h. (Minimum: 0s, Maximum: 18h)

## system restore

Restore the device's configuration from a backup archive or CLI commands file.

### *Syntax*

```
system restore <path> [passphrase STRING]
```

**Parameters**

path: The path to the backup file.

passphrase: Decrypt the archive with a passphrase.

## system script start

Run a manual script. Scripts that are disabled, not a manual script, or already running can not be run.

### *Syntax*

```
system script start <script>
```

**Parameters**

script: Script to start.

## system script stop

Stop an active running script. Scripts scheduled to run again will still run again (disable a script to prevent it from running again).

### *Syntax*

```
system script stop <script>
```

**Parameters**

script: Script to stop.

## system serial clear

Clears the serial log.

### *Syntax*

```
system serial clear <port>
```

**Parameters**

port: Serial port.

## system serial copy

Copy serial settings from a port to a list of ports.

### *Syntax*

```
system serial copy <source> <destination> [all] [label] [base] [serial]
[session] [monitor] [service] [hangup] [autoconnect] [framing] [modem] [ppp_
dialin] [udp] [logging]
```

**Parameters**

source: The serial port to copy settings from.

destination: A list of serial ports to copy settings to. Example: 1-4,8-10 or all.

all: Copy all serial port settings.

label: Copy label setting.

base: Copy enable, mode, sharing, and signal settings.

serial: Copy baudrate, data bits, parity, stop bits, and flow control settings.

session: Copy escape, history, exclusive, and idle timeout settings.

monitor: Copy signal change monitoring settings.

service: Copy SSH, TCP, and Telnet service settings.

hangup: Copy hangup on signal loss settings.

autoconnect: Copy autoconnect settings.

framing: Copy data framing settings.

modem: Copy modem emulator settings.

ppp_dialin: Copy PPP dial-in settings.

udp: Copy UDP serial settings.

logging: Copy logging settings.

## system serial ipport

Set sequential IP port numbers for a service on a list of ports.

### *Syntax*

```
system serial ipport <destination> <service> <base>
```

**Parameters**

destination: A list of serial ports to set IP port numbers. Example: 1-4,8-10 or all.

service: The service type to set IP port numbers.

base: Set service IP port numbers to base port + serial port number. (Minimum: 1, Maximum: 65535)

## system serial restart

Delete and restart the serial log.

### *Syntax*

```
system serial restart <port>
```

**Parameters**

port: Serial port.

## system serial save

Saves the current serial log to a file.

### *Syntax*

```
system serial save <port> <path>
```

**Parameters**

port: Serial port.

path: The path and filename to save captured traffic to. If a relative path is provided, /etc/config/serial will be used as the root directory for the path and file.

## system serial show

Displays the serial log on the screen.

### *Syntax*

```
system serial show <port>
```

**Parameters**

port: Serial port.

## system storage format

Format the SD card.

### *Syntax*

```
system storage format sd [ext4|exfat]
```

**Parameters**

file system type: Select file system type for an SD card (exfat4, exfat).

## system storage mount

Mount an SD card on a specified partition.

### *Syntax*

```
system storage mount /opt/ext/sd <partition>
```

**Parameters**

partition: Specify the partition number to be mounted.

## system storage show

Shows information about an SD card.

### *Syntax*

```
system storage show
```

**Parameters**

None

**Example**

```
> system storage show

SD Card
-------
Mount Path:  /opt/ext/sd
Device Path: /dev/sdb
Total Size:  3965MB
Partitions:
Num  Type   Size
---  -----  ------
1    exfat  3964MB
```

## system storage unmount

Unmount the mounted SD card.

### *Syntax*

```
system storage unmount /opt/ext/sd
```

**Parameters**

None

## system storage format

Format a device to the selected filesystem type.

### *Syntax*

```
system storage format <device> <fstype>
```

**Parameters**

device: Storage device type.

fstype: Format to this filesystem type.

## system storage mount

Mount a partition on the device.

### *Syntax*

```
system storage mount <device> [partition INTEGER]
```

**Parameters**
device: Storage device type.
partition: The partition number to mount. (Minimum: 1, Default: 1)

## system storage show

Display information about external devices.

### *Syntax*

```
system storage show
```

**Parameters**
None

## system storage unmount

Unmount the device.

### *Syntax*

```
system storage unmount <device>
```

**Parameters**
device: Storage device type.

## system support-report

Save a support report to a file and include with support requests.

### *Syntax*

```
system support-report [path STRING]
```

**Parameters**
path: The file path to save the support report to. (Default: /var/log/)

## system time set

Set the local date and time using the timezone set in the system.time.timezone config setting.

### *Syntax*

```
system time set <datetime>
```

**Parameters**

datetime: The date in year-month-day hour:minute:second format (e.g "2021-09-26 12:24:48").

## system time sync

Set the local time to the first enabled time source that returns valid time information.

### *Syntax*

```
system time sync
```

**Parameters**

None

## system time test

Test each enabled time source. This test will not affect the device's current local date and time.

### *Syntax*

```
system time test
```

**Parameters**

None

## tail

Tail a file to see its contents.

### *Syntax*

```
tail <path> [timeout INTEGER] [filter STRING] [match STRING]
```

**Parameters**

path: The file to tail.

timeout: The amount of time in seconds to tail the file. (Default: 10)

filter: Only see output that contains this string.

match: Stop tail when this string is detected in output.

## telnet

Use Telnet protocol to log into a remote server.

### *Syntax*

```
telnet <host> [port INTEGER]
```

**Parameters**

host: The hostname or IP address of the remote host.

port: The telnet port to use to connect to the remote host. (Minimum: 1, Maximum: 65535, Default: 23)

## traceroute

Print the route packets trace to network host.

### *Syntax*

```
traceroute <host> [ipv6] [gateway STRING] [interface STRING] [first_ttl
INTEGER] [max_ttl INTEGER] [port INTEGER] [nqueries INTEGER] [src_addr STRING]
[tos INTEGER] [waittime INTEGER] [pausemsecs INTEGER] [packetlen INTEGER]
[debug] [dontfragment] [icmp] [nomap] [bypass]
```

**Parameters**

host: The host that we wish to trace the route packets for.

ipv6: If a hostname is defined as the value of the 'host' parameter, use the hosts IPV6 address.

gateway: Tells traceroute to add an IP source routing option to the outgoing packet that tells the network to route the packet through the specified gateway.

interface: Specifies the interface through which traceroute should send packets. By default, the interface is selected according to the routing table.

first_ttl: Specifies with what TTL to start. (Minimum: 1, Default: 1)

max_ttl: Specifies the maximum number of hops (max time-to-live value) traceroute will probe. (Minimum: 1, Default: 30)

port: Specifies the destination port base traceroute will use (the destination port number will be incremented by each probe). A value of -1 specifies that no specific port will be used. (Minimum: -1, Default: -1)

nqueries: Sets the number of probe packets per hop. A value of -1 indicated. (Minimum: 1, Default: 3)

src_addr: Chooses an alternative source address. Note that you must select the address of one of the interfaces. By default, the address of the outgoing interface is used.

tos: For IPv4, set the Type of Service (ToS) and Precedence value. Useful values are 16 (low delay) and 8 (high throughput). Note that in order to use some TOS precedence values, you have to be super user. For IPv6, set the Traffic Control value. A value of -1 specifies that no value will be used. (Minimum: -1, Default: -1)

waittime: Determines how long to wait for a response to a probe. (Minimum: 1, Default: 5)

pausemsecs: Minimal time interval between probes. (Minimum: 0, Default: 0)

packetlen: Total size of the probing packet. Default 60 bytes for IPv4 and 80 for Ipv6. A value of -1 specifies that the default value will be used. (Minimum: -1, Default: -1)

debug: Enable socket level debugging.

dontfragment: Do not fragment probe packets.

icmp: Use ICMP ECHO for probes.

nomap: Do not try to map IP addresses to host names when displaying them.

bypass: Bypass the normal routing tables and send directly to a host on an attached network.

## vtysh

Opens the integrated shell for FRRouting (FRR), for more information on FRRouting and VTYSH, visit the FRRouting documentation at https://docs.frrouting.org/projects/dev-guide/en/latest/vtysh.html.

### *Syntax*

```
vtysh
```

**Parameters**

None

## Safety warnings

### English

Operation of this equipment in a residential environment could cause radio interference.

### Bulgarian--български

Работата с това оборудване в жилищна среда може да причини радиосмущения.

### Croatian--Hrvatski

Rad ove opreme u stambenom okruženju mogao bi prouzročiti radio smetnje.

### French--Français

L'utilisation de cet équipement dans un environnement résidentiel peut provoquer des interférences radio.

### Greek--Ελληνικά

Η λειτουργία αυτού του εξοπλισμού σε οικιστικό περιβάλλον μπορεί να προκαλέσει παρεμβολές ραδιοφώνου.

### Hungarian--Magyar

A berendezés lakókörnyezetben történő működtetése rádiózavarokat okozhat.

## Italian--Italiano

Il funzionamento di questa apparecchiatura in un ambiente residenziale potrebbe causare interferenze radio.

## Latvian--Latvietis

Šīs ierīces darbība dzīvojamā vidē var izraisīt radio traucējumus.

## Lithuanian--Lietuvis

Naudojant šią įrangą gyvenamojoje aplinkoje, gali kilti radijo trukdžių.

## Polish--Polskie

Praca tego sprzętu w środowisku mieszkalnym może powodować zakłócenia radiowe.

## Portuguese--Português

A operação deste equipamento em um ambiente residencial pode causar interferência de rádio.

## Slovak--Slovák

Prevádzka tohto zariadenia v obytnom prostredí by mohla spôsobiť rádiové rušenie.

## Slovenian--Esloveno

Delovanje te opreme v stanovanjskem okolju lahko povzroči radijske motnje.

# Spanish--Español

El funcionamiento de este equipo en un entorno residencial puede provocar interferencias de radio.

# Digi Connect EZ 16/32 regulatory and safety statements

## RF exposure statement

In order to comply with RF exposure limits established in the ANSI C95.1 standards, the distance between the antenna or antennas and the user should not be less than **20 cm**.

## Federal Communication (FCC) Part 15 Class B

### Radio Frequency Interference (RFI) (FCC 15.105)

The Digi Connect EZ 16/32 has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet that is on a circuit different from the receiver.
- Consult the dealer or an experienced radio/TV technician for help.

**Labeling Requirements (FCC 15.19)**

Connect EZ 16/32 complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

If the FCC ID is not visible when installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module FCC ID.

**Modifications (FCC 15.21)**

Changes or modifications to this equipment not expressly approved by Digi may void the user's authority to operate this equipment.

## European Community - CE Mark Declaration of Conformity (DoC)

Digi has issued Declarations of Conformity for the Connect EZ 16/32 concerning emissions, EMC, and safety. For more information, see www.digi.com/resources/certifications.

**Important note**

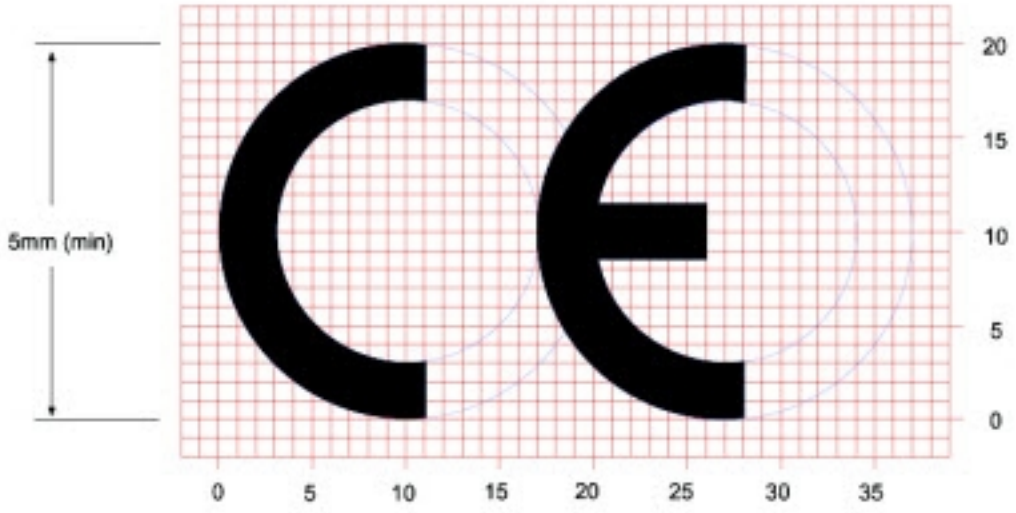
Digi customers assume full responsibility for learning and meeting the required guidelines for each country in their distribution market. Refer to the radio regulatory agency in the desired countries of operation for more information.

# CE and UKCA OEM labeling requirements

The CE and UKCA markings must be clearly visible and legible when you affix it to the product. If this is not possible, you must attach these marks to the packaging (if any) or accompanying documents.

## CE labeling requirements

The "CE" marking must be affixed to a visible location on the OEM product. The following figure shows CE labeling requirements.




The CE mark shall consist of the initials "CE" taking the following form:

- If the CE marking is reduced or enlarged, the proportions given in the above graduated drawing must be respected.
- The CE marking must have a height of at least 5 mm except where this is not possible on account of the nature of the apparatus.
- The CE marking must be affixed visibly, legibly, and indelibly.

## UK Conformity Assessed (UKCA) labeling requirements

UK
CA

See guidance/using-the-ukca-marking for further details.

You must make sure that:

- If you reduce or enlarge the size of your marking, the letters forming the UKCA marking must be in proportion to the version set out below.
- The UKCA marking is at least 5 mm in height – unless a different minimum dimension is specified in the relevant legislation.
- The UKCA marking is easily visible, legible (from 1 January 2023 it must be permanently attached).
- The UKCA marking can take different forms (for example, the color does not have to be solid), as long as it remains visible, legible and maintains the required proportions.

# RoHS compliance statement

All Digi International Inc. products that are compliant with the RoHS Directive (EU Directive 2002/95/EC and subsequent amendments) are marked as **RoHS COMPLIANT**. RoHS COMPLIANT means that the substances restricted by the EU Directive 2002/95/EC and subsequent amendments of the European Parliament are not contained in a finished product above threshold limits mandated by EU Directive 2002/95/EC and subsequent amendments, unless the restrictive substance is subject of an exemption contained in the RoHS Directive. Digi International Inc., cannot guarantee that inventory held by distributors or other third parties is RoHS compliant.

# Safety notices

- Read all instructions before installing and powering the router. You should keep these instructions in a safe place for future reference.
- If the power supply shows signs of damage or malfunction, stop using it immediately, turn off the power and disconnect the power supply before contacting your supplier for a repair or replacement.
- Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Use only the accessories, attachments, and power supplies provided by the manufacturer-connecting non-approved antennas or power supplies may damage the router, cause interference or create an electric shock hazard, and will void the warranty.
- Do not attempt to repair the product. The router contains no electronic components that can be serviced or replaced by the user. Any attempt to service or repair the router by the user will void the product warranty.
- Ports that are capable of connecting to other apparatus are defined as SELV ports. To ensure conformity with IEC60950 ensure that these ports are only connected to ports of the same type on other apparatus.

# Cautionary statements for Connect EZ 16/32

## Residential environment warnings

**Note** This equipment meets Class A requirements that may not offer adequate protection to broadcast services within a residential environment.

# Product disposal instructions

The WEEE (Waste Electrical and Electronic Equipment: 2002/96/EC) directive has been introduced to ensure that electrical/ electronic products are recycled using the best available recovery techniques to minimize the impact on the environment.

This product contains high quality materials and components which can be recycled. At the end of its life this product MUST NOT be mixed with other commercial waste for disposal. Check with the terms and conditions of your supplier for disposal information.

Digi International Ltd WEEE Registration number: WEE/HF1515VU