Content

1 Overview

TP-Link Omada/Omada Pro/Festa EAPs provide Command Line Interface (CLI) for debugging. This guide introduces detailed information about the debug commands to facilitate troubleshooting and locating the fault when the EAP encounters an exception.

With these commands, you can:

1. Perform channel scanning to analyze the Wi-Fi environment; view the wireless information, including the settings and statistics of the EAP's wireless interfaces, and the statistics of clients, etc.
2. Invoke built-in tools, including ping, tcpdump, iPerf.
3. Manage the hostapd logs: determine the level of logs to be outputted, the output method, and the size of log files to be saved in /tmp/logdump.

Currently, all EAPs that are still being updated and maintained (that is, not in EOL status) apply to the commands in this document to varying degrees. If you encounter some commands that do not take effect as described in the guide during the use of these commands, please keep an eye on the TP-Link official website to upgrade your device to the latest firmware released if possible. If it still doesn't work, you can report it to the TP-Link Technical support center or R&D department. We will provide you with timely assistance and guidance.

Kindly note: the commands displayed in the terminal by entering **cliclientd -h** may be not supported completely by the device you are using, please refer to this document for specific support of the device. In the future, if the commands supported by EAP are added or improved, we will update them simultaneously in this document.

2 How to use the CLI

2.1 Accessing the CLI

2.1.1 via SSH

1. Enable *SSH Login* first

(1) If the EAP is managed in standalone mode, please access its web page and go to *Management* > *SSH* to enable *SSH Login* and set a proper value for *Server Port*.

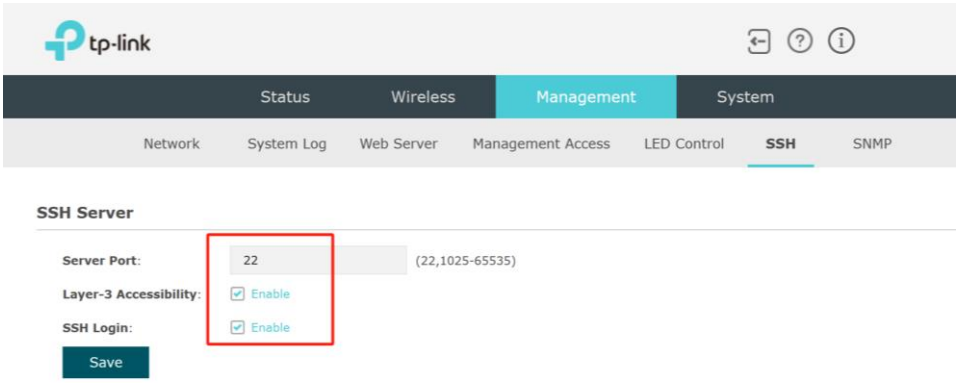


Figure 2-1 Enable SSH login in Standalone web

(2) If the EAP is managed via Controller, then go to Site's *Settings* > *Services* > *SSH* to perform the relevant operations.

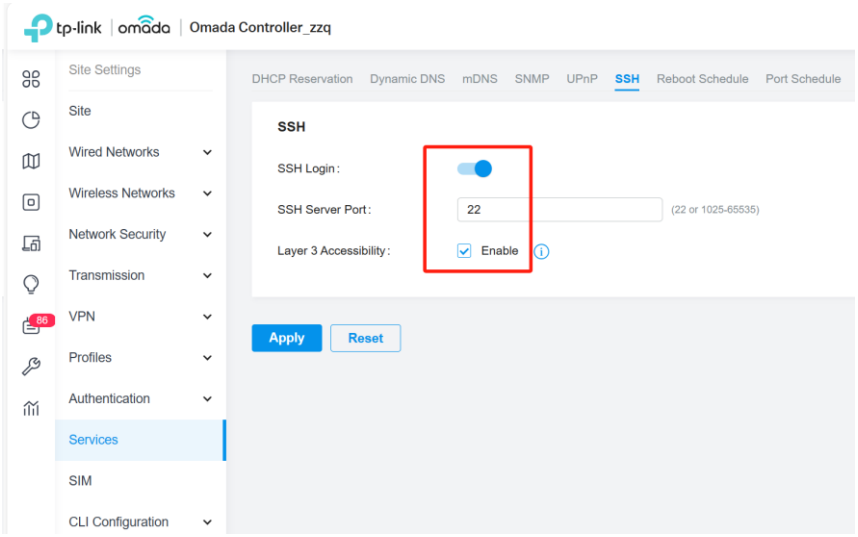


Figure 2-2 Enable SSH login in Controller

Kindly note: If the host PC from which you access EAP via SSH is not on the same LAN as the EAP, please make sure to enable Layer-3-Accessibility, as well as ensuring they are accessible to each other.

2. Access the EAP via SSH

To log on by SSH, you are recommended to use a SSH connection tools via password authentication, such as Software PuTTY, Teraterm, MobaXterm. etc. Here we take putty as an example to introduce how to access EAP through SSH, which can be analogous to know how to configure the other software.

Kindly note: To ensure secure data transmission over SSH connections, the EAP will stop supporting weak security algorithms in the future. Therefore, it's recommended to use the latest version of these SSH connection tools.

(1) Open the software to logon to the interface of Putty, enter the IP address of the EAP into the *Host Name* (or *IP address*) field; fill the server port value set in the step 1 in the *Port* field; select SSH as the Connection Type.

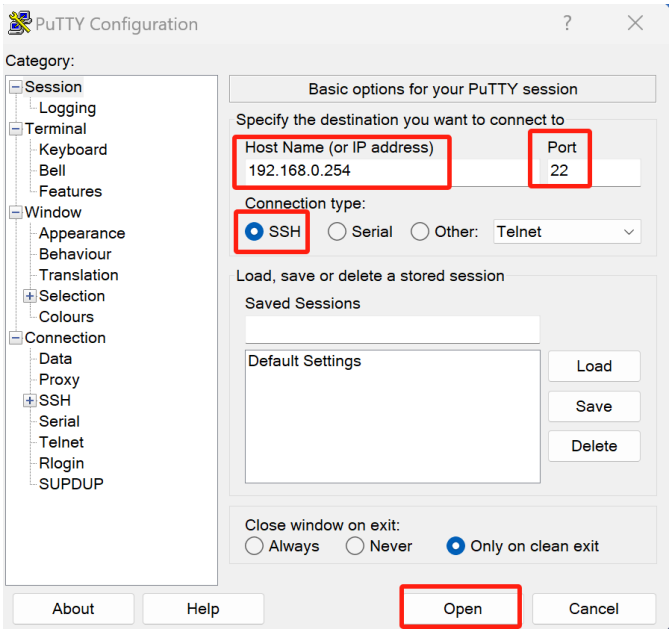


Figure 2-3 How to configure PuTTY for SSH connection – 01

(2) Click the "Open" button in the above picture to log on to the EAP and click "Accept" or "Connect Once" according to your needs.

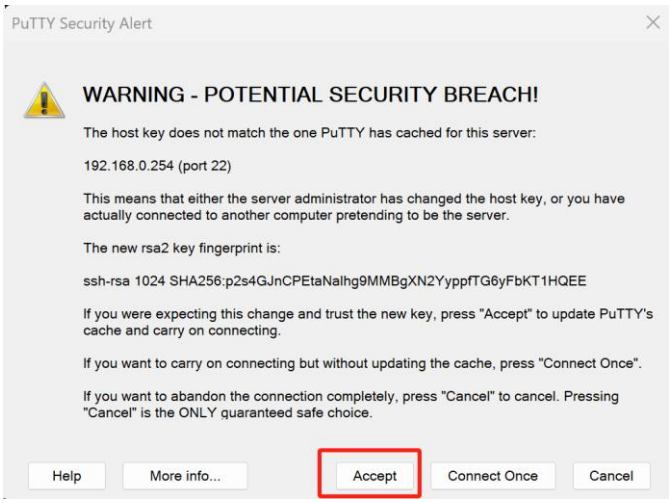


Figure 2-4 How to configure PuTTY for SSH connection - 02

(3) Finally enter the login user name and password to log on the EAP.

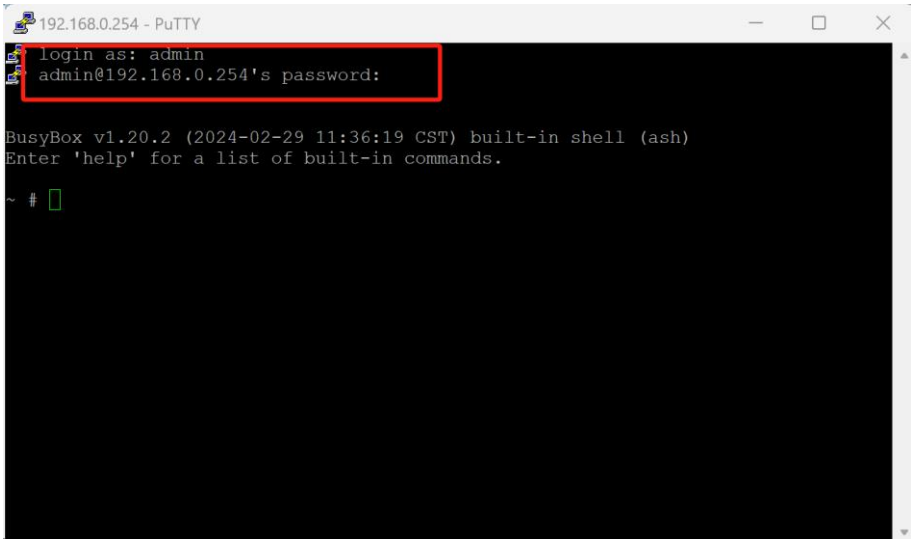


Figure 2-5 How to configure PuTTY for SSH connection - 03

2.1.2 via Terminal in Controller

The commands for EAP embedded in the Terminal Tool of the Controller are coupled with the commands for SSH access to the EAPs. By using the Terminal tool, there is no need to download and configure SSH connection software to enter commands to get the information you want.

For the detailed operation, please go to Site's *Tools* > *Terminal* to select the target devices and click "Open Terminal" button. (Kindly note: Currently the terminal tool supports simultaneous access to up to 10 devices.)

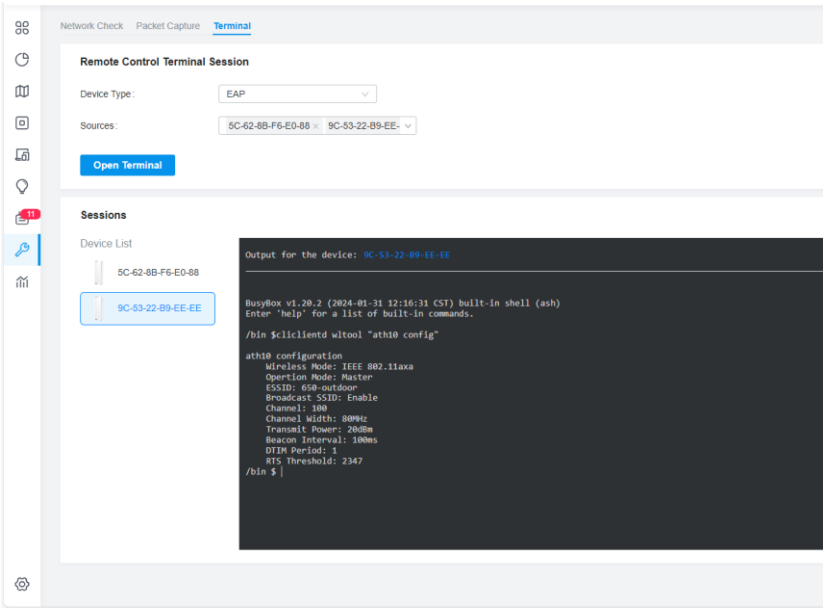


Figure 2-6 Terminal Tool in Controller

2.2 Conventions

The following conventions are used for EAP CLI commands in this Guide:

Table 2-1 Command conventions

Bold Font	An unalterable keyword For example: **cliclientd wltool** in **cliclientd wltool** "*interface* {stats | config}"
Normal Font	A constant (several options are enumerated and only one can be selected). For example: stats & config in **cliclientd wltool** "*interface* {stats | config}"
Italic Font	A variable (an actual value must be assigned) For example: *host_IP* in **cliclientd pingstart** "*host_IP* [options]"
{}	Items in braces {} are required
[]	Items in square brackets [] are optional.
|	Alternative items are grouped in braces and separated by vertical bars.

3 Debug Commands

The commands introduced in this chapter and their usage are listed in the following table:

Table 3-1 Brief introduction of commands listed in this chapter

Command	Brief introduction
cliclientd reset	To reset AP.
restart	To reboot AP.
iwconfig	View the all wireless interfaces' information.
ifconfig	View the all network interfaces' information.
iwlist	A wireless device configuration and diagnostic tool that can be utilized to obtain various parameters of a wireless network.
iperf	A network performance testing tool that can be used to test TCP/UDP bandwidth quality, report network delay jitter, view packet loss rate and other statistical information.
cliclientd setctrladdr "inform_url"	Configure the IP/URL of the Controller for the EAP to facilitate adoption and management across the layer-3 network.
cliclientd wltool scan	Detect the BSS information of each wireless channel in the current environment.
cliclientd wltool sta	View the basic statistics information of all clients currently associated with the EAP or the detailed statistics information of a certain client.
cliclientd wltool interface	View the configuration of a specified interface or the statistics of Tx and Rx packets.
cliclientd (ping)	A TCP/ IP-based network diagnostic tool for testing network connectivity.
cliclientd (tcpdump)	A packet capture tool that can be used for network analysis and troubleshooting.
cliclientd debug "hostapad"	Adjust Hostapd log's level, type and size.
cliclientd debug "hostapd_cli get_ptk"	Obtain the PTK generated each time the wireless client connects to the AP to decrypt wireless packets captured by Wireshark.
dmesg	Display all messages from kernel ring buffer and the driver.

3.1 cliclientd reset

Description：

Triggers the device to perform a reset operation.

Syntax:

cliclientd reset

Note:

Some models, such as Wi-Fi7 products or Wi-Fi5 models that have not fully adapted the new functions of Omada Controller v5.9, may not support this command yet. And they will gradually adapt to this command in the near future, please follow the TP-Link official website to get the latest firmware in time.

Example:

```
/bin $ cliclientd reset
Reset Success
```

3.2 restart

Description：

Triggers the device to perform a reboot operation.

Syntax:

restart

Note:

The commands supported by different models to reboot the device may not be consistent. For example, EAP772 V2 supports both **reboot** and **restart**, while the EAP650-Outdoor V1 only supports **restart**. And the command to trigger AP reboot will be changed to **restart** uniformly in the near future.

Example:

```
/bin $ restart
```

3.3 iwconfig

Description:

This command can be used to view the status information of all the wireless interfaces of EAP, including the identification name (ESSID), working mode, operating frequency, transmission rate, and signal strength of each interface, etc.

Syntax:

iwconfig [*interface*]

Note:

As different models adopt different design schemes, which leads to different interfaces of different models with different names obtained through enter **iwconfig**, currently it can be divided into two categories, We will show the two categories of design schemes in detail in the Example module below of the specific information of the wireless interface.

Example:

1. Scheme 1

Table 3-2 Interfaces brief introduction of EAP in category 1

Interface	Description
br0	Indicates the bridge interface, which combines multiple network interfaces into a single logical interface.
bkhap{n}	The interface used in the mesh network to provide wireless connectivity to downlinked EAPs, with n being 0/1/2 to indicate that it operates at 2.4GHz/5GHz/6GHz radio, respectively.
sta{n}	The interface used to connect to the uplink EAP wirelessly in the mesh network, with n being 0/1/2 to indicate that it operates at 2.4GHz/5GHz/6GHz radio, respectively.
ath{n}	Indicates the n+1th VAP (virtual access point) of 2.4GHz of the device, each SSID corresponds to one VAP. e.g. ath1 indicates the interface of the second 2.4GHz SSID.
ath1{n}	Indicates the n+1th VAP (virtual access point) of 5GHz of the device, each SSID corresponds to one VAP. e.g. ath12 indicates the interface of the third 5GHz SSID.
ath2{n}	Indicates the n+1th VAP (virtual access point) of 6GHz of the device, each SSID corresponds to one VAP. e.g. ath21 indicates the interface of the second 6GHz SSID.
wifi{n}	Radio layer interface of the device. In general, 2.4GHz /5GHz/6GHz radio corresponds to wifi0/wifi1/wifi2 interfaces respectively (2.4GHz and 5GHz correspond to wifi1 and wifi0 for individual models, e.g. EAP620 v3)
eth{n}	Usually refers to the n+1th Ethernet interface.
lo	A local loopback interface that provides intra-system communication and self-identification of network services.

```
/bin $ iwconfig
```

```
br0       no wireless extensions.
bkhap1    IEEE 802.11axa  ESSID:"mesh_00ff00243411"
          Mode:Master  Frequency:5.24 GHz  Access Point: 0A:FF:00:24:34:12
          Bit Rate:1.201 Gb/s  Tx-Power=21 dBm
          RTS thr=1 B  Fragment thr:off
          Encryption key:33C2-1461-6928-E313-B318-A20C-28C5-3F5B  Security mode:restricted
          Power Management:off
          Link Quality=94/94  Signal level=-35 dBm  Noise level=-91 dBm (BDF averaged NF
value in dBm)
          Rx invalid nwid:2586  Rx invalid crypt:0  Rx invalid frag:0
          Tx excessive retries:0  Invalid misc:0  Missed beacon:0
ath10     IEEE 802.11axa  ESSID:"EAP653-01"
          Mode:Master  Frequency:5.24 GHz  Access Point: 00:FF:00:24:34:12
          Bit Rate:1.201 Gb/s  Tx-Power=21 dBm
          RTS thr:off  Fragment thr:off
          Encryption  key:2E9E-62BA-555A-B080-4773-9D8B-39AD-FE0A  Security
mode:restricted
          Power Management:off
          Link Quality=94/94  Signal level=-42 dBm  Noise level=-91 dBm (BDF averaged NF
value in dBm)
          Rx invalid nwid:2417  Rx invalid crypt:0  Rx invalid frag:0
          Tx excessive retries:0  Invalid misc:0  Missed beacon:0
wifi0     no wireless extensions.
ath0      IEEE 802.11axg  ESSID:"EAP653-01"
          Mode:Master  Frequency:2.412 GHz  Access Point: 00:FF:00:24:34:11
          Bit Rate:286.8 Mb/s  Tx-Power=24 dBm
          RTS thr:off  Fragment thr:off
          Encryption  key:991A-D3FE-7344-9168-5AD6-70BC-C4C8-10A9  Security
mode:restricted
          Power Management:off
          Link Quality=94/94  Signal level=-49 dBm  Noise level=-99 dBm (BDF averaged NF
value in dBm)
          Rx invalid nwid:503  Rx invalid crypt:0  Rx invalid frag:0
          Tx excessive retries:0  Invalid misc:0  Missed beacon:0
lo        no wireless extensions.
sta1      IEEE 802.11axa  ESSID:""
          Mode:Managed  Frequency:5.24 GHz  Access Point: Not-Associated
          Bit Rate:0 kb/s  Tx-Power=21 dBm
          RTS thr=1 B  Fragment thr:off
          Encryption key:off
          Power Management:off
          Link Quality=0/94  Signal level=-91 dBm  Noise level=-91 dBm (BDF averaged NF value
in dBm)
          Rx invalid nwid:0  Rx invalid crypt:0  Rx invalid frag:0
          Tx excessive retries:0  Invalid misc:0  Missed beacon:0
eth0      no wireless extensions.
wifi1     no wireless extensions.
soc0      no wireless extensions.
……
```

2. Scheme 2

Table 3-3 Interfaces brief introduction of EAP in category 2

Interface	Description
br0	Indicates the bridge interface, which combines multiple network interfaces into

	a single logical interface.
apcli0	The interface used to connect to the uplink EAP via 2.4GHz radio in the mesh network. Currently, EAP does not support mesh networking over 2.4GHz, so this interface will not work and you can ignore it.
apclix0	The interface used to connect to the uplink EAP via 5GHz radio in the mesh network.
ra{n}	Indicates the n+1th VAP (virtual access point) of 2.4GHz of the device, each SSID corresponds to one VAP. e.g. ra1 indicates the interface of the second 2.4GHz SSID.
rax{n}	Indicates the n+1th VAP (virtual access point) of 5GHz of the device, each SSID corresponds to one VAP. e.g. rax2 indicates the interface of the third 5GHz SSID. Note: The rax8 interface is used in the mesh network to provide 5GHz wireless connectivity to downlinked EAPs which is similar to bkhap1 interface of EAP in category 1.
eth{n}	Usually refers to the n+1th Ethernet interface.
lo	A local loopback interface that provides intra-system communication and self-identification of network services.

```
/bin $ iwconfig
rax0          RTWIFI SoftAP   ESSID:"TP-Link 001"
              Mode:Master   Channel=48   Access Point: 00:FF:00:2A:E0:8B
              Bit Rate:1.134 Gb/s
              RTS thr=2347 B
              Link Quality:10   Signal level:0   Noise level:199
              Rx invalid nwid:0   invalid crypt:0   invalid misc:0
lo            no wireless extensions.
br0           no wireless extensions.
rax8          RTWIFI SoftAP   ESSID:"mesh_00ff002ae08a"
              Mode:Master   Channel=48   Access Point: 22:FF:00:2A:E0:8B
              Bit Rate:1.134 Gb/s
              RTS thr=2347 B
              Link Quality:10   Signal level:0   Noise level:199
              Rx invalid nwid:0   invalid crypt:0   invalid misc:0
apclix0       RTWIFI SoftAP   ESSID:""
              Mode:Managed   Channel=48   Access Point: Not-Associated
              Bit Rate:0.001 kb/s
              RTS thr=2347 B
              Link Quality:10   Signal level:0   Noise level:199
              Rx invalid nwid:0   invalid crypt:0   invalid misc:0
eth1          no wireless extensions.
rax7          RTWIFI SoftAP   ESSID:""
              Mode:Master   Channel=48   Access Point: Not-Associated
```

```
          Bit Rate:0.015 kb/s
          RTS thr=0 B
          Link Quality:10    Signal level:0    Noise level:199
          Rx invalid nwid:0    invalid crypt:0    invalid misc:0
ra0       RTWIFI SoftAP    ESSID:"TP-Link 001"
          Mode:Master    Channel=6    Access Point: 00:FF:00:2A:E0:8A
          Bit Rate:541 Mb/s
          RTS thr=2347 B
          Link Quality:10    Signal level:0    Noise level:199
          Rx invalid nwid:0    invalid crypt:0    invalid misc:0
eth0      no wireless extensions.
apcli0    RTWIFI SoftAP    ESSID:""
          Mode:Managed    Channel=6    Access Point: Not-Associated
          Bit Rate:0 kb/s
          RTS thr=2347 B
          Link Quality:10    Signal level:0    Noise level:199
          Rx invalid nwid:0    invalid crypt:0    invalid misc:0
ra7       RTWIFI SoftAP    ESSID:""
          Mode:Master    Channel=6    Access Point: Not-Associated
          Bit Rate:0.007 kb/s
          RTS thr=0 B
          Link Quality:10    Signal level:0    Noise level:199
          Rx invalid nwid:0    invalid crypt:0    invalid misc:0
……
```

3.4 ifconfig

Description:

This command is used to view the basic parameters of EAP's network interfaces, such as IP address, subnet mask, hardware address, traffic statistics, etc.

Syntax:

ifconfig [[-a] | [*interface*]]

Example:

Show the br0 interface's basic parameters:

```
/bin $ ifconfig br0
br0       Link encap:Ethernet  HWaddr 00:FF:00:39:D2:5B
          inet addr:192.168.0.254  Bcast:192.168.0.255  Mask:255.255.255.0
          inet6 addr: fe80::2ff:ff:fe39:d25b/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:5625 errors:0 dropped:0 overruns:0 frame:0
          TX packets:6566 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:1129559 (1.0 MiB)  TX bytes:4127984 (3.9 MiB)
```

3.5 iwlist

Description:

This command iwlist is a wireless device configuration and diagnostic tool for Linux that can be utilized to obtain various parameters of a wireless network, including frequency, rate, power mode, transmission power, etc., so that we can perform a series of actions to diagnose the status and performance of the wireless network.

Syntax:

iwlist [{interface} {scanning | channel | bitrate | rate | encryption | keys | power | txpower}]

Parameters:

scanning: Display the list of access points and ad-hoc cells in range.

channel: Display available frequencies in the device.

bitrate/rate: List the bit-rates supported by the device.

encryption/keys: List the encryption key sizes supported and list all the encryption keys set

in the device.

power: List the various power management attributes and models of the device.

txpower: List the various available transmit-powers and the current Tx-power of the device

Example:

Perform scanning for the access points or ad-hoc cells nearby on the ath10 interface:

```
/bin $ iwlist ath10 scanning
ath10         Scan completed :
              Cell 01 - Address: 06:00:FF:FF:0B:E1
                        ESSID:"!!!gxc1"
                        Mode:Master
                        Frequency:5.22 GHz (Channel 44)
                        Quality=91/94  Signal level=-57 dBm  Noise level=-95 dBm (BDF averaged
NF value in dBm)
                        Encryption key:off
                        Bit Rates:6 Mb/s; 9 Mb/s; 12 Mb/s; 18 Mb/s; 24 Mb/s
                                  36 Mb/s; 48 Mb/s; 54 Mb/s
                        Extra:bcn_int=100
Extra:wme_ie=dd180050f2020101800003a4000027a4000042435e0062322f00
                        Extra:phy_mode=IEEE80211_MODE_11AC_VHT80
                        Extra:dtim_period=1
……
              Cell 135 - Address: 06:31:27:B1:39:32
                        ESSID:"!!!ruijie_5g_ap2"
                        Mode:Master
                        Frequency:5.22 GHz (Channel 44)
                        Quality=93/94  Signal level=-54 dBm  Noise level=-95 dBm (BDF averaged
NF value in dBm)
                        Encryption key:on
                        Bit Rates:6 Mb/s; 9 Mb/s; 12 Mb/s; 18 Mb/s; 24 Mb/s
                                  36 Mb/s; 48 Mb/s; 54 Mb/s
                        Extra:bcn_int=100
                        IE: IEEE 802.11i/WPA2 Version 1
                            Group Cipher : CCMP
                            Pairwise Ciphers (1) : CCMP
                            Authentication Suites (1) : PSK
                        IE: WPA Version 1
                            Group Cipher : CCMP
                            Pairwise Ciphers (1) : CCMP
                            Authentication Suites (1) : PSK
                Extra:wme_ie=dd180050f2020101880003a4000027a4000042435e0062322f00
                        Extra:phy_mode=IEEE80211_MODE_11AXA_HE40PLUS
                        Extra:dtim_period=1
```

This command acts like the Rouge AP Detection functionality similar to the Controller and Standalone Web, but provides more detailed information about all the Access Points/SSIDs around the device than either.

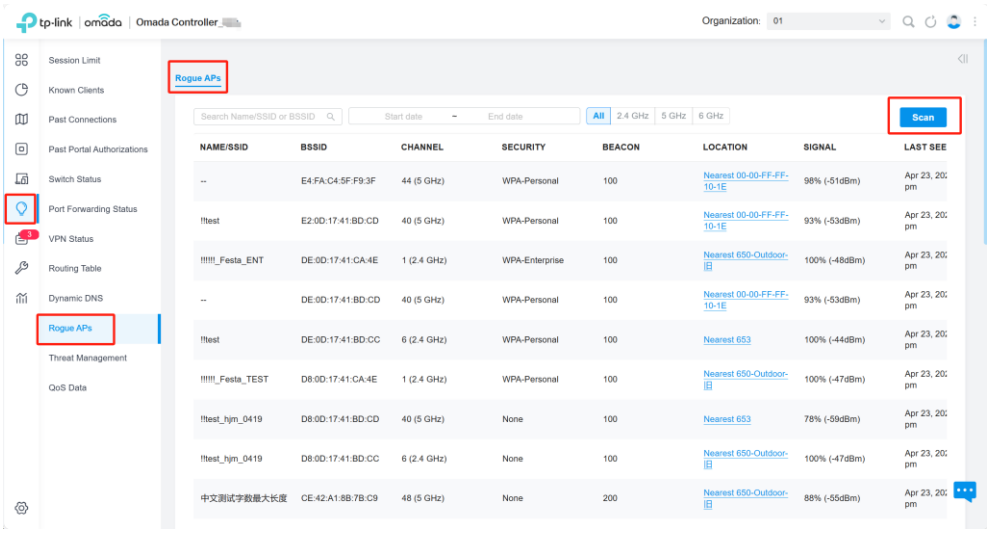


Figure 3-1 Rogue APs function in Controller

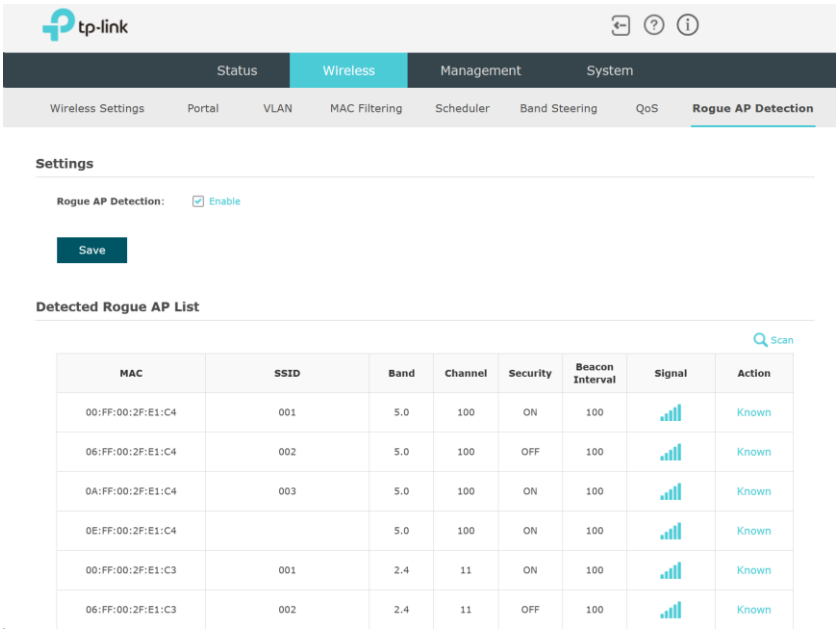


Figure 3-2 Rogue AP Detection function in Standalone Web

3.6 iperf

Description：

iPerf is a network performance testing tool that can be used to test TCP/UDP bandwidth quality, report network delay jitter, view packet loss rate and other statistical information. Based on these information, we can grasp and evaluate network performance problems, so as to locate network bottlenecks and solve network failures.

Syntax:

iperf -c *server_IP* [options]

iperf -s

Note:

1. The built-in iPerf version of EAP is iPerf2, the specific version varies from model to model, which can be viewed by executing **iperf -v**. For instance, iperf version 2.0.5 (08 Jul 2010) pthreads for EAP650-Outdoor v1, while 2.0.13(21 Jan 2019) pthreads for EAP772v2.

```
/bin $ iperf -v
iperf version 2.0.13 (21 Jan 2019) pthreads
```

2. iPerf2 and iPerf3 are two different versions of network testing tools, which cannot be used in combination due to the differences in architecture, design and features. The different versions of iPerf2 maintain the same core functionality, the main difference is reflected in some of the new features, improvements and bug fixes, different versions of iPerf2 can theoretically be used in combination, in order to ensure the accuracy and validity of the test results, it is recommended that you try to use the same version of the iPerf tool.
3. For more details about iPerf, run the command **iperf -h** to show the help information.

Example:

1. Measuring the throughput between two APs.

   To measure the throughput between the Root AP and Mesh AP can provide a reference for judging the quality of the mesh link. You can use one AP as the iPerf server and the other AP as the iPerf client.

   In the iPerf server's side:

```
/bin $ iperf -s
------------------------------------------------------------
Server listening on TCP port 5001
```

```
TCP window size:    128 KByte (default)
------------------------------------------------------------
[    4] local 192.168.0.10 port 5001 connected with 192.168.0.253 port 60456
[    8] local 192.168.0.10 port 5001 connected with 192.168.0.253 port 60472
[    6] local 192.168.0.10 port 5001 connected with 192.168.0.253 port 60466
[    5] local 192.168.0.10 port 5001 connected with 192.168.0.253 port 60454
[    9] local 192.168.0.10 port 5001 connected with 192.168.0.253 port 60478
[ ID] Interval            Transfer         Bandwidth
[    4]    0.0-10.1 sec     307 MBytes      255 Mbits/sec
[    6]    0.0-10.1 sec     320 MBytes      266 Mbits/sec
[    9]    0.0-10.1 sec     313 MBytes      261 Mbits/sec
[    8]    0.0-10.1 sec     325 MBytes      269 Mbits/sec
[    5]    0.0-10.1 sec     210 MBytes      174 Mbits/sec
[SUM]    0.0-10.1 sec    1.44 GBytes    1.22 Gbits/sec
```

In the iPerf client's side:

```
/bin $ iperf -c 192.168.0.10 -P 5 -t 10
------------------------------------------------------------
Client connecting to 192.168.0.10, TCP port 5001
TCP window size:    238 KByte (default)
------------------------------------------------------------
[    5] local 192.168.0.253 port 60466 connected with 192.168.0.10 port 5001
[    3] local 192.168.0.253 port 60456 connected with 192.168.0.10 port 5001
[    4] local 192.168.0.253 port 60454 connected with 192.168.0.10 port 5001
[    6] local 192.168.0.253 port 60472 connected with 192.168.0.10 port 5001
[    7] local 192.168.0.253 port 60478 connected with 192.168.0.10 port 5001
[ ID] Interval            Transfer         Bandwidth
[    3]    0.0-10.0 sec     307 MBytes      257 Mbits/sec
[    7]    0.0-10.0 sec     313 MBytes      263 Mbits/sec
[    5]    0.0-10.0 sec     320 MBytes      267 Mbits/sec
[    4]    0.0-10.0 sec     210 MBytes      176 Mbits/sec
[    6]    0.0-10.0 sec     325 MBytes      272 Mbits/sec
[SUM]    0.0-10.0 sec    1.44 GBytes    1.23 Gbits/sec
```

2. Measuring the throughput between AP and the client

To measure the throughput between AP and a specific client, you can download and use the same version of iPerf tool on the client, which is available at https://iperf.fr/iperf-download.php.

3.7 cliclientd setctrladdr “inform_url”

Description:

Executing this command is equivalent to configuring an inform URL in the standalone web page of the device or using the Omada Discovery Utility to facilitate Layer-3 adoption and management when the Controller is not on the same LAN as the device.

Syntax:

cliclientd setctrladdr {*IP_address* | *domain_name* }

Note:

1. the domain name for the controller cannot contain special characters (only “0-9/a-z/A-Z/.” are supported), otherwise it will not work.
2. This command is not currently supported to configure an inform URL of Cloud-Based Controller for an EAP to enable it to be discovered and managed by the Cloud-Based Controller.

Example:

The IP address of the EAP is 192.168.5.31/24, and the IP address of the controller is 192.168.100.102/24. To configure the controller's inform URL for EAP through the command **cliclientd setctrladdr "192.168.100.102"** so that it can actively discover the controller and be managed by it.

```
/bin $ cliclientd setctrladdr "192.168.100.102"
set url:192.168.100.102, discoverPort:0, managePort:0 success.
```

Then you can see in the EAP's standalone web pege that Controller Inform URL filed has been populated with the inform URL you entered in the above command, and that the controller has been able to discover the EAP in the pending state and successfully adopt it.

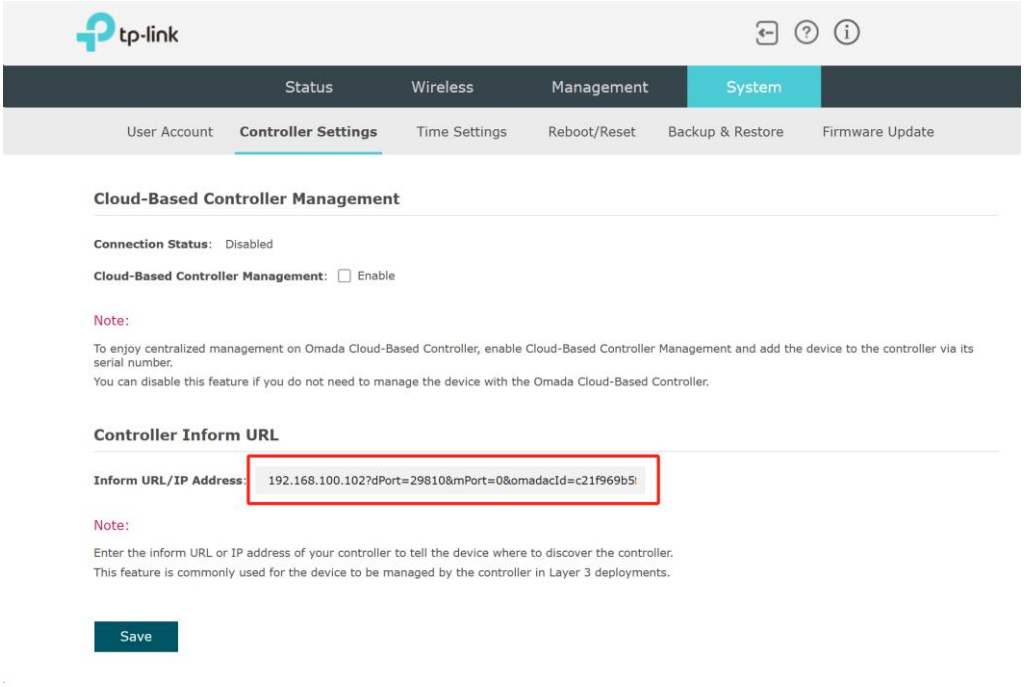


Figure 3-3 How to configure Inform URL in the standalone web

3.8 cliclientd wltool scan

Description:

This command is used to detect the BSS information of each wireless channel in the current environment. When the command **cliclientd wltool scan** is entered, an active scan will be performed on all allowed working channels, and the scanning results include the total number of BSS on each channel, the maximum RSSI and minimum RSSI of the BSS scanned on each channel, and the channel utilization in both Rx and Tx directions on each channel.

Example:

```
/bin $ cliclientd wltool scan
/bin $ it will take about 15s, scanning...
  ath0:    TR069ACSDIAGNOSTICSTATE:        COMPLETED
  ath10:   TR069ACSDIAGNOSTICSTATE:        COMPLETED
Channel | Bss | Maxrssi | Minrssi| Rxutil
----------------------------------------
    1          23        -73          -95        58
    2           9        -80          -95        62
    3           0        -95          -95        35
    4           0        -95          -95        42
    5           0        -95          -95        54
    6          31        -65          -95        56
    7           0        -95          -95        61
```

8	6	-79	-95	45
9	0	-95	-95	33
10	0	-95	-95	46
11	26	-40	-78	32
36	21	-65	-70	35
40	23	-65	-72	60
44	24	-63	-78	61
48	19	-68	-70	11
149	20	-65	-77	8
153	23	-56	-75	13
157	10	-66	-68	10
161	10	-47	-76	6
165	0	-95	-95	1

3.9 cliclientd wltool sta

Description:

This command is used to view the statistics information of all clients currently associated with the device, including data rate, signal strength, connection time and inactive time between the client and the device.

Use the command **cliclientd wltool sta** to show the basic statistics of all clients, and use **cliclientd wltool "sta** *mac_address*" to show the statistics information of a certain client.

Kindly note:

1. Specify the MAC address of the client of which you want to show the detailed statistics, the MAC address should be entered in the format of xx-xx-xx-xx-xx-xx or xx:xx:xx:xx:xx:xx or xxxxxxxxxxxx, and it's not case sensitive.
2. Compared to viewing client statistics in the *Status* > *Client* of the standalone web interface or in the Clients module of the Controller, it is more accurate and real-time to view client statistics through this CLI command.

Syntax:

cliclientd wltool sta

cliclientd wltool "sta *mac_address*"

Example:

1. Show the basic statistics of all clients associated to the device:

```
/bin $ cliclientd wltool sta
ifname | channel | addr                | txrate | rxrate | rssi | connect-time | inactive-time
```

```
-------------------------------------------------------------------------------------------------------
ath10     48     fa-6b-f6-8a-87-58        6M       1201M     -27        296s        2s
ath11     48     60-45-2e-92-6d-55      137M        816M     -41        192s        1s
ath11     48     22-e3-e9-81-97-7e        6M       1201M     -45         28s        0s
total 3 associated stations
```

2. Show the detailed statistics of the client whose MAC address is fa-6b-f6-8a-87-58:

```
/bin $ cliclientd wltool "sta fa-6b-f6-8a-87-58"
station fa-6b-f6-8a-87-58 :
        ifname:ath10
        channel:48
        rssi:-26dB
        maxrssi:-18dB
        minrssi:-32dB
        connection time:361s
        inactive time:1s
        average tx rate:172(mbps)
        average rx rate:1201(mbps)
        last tx data pkt rate:172(mbps)
        last rx data pkt rate:1201(mbps)
        tx bytes:8443
        tx packets:85
        tx ucast packets:85
        tx mcast packets:0
        tx error packets:0
        rx bytes:18962
        rx packets:241
        rx ucast packets:187
        rx mcast packets:43
        rx error packets:0
        rx decrypt error:0
```

3.10 cliclientd wltool interface

Description:

This command is used to view the configuration of a specified interface (including the wireless mode, ESSID, whether to broadcast SSID, working channel and bandwidth, transmit power, beacon frame interval, and so on) and the statistics of Tx and Rx packets.

Syntax:

cliclientd wltool "interface {config | stats}**"**

Example:

1. Show the configuration of this device's ath10 interface:

```
/bin $ cliclientd wltool "ath10 config"
ath10 configuration
        Wireless Mode: IEEE 802.11axa
        Opertion Mode: Master
        ESSID: EAP653-01
        Broadcast SSID: Enable
        Channel: 161
        Channel Width: 80MHz
        Transmit Power: 22dBm
        Beacon Interval: 100ms
        DTIM Period: 1
        RTS Threshold: 2347
```

2. Show the statistics information of this device's ath10 interface:

```
/bin $ cliclientd wltool "ath10 stats"
ath10 statistic:
        tx bytes:463534
        tx packets:2116
        tx error packets:1
        tx discard packets:3352
        rx bytes:43809
        rx packets:541
        rx error packets:21
        rx discard packets:21
        channel 161 util(Busy/RX/TX): 16/9/5
```

3.11 cliclientd (ping)

Description:

The command are used to invoke the Ping tool. Use the command **cliclientd pingstart** "{*host_IP* [options]} "to start the ping test. Use the command **cliclientd pingstop** to stop the ping test.

Syntax:

cliclientd pingstart "{*host_IP* [options]}"

cliclientd pingstop

Note:

1. **cliclientd pingstart** can be replaced by **xping**, **cliclientd pingstop** can be replaced by **xping stop**. that is, **cliclientd pingstart "**192.168. 0.1 -w 10**"** is equivalent to **xping** "192.168.0.1 -w 10".
2. For more about ping tool, please run the command **cliclientd pingstart -h** or **xping** -h to show the help information.
3. Always remember to perform **clcilientd pingstop** to stop it, otherwise the performance of the device may be affected.

Example:

Perform a ping test on the device with IP 192.168.0.253 and set the test to stop automatically after 5 seconds.

```
/bin $ cliclientd pingstart "192.168.0.253 -w 5"
/bin $ PING 192.168.0.253 (192.168.0.253): 56 data bytes
64 bytes from 192.168.0.253: seq=0 ttl=64 time=2.910 ms
64 bytes from 192.168.0.253: seq=1 ttl=64 time=2.418 ms
64 bytes from 192.168.0.253: seq=2 ttl=64 time=2.817 ms
64 bytes from 192.168.0.253: seq=3 ttl=64 time=2.654 ms
64 bytes from 192.168.0.253: seq=4 ttl=64 time=2.404 ms

--- 192.168.0.253 ping statistics ---
5 packets transmitted, 5 packets received, 0% packet loss
round-trip min/avg/max = 2.404/2.640/2.910 ms
```

For convenience, you can also perform a ping test by selecting an AP with connected state in *Tools* > *Network Check* of the Controller currently.

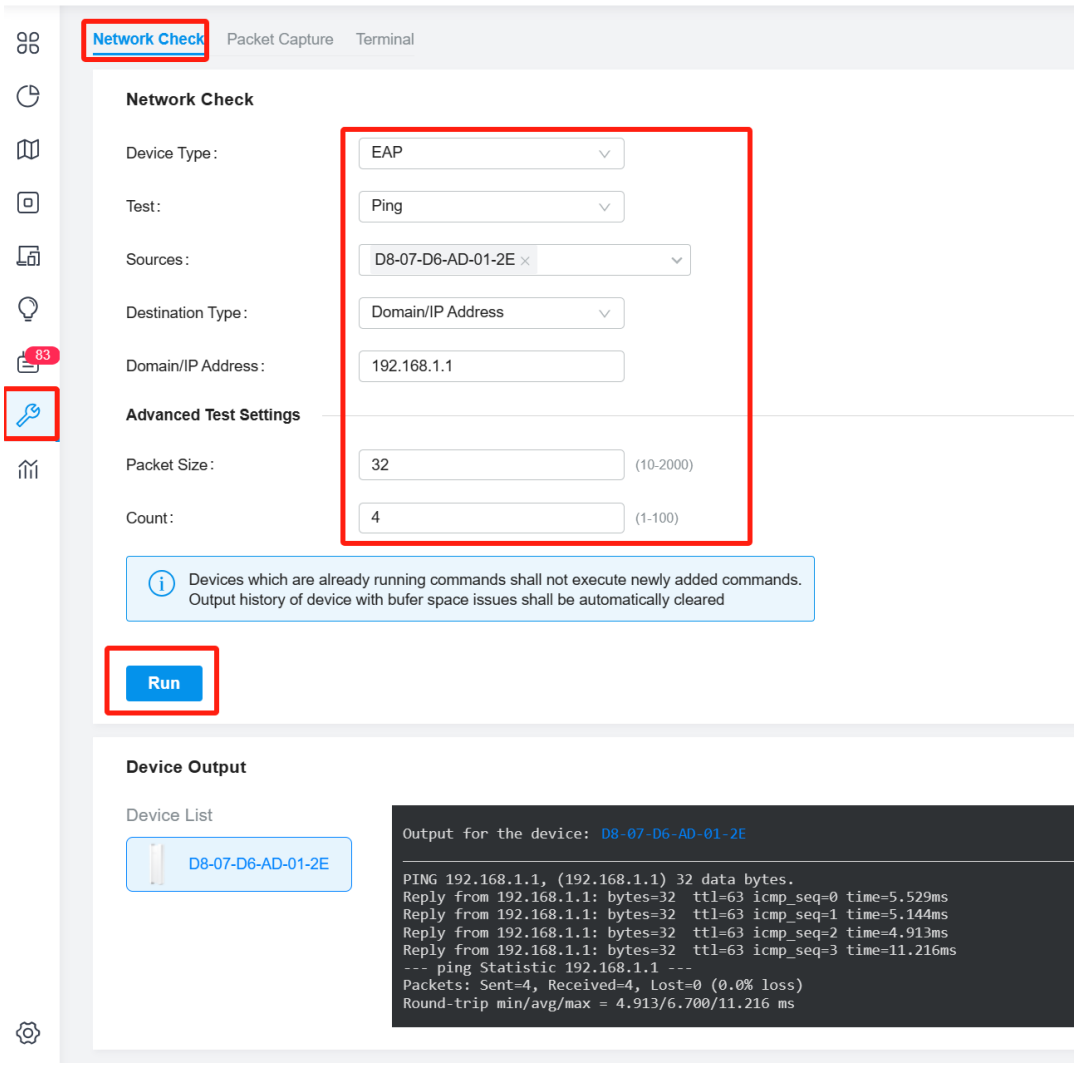


Figure 3-4 Network Check Tool in Controller

3.12 cliclientd (tcpdump)

Description:

The command are used to invoke the tcpdump tool. Use the command **cliclientd tcpdumpstart "**options**"** to start the capturing or filtering packets. Use the command **cliclientd tcpdumpstop** to stop the process.

Syntax:

cliclientd tcpdumpstart "{options}**"**

cliclientd tcpdumpstop

Note:

1. The string **cliclientd tcpdumpstart** in this command can be replaced by string **xtcpdump**, **cliclientd tcpdumpstop** can be also replaced by **xtcpdump stop**.
2. All standard tcpdump parameters are supported. For more about tcpdump tool, please run the command **cliclientd tcpdumpstart** -h or **xtcpdump** -h to show the help information.

```
~ # cliclientd tcpdumpstart -h
~ # tcpdump version 4.2.1
libpcap version 1.1.1
Usage: tcpdump [-aAbdDefhHIKlLnNOpqRStuUvxX] [ -B size ] [ -c count ]
                [ -C file_size ] [ -E algo:secret ] [ -F file ] [ -G seconds ]
                [ -i interface ] [ -M secret ]
                [ -r file ] [ -s snaplen ] [ -T type ] [ -w file ]
                [ -W filecount ] [ -y datalinktype ] [ -z command ]
                [ -Z user ] [ expression ]
```

3. Always remember to perform **clcilientd tcpdumpstop** and delete the file **via rm** *file_name* when you are done capturing packets, otherwise the performance of the device may be affected.

Example:

1. To capture the DHCP interaction between the device and the DHCP server and show it in terminal window, as follows for the DHCP renewal message:

```
/bin $cliclientd tcpdumpstart "-i br0 udp port 67 or port 68"
/bin $ tcpdump: verbose output suppressed, use -v or -vv for full protocol decode listening on br0, link-type EN10MB (Ethernet), capture size 65535 bytes
23:14:45.576526 IP 192.168.1.105.bootpc > 192.168.1.1.bootps: BOOTP/DHCP, Request from 00:ff:00:39:cf:f1 (oui Unknown), length 311
```

```
23:14:45.578654 IP 192.168.1.1.bootps > 192.168.1.105.bootpc: BOOTP/DHCP, Reply, length 300
23:15:17.606485 IP 192.168.1.105.bootpc > 192.168.1.1.bootps: BOOTP/DHCP, Request from 00:ff:00:39:cf:f1 (oui Unknown), length 311
23:15:17.608512 IP 192.168.1.1.bootps > 192.168.1.105.bootpc: BOOTP/DHCP, Reply, length 300
```

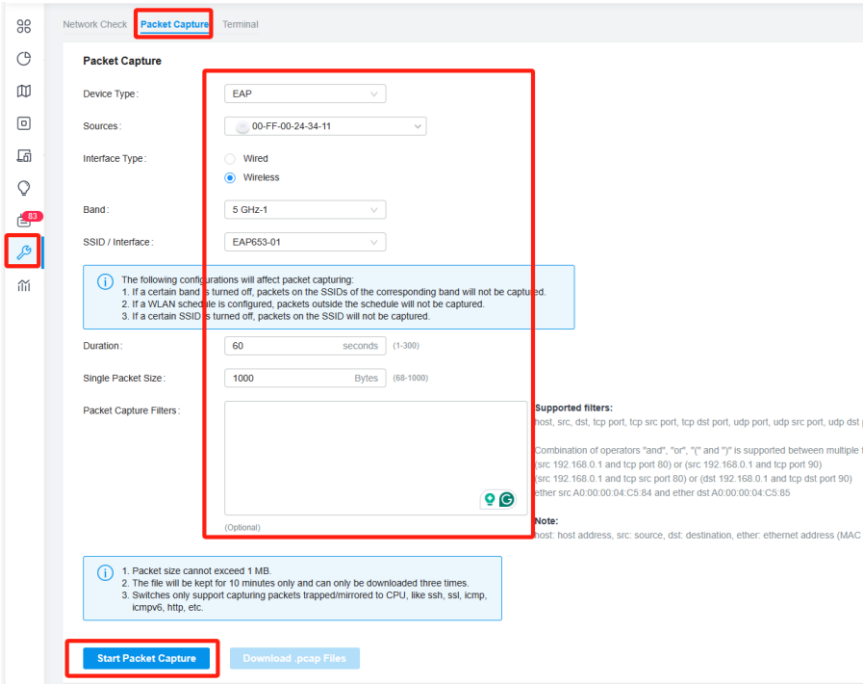


Figure 3-5 Packet Capture Tool in Controller

2. To capture all packets flowing through the ath10 interface (wireless packets are not included) and output them to the specified file. Note: the file name must contain a complete path, and the path must be **/tmp/logdump**. For example, **-w /tmp/logdump/*file_name***, not **-w *file_*name**, then you can use TFTP to export the file to your PC and open it with Wireshark. Please refer to **3.13.2 cliclientd debug "hostapd log_type"** for how to use TFTP.

```
/bin $ cliclientd tcpdumpstart "-w /tmp/logdump/capture_test capture_test -i ath10"
tcpdump: WARNING: ath10: no IPv4 address assigned
tcpdump: listening on ath10, link-type EN10MB (Ethernet), capture size 65535 bytes

/bin $ cliclientd tcpdumpstop

/bin $ ls -al /tmp/logdump
total 16
drwxrwxrwx    3 0        root             0 May 31  14:04 .
drwxr-xr-x   11 0        root             0 May 31  14:03 ..
-rw-r--r--    1 0        root          9985 May 31  14:05 capture_test
```

3.13 cliclientd debug “hostapd”

Hostapd (Host access point Daemon) is a daemon used to create and manage wireless network access points. Modifying the working channel, bandwidth, transmit power, MAC authentication, Radius authentication and other wireless-related parts are all handled by Hostapd. Hostapd's logs contain detailed information related to the operation of the wireless network, which is useful for diagnosing and solving network problems.

Note: After you get the desired Hostapd logs, please make sure to adjust the hostapd log_level/log_type/log_size to the default state to prevent them from affecting the device’s performance.

3.13.1 cliclientd debug “hostapd log_level”

Description:

When the wireless part of the device is abnormal or bugs are found during the working process, we can adjust the log level of Hostapd to make the log content printed out more detailed, so as to quickly locate the cause of the issue.

Synax:

cliclientd debug “hostapd log_level {error | warning | info | debug | msgdump} [0 | 1]”

cliclientd debug “hostapd log_level”

Parameters:

error | warning | info | debug | msgdump: Specify the level of Hostapd logs to be outputted. The log levels from high to low are error, warning, info, debug and msgdump, it’s info by default. Logs that are not lower than the set level will be output. For instance, if the log level is set to info, all error, warning and info messages will be outputted.

0 | 1: Specify whether to output the log messages with the time stamp. It’s 0 by default, indicating that the log messages will be outputted without the time stamp. If no value is specified here, the system will follow the previous settings.

Note:

1. TP-Link's EAP products adopt two major types of design schemes, and currently only the models adopting Scheme 1 intruduced in **3.3 iwconfig** support this command.
2. Use the command **cliclientd debug “hostapd log_type”** directly without any parameters to show the current settings.

Example:

1. Show which levels of Hostapd logs are outputted currently.

```
/bin $ cliclientd debug "hostapd log_level"
/bin $ Selected interface 'ath11'

Current level: INFO
Timestamp: 0
```

2. Set the log level of hostapd to info, the following are the relevant log messages of a client connecting and disconnecting from the device.

```
/bin $ cliclientd debug "hostapd log_level info 1"
/bin $ Selected interface 'ath11'
OK
……
01-01 00:55:34 ath10: STA dc:6a:e7:10:1a:05 IEEE 802.11: associated
01-01 00:55:34 ath10: AP-STA-CONNECTED dc:6a:e7:10:1a:05
01-01 00:56:00 ath10: STA dc:6a:e7:10:1a:05 IEEE 802.11: disassociated
01-01 00:56:00 ath10: AP-STA-DISCONNECTED dc:6a:e7:10:1a:05
```

3. While if you set the log level of Hostapd to debug, the log messages when a client is connected and disconnected from the device are as follows, you can see more detailed relevant output.

```
/bin $ cliclientd debug "hostapd log_level debug 1"
/bin $ Selected interface 'ath11'
OK

……
01-01 00:59:05 Custom wireless event: 'Manage.auth 30'
01-01 00:59:05 atheros_raw_receive: subtype 0xb len 30
01-01 00:59:05 ath10: Event AUTH (11) received
01-01 00:59:05      New STA
01-01 00:59:05 ap_sta_add: register ap_handle_timer timeout for dc:6a:e7:10:1a:05 (300 seconds - ap_max_inactivity)
01-01 00:59:05 trans sta dc:6a:e7:10:1a:05 state:7 to 1
01-01 00:59:05 update sta dc:6a:e7:10:1a:05 state 1 at time: 1704041945366
01-01 00:59:05 atheros_sta_auth: addr=dc:6a:e7:10:1a:05 status_code=0
01-01 00:59:05 trans sta dc:6a:e7:10:1a:05 state:1 to 2
01-01 00:59:05 update sta dc:6a:e7:10:1a:05 state 2 at time: 1704041945367
01-01 00:59:05 Custom wireless event: 'Manage.assoc_req 167'
01-01 00:59:05 atheros_raw_receive: subtype 0x0 len 167
01-01 00:59:05 ath10: Event ASSOC (0) received
01-01 00:59:05 ath10: STA dc:6a:e7:10:1a:05 IEEE 802.11: associated
01-01 00:59:05 STA did not include WPS/RSN/WPA IE in (Re)AssocReq
01-01 00:59:05 trans dc:6a:e7:10:1a:05 acl's state:10 to 8
01-01 00:59:05 trans dc:6a:e7:10:1a:05 acl's state:8 to 10
01-01 00:59:05 atheros_sta_assoc: addr=dc:6a:e7:10:1a:05 status_code=0 reassoc 0
```

```
01-01 00:59:05 trans sta dc:6a:e7:10:1a:05 state:2 to 6
01-01 00:59:05 update sta dc:6a:e7:10:1a:05 state 6 at time: 1704041945373
01-01 00:59:05 ath10: AP-STA-CONNECTED dc:6a:e7:10:1a:05
01-01 00:59:05 IEEE 802.1X: Ignore STA - 802.1X not enabled or forced for WPS
01-01 00:59:05 ath10: hostapd_new_assoc_sta: reschedule ap_handle_timer timeout for dc:6a:e7:10:1a:05
(300 seconds - ap_max_inactivity)
01-01 00:59:20 Custom wireless event: 'STA-TRAFFIC-STATj'
01-01 00:59:20 DISASSOC_REASON19:0xf0003
01-01 00:59:20 ath10: Event DISASSOC (1) received
01-01 00:59:20 ath10: STA dc:6a:e7:10:1a:05 IEEE 802.11: disassociated
01-01 00:59:20 trans sta dc:6a:e7:10:1a:05 state:6 to 7
01-01 00:59:20 update sta dc:6a:e7:10:1a:05 state 7 at time: 1704041960623
01-01 00:59:20 ath10: AP-STA-DISCONNECTED dc:6a:e7:10:1a:05
01-01 00:59:20 ap_free_sta: cancel ap_handle_timer for dc:6a:e7:10:1a:05
```

3.13.2 cliclientd debug “hostapd log_type”

Description:

The command is used to configure how Hostapd logs are outputted.

Syntax:

cliclientd debug “hostapd log_type {file *file_name* | stdout} [0 | 1]”

cliclientd debug “hostapd log_type”

Parameters:

file *file_name* | stdout: Specify how Hostapd logs are outputted. It is stdout by default, the log messages will be displayed in the terminal windows opend with console port via the stdout (standard out) stream, not SSH for now. When set it to file, the log messages will be outputted as a file named *file_name*, which is defined by yourself in the folder /tmp/logdump.

0 |1: Specify whether to output the log messages with the time stamp.It is 0 by default, indicating that the log messages will be outputted without the time stamp. While if you set it to 1, the log messages will be outputted with the time stamp.

Note:

1. Among the models that support **cliclientd debug “hostapd log_level** {error | warning | info | debug | msgdump} [0 | 1]” command, only 802.11AC (WiFi5) models support this command to configure how to output the Hostapd log messages, other models will also support this command in the future, please pay attention to the TP-Link official website to obtain the latest firmware. The Hostapd logs will be sent to the console port via stdout stream for the other models which don’t support this command, and the log cannot be accessed in the current SSH connection which will be adapted in the future.

2. use the command **cliclientd debug "hostapd log_type"** directly without any parameters to show the current settings.

3. When the size of hostapd log exceeds the pre-set log size, it will be packed into a zip file and named *hostapd_logx_xxxx_xxxxxx.tar.gz*. A total of 10 zip files can be stored, and when the number exceeds 10, the newly generated zip file will overwrite the old one. These files will be erased after the device is rebooted or reset again.

Example:

1. Configure the device to output the Hostapd logs into a file and the logs is required to be outputted with the time stamp via **cliclientd debug "hostapd log_type** *hostapd_test 1*", then enter **ls –al /tmp/logdump** to check the real-time log file and generated zip files.

```
/bin $ cliclientd debug "hostapd log_type file hostapd_test 1"
Selected interface 'bkhap1'
log_file:[hostapd_test] ,
OK

/bin & ls –al /tmp/logdump
total 288
drwxrwxrwx     3 0      root            0   May 31   09:30 .
drwxr-xr-x    11 0      root            0   May 31   09:22 ..
-rw-r--r--     1 0      root        74621   May 31   09:30 hostapd_test
drwxr-xr-x     2 0      root            0   Jan  1   1970 bk_scan_debug
-rwxr-xr-x     1 0      root        12113   May 31   09:16 hostapd_log0_0531_091605.tar.gz
-rwxr-xr-x     1 0      root         5598   May 31   09:17 hostapd_log1_0531_091739.tar.gz
-rwxr-xr-x     1 0      root         3892   May 31   09:19 hostapd_log2_0531_091909.tar.gz
-rwxr-xr-x     1 0      root        11949   May 31   09:20 hostapd_log3_0531_092027.tar.gz
-rwxr-xr-x     1 0      root         9325   May 31   09:21 hostapd_log4_0531_092147.tar.gz
-rwxr-xr-x     1 0      root         4059   May 31   09:23 hostapd_log5_0531_092323.tar.gz
-rwxr-xr-x     1 0      root         4053   May 31   09:25 hostapd_log6_0531_092507.tar.gz
-rwxr-xr-x     1 0      root         3996   May 31   09:26 hostapd_log7_0531_092648.tar.gz
-rwxr-xr-x     1 0      root         4047   May 31   09:28 hostapd_log8_0531_092831.tar.gz
-rwxr-xr-x     1 0      root         3866   May 31   09:30 hostapd_log9_0531_093003.tar.gz
```

2. Show how the Hostapd log messages are outputted currently:

```
/bin $ cliclientd debug "hostapd log_type"
/bin $ Selected interface 'bkhap1'
Current log type: file
Timestamp: 1
```

Addition：

You can also export the log file and generated zip files to a local host via TFTP for viewing.

For instance, you can do this if the product is working abnormally to provide them to the TP-Link R&D department.

There are many free Simple File Transfer Protocol (TFTP) servers on the Internet, which are able to perform the file transfer task, such as tfpd32/tfpd64 software, you can choose the appropriate TFTP server according to your actual needs. We are here to briefly describe how to export the target file to the local host via TFTP:

1. Open the TFTP server at first.
2. Change the current directory in SSH via the command **cd /tmp/logdump**.
3. Enter **tftp -pl** *file_name local_IP* to export the file to the local host, *file_name* is the file's name you want to export, *local_IP* is the IP address of the PC where TFTP server is located. (Please make sure your PC's firewall does not isolate it),

Then you can find the exported file in the folder where the tftpd64 software is installed.

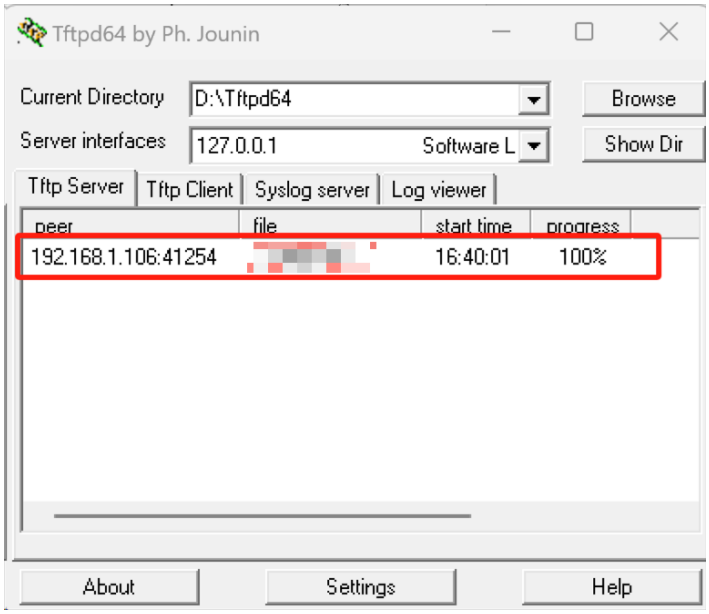


Figure 3-6 Display when the file is successfully transferred using Tftpd64

3.13.3 cliclientd debug "hostapd log_size"

Description:

The command is used to configure the size for Hostapd log files when the log type is set to "file". The system will automatically compress the log file and store it in **/tmp/logdump** every time the file reaches the specified size. Ten log files can be retained at most. After the file number reaches 10, the earliest one will be overridden.

Syntax:

cliclientd debug "hostapd log_size [*size*]**"**

cliclientd debug "hostapd log_size"

Parameters:

size: Specify the size for the Hostapd log files in bytes. Valid values are from 256KB to 10MB, and the new content will overwrite the old content, and the file size is 256 KB (262144 bytes) by default. Please convert values into bytes before running the command **cliclientd debug "hostapd log_size** [*size*]**"**.

Note:

1. Among the models that support **cliclientd debug "hostapd log_level** {error | warning | info | debug | msgdump} [0 | 1]**"** command, only 802.11AC (WiFi5) models support this command to configure the size for Hostapd log files, other models will also support this command in the future, please pay attention to the TP-Link official website to obtain the latest firmware.
2. It is recommended that you change the file size back to 256 KB after debugging. Otherwise, the log files will occupy too much system memory and affect performance.
3. use the command **cliclientd debug "hostapd log_size"** directly without any parameters to show the current settings.

Examples:

1. Show how the Hostapd log messages are outputted currently

```
/bin $ cliclientd debug "hostapd log_size"
/bin $ Selected interface 'ath11'
Current log size: 262144
```

2. Show how the Hostapd log messages are outputted currently: Configure the size for Hostapd files as 1 MB(1048576 B):

```
/bin $ cliclientd debug "hostapd log_size 1048576"
/bin $ Selected interface 'ath11'
OK
```

3.14 cliclientd debug “hostapd_cli get_ptk”

Description:

This command is used to obtain the PTK of a specific wireless client when it is associated with EAP. PTK is used to encrypt the unicast packets communicated between the AP and wireless clients. PTK is unique for each client that the AP communicates with, and is different each time a client associates with the AP. Generally, we can enter *wpa-pwd* in *Wireshark* > *Edit* > *Preferences* > *Protocols* > *IEEE 802.11* > *Decryption keys* for decryption. However, the Wireshark must be able to capture the complete association process between a client and an AP in this mode.

The command introduced in this chapter is not required to capture the complete association process of the wireless client. It is useful in scenarios where clients are prohibited from disconnecting from the Wi-Fi, such as when there are a lot of security devices in the network, or when the wireless network is down and some clients’ wireless packets need to be captured for troubleshooting.

Syntax:

cliclientd debug “hostapd_cli get_ptk *xx:xx:xx:xx:xx:xx* **–i** interface”

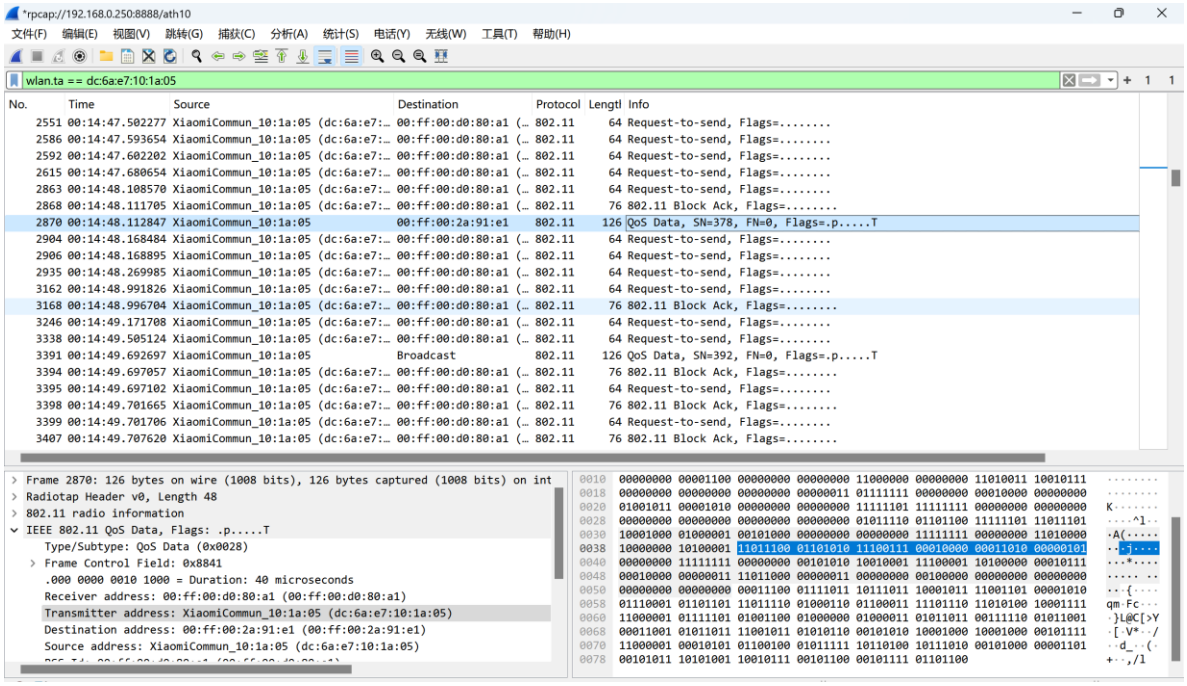
Note:

1. The string *xx:xx:xx:xx:xx:xx* in this command refers to the mac address of the wireless client. The mac address format is case insensitive. " *xx:xx:xx:xx:xx:xx* " can also be replaced with " *xx-xx-xx-xx-xx-xx* ".
2. Currently, TP-Link's EAP products adopt two major types of design schemes, and currently only the models adopting Scheme 1 intruduced in **3.3 iwconfig** support this command, and some of these models may not have been adapted to it yet, please wait for firmware updates on the official website.
3. Some wireless clients such as many Android phones use randomly generated MAC addresses when connecting to Wi-Fi instead of the client's real WLAN MAC address. Moreover, it is difficult for us to determine which wireless interface of the AP the client is connected to. We strongly recommend that customers use the command **cliclientd wltool sta** to obtain the MAC address and wireless interface at first, and then enter **cliclientd debug “hostapd_cli get_ptk** *xx:xx:xx:xx:xx:xx* **–i** interface” get the PTK.
4. The PTK in the client's association process is different each time, so please make sure that the captured packets and PTK are in the same association.
5. The wireshark version must be at least v3.4.6.

6. Currently, this command does not support WPA3 encryption (only WPA/WPA2-PSK, WPA/WPA2-Enterprise, and PPSK are supported.)

Example:

1. Connect the wireless client to AP at first.
2. Capture the wireless packets via Wireshark for a few time, please refer to [How to Capture the Wireless Packets on MacBook | TP-Link] to learn how to capture wireless packets. Of course, you can also search for other packet capture methods online.



3. Obtain the WLAN MAC address and the wireless interface connected to the AP at first.

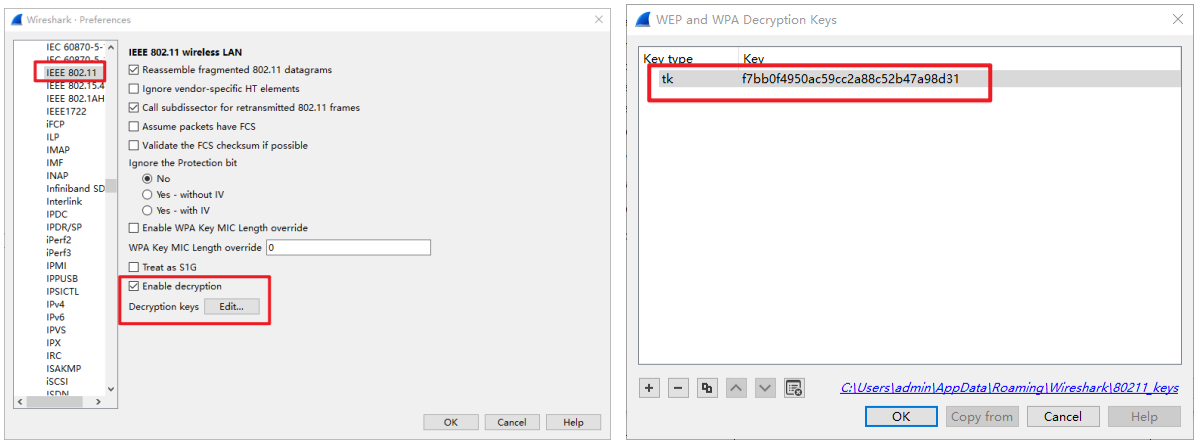
```
/bin $ cliclientd wltool sta
/bin $
ifname | channel | addr                  | txrate | rxrate | rssi | connect-time | inactive-time
-------------------------------------------------------------------------------------------
ath10     40        dc-6a-e7-10-1a-05     960M     6M     -41       37s            0s

total 1 associated stations
```

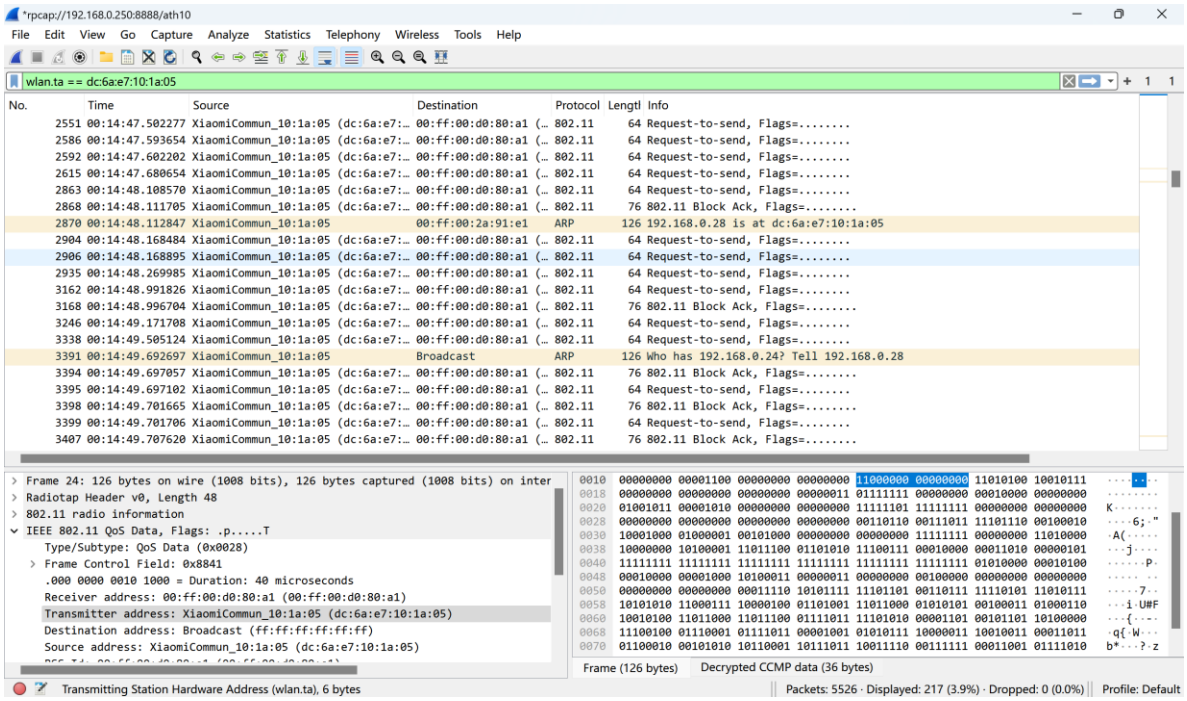
4. Obtain the PTK generated by the client and AP during this connection.

```
/bin $ cliclientd debug "hostapd_cli get_ptk dc-6a-e7-10-1a-05 -i ath10"
f7bb0f4950ac59cc2a88c52b47a98d31
```

5. In the Wireshark, go to *Edit* > *Preferences* > *Protocols* > *IEEE 802.11* > *Decryption keys* to select tk as key type and enter the PTK obtained in step 4.



6. Finally, you can see that the encrypted Qos Data packets have been decrypted.



3.15 dmesg

Description:

The default action is to read all messages from kernel ring buffer and the driver. These messages contain detailed information about the system boot process, such as memory initialization, device driver loading, filesystem mounts, etc. The output of **dmesg** is useful for diagnosing system problems, monitoring hardware status, and debugging software. For example, if you encounter problems during EAP startup, you can check the output of **dmesg** for possible error messages. For a more detailed description, please refer to the Linux manpage.

Syntax:

dmesg

Note:

The size of the file does not exceed 128KB for most models, and the new content will overwrite the old content.

Example:

1. When the root AP in the mesh network modifies the working channel from channel 36 to channel 161, the **dmesg** printout of the mesh AP is shown in the figure below, and you can clearly see that the output of **dmesg** records in detail the process of the mesh AP successfully completing the channel switching and re-associating to the root AP. Accordingly, if there are some abnormalities during the process, we can also clearly see the kernel or driver error messages, which can help quickly locate the cause of the problem.

```
/bin $ dmesg
……
[22900.339668] wlan: [0:I:ANY] ieee80211_mgmt_sta_send_csa_rx_nl_msg: valid=1 chan=161 width=80 sec=0 cfreq2=0
[22900.339668]
[22900.339884] wlan: [0:E:CMN_MLME] wlan_pdev_mlme_vdev_sm_csa_restart: Starting MVR for Pdev 0
[22900.351033] wlan: [0:W:ANY] ol_ath_vdev_beacon_template_update: Channel switch is ON - Ignore Template update
[22900.368195] wlan: [0:W:ANY] ol_ath_vdev_beacon_template_update: Channel switch is ON - Ignore Template update
[22900.442104] wlan: [0:I:ANY] ieee80211_mgmt_sta_send_csa_rx_nl_msg: valid=1 chan=161 width=80 sec=0 cfreq2=0
[22900.749257] wlan: [0:I:ANY] ieee80211_mgmt_sta_send_csa_rx_nl_msg: valid=1 chan=161 width=80 sec=0 cfreq2=0
[22900.851667] wlan: [0:I:ANY] ieee80211_mgmt_sta_send_csa_rx_nl_msg: valid=1 chan=161 width=80 sec=0 cfreq2=0
[22901.160066] wlan: [0:I:ANY] ieee80211_mgmt_sta_send_csa_rx_nl_msg: valid=1 chan=161 width=80 sec=0 cfreq2=0
[22901.331487] wlan: [0:I:MBSSIE] ol_ath_pdev_csa_status_event_handler: vdev_id: 0
[22901.331573] wlan: [0:I:MBSSIE] ol_ath_pdev_csa_status_event_handler: vdev_id: 1
[22901.337704] wlan: [0:I:MBSSIE] ol_ath_pdev_csa_status_event_handler: vdev_id: 4
[22901.345157] wlan: [0:E:CMN_MLME] wlan_pdev_mlme_vdev_sm_seamless_chan_change: Starting MVR Vdev 5 Pdev 0
[22901.352230] wlan: [0:E:CMN_MLME] mlme_multivdev_restart: Sending MVR for Pdev 0
[22901.361942] wlan: [0:E:CMN_MLME] mlme_vdev_multivdev_restart_fw_send_cb: (vdev-id:0) des chan(36)
[22901.368988] wlan: [0:I:CMN_MLME] phymode for mvr: 18
[22901.896306] wlan: [0:I:CMN_MLME] vdev[0] ieee chan:36 freq:5180
[22901.896454] wlan: [0:D:dfs] Skip CAC on NON-DFS chan
[22901.901598] wlan: [0:I:ANY] vdev[0]: Mgt Rate:6000(kbps)
[22901.906296] wlan: [0:I:ANY] ol_ath_vap_set_param: Now supported BCAST RATE is 6000(kbps) rate code: 0x10000003
[22901.911560] wlan: [0:I:ANY] ol_ath_vap_set_param: Now supported MCAST RATE 6000(kbps), rate code: 0x10000003
[22901.921454] wlan: [0:I:CMN_MLME] vdev[1] ieee chan:36 freq:5180
[22901.931428] wlan: [0:D:dfs] Skip CAC on NON-DFS chan
[22901.937726] wlan: [0:I:ANY] vdev[1]: Mgt Rate:6000(kbps)
[22901.942200] wlan: [0:I:ANY] ol_ath_vap_set_param: Now supported BCAST RATE is 6000(kbps) rate code: 0x10000003
[22901.947584] wlan: [0:I:ANY] ol_ath_vap_set_param: Now supported MCAST RATE 6000(kbps), rate code: 0x10000003
```

```
[22901.957385] wlan: [0:I:CMN_MLME] vdev[4] ieee chan:36 freq:5180
[22901.967471] wlan: [0:D:dfs] Skip CAC on NON-DFS chan
[22908.175510] wlan: [0:I:ANY] ieee80211_assoc_state_run_event: ieee80211_assoc_state_run_event: vap: 5(0x913e0060) event: 13
[22908.185521] wlan: [0:I:ANY] ieee80211_connection_state_connected_event: vdev:5(0x913e0060) event: 5
[22908.185593] wlan: [0:I:ANY] wlan_candidate_list_free: SSID:mesh_00ff003b69b0 bssid:22:ff:00:3b:69:b1 score:4486
[22908.194923] br0: port 2(sta1) entered disabled state
[22908.199327] wlan: [0:I:ANY] ol_ath_update_stats_event_handler: ol_ath_update_stats_event_handler: pdev object (id: 255) is NULL
[22908.206264] wlan: [0:I:ANY] ol_ath_update_stats_event_handler: ol_ath_update_stats_event_handler: pdev object (id: 255) is NULL
[22908.216530] wlan: [0:I:ANY] ol_ath_update_stats_event_handler: ol_ath_update_stats_event_handler: pdev object (id: 255) is NULL
[22908.228254] wlan: [0:I:ANY] ol_ath_update_stats_event_handler: ol_ath_update_stats_event_handler: pdev object (id: 255) is NULL
[22908.240141] wlan: [0:I:ANY] ol_ath_update_stats_event_handler: ol_ath_update_stats_event_handler: pdev object (id: 255) is NULL
[22908.258655] wlan: [0:I:ANY] wlan_bss_node_freed_handler: wlan_bss_node_freed_handler for vap: 5 (0x913e0060)
[22908.265551] wlan: [0:I:ANY] ieee80211_connection_state_init_event: vdev:5(0x913e0060) event: 14
[22908.752191] wlan: [0:E:NSS] osif_nss_wifili_update_wds_activeinfo: [nss-wifili]: Could not set astenty active for hw_idx = 190 due to ast NULL
[22917.757174] wlan: [3137:I:ANY] wlan_cfg80211_get_wideband_support: Sending wideband support: 0
[22917.769730] wlan: [3137:I:ANY] wlan_cfg80211_connect: DES SSID SET=mesh_00ff003b69b0
[22917.774640] wlan: [3137:I:ANY] wlan_cfg80211_connect: DES BSSID SET=22:ff:00:3b:69:b1
[22917.782622] wlan: [3137:E:mlme] wlan_mlme_stop_sta_vdev: connection stop failed
[22917.805504] wlan: [0:I:ANY] ieee80211_connection_state_init_event: vdev:5(0x913e0060) event: 1
[22917.814352] wlan: [0:I:ANY] ieee80211_candidate_list_print: Num of entries: 1
[22917.822921] wlan: [0:I:ANY] ieee80211_candidate_list_print: SSID:mesh_00ff003b69b0 bssid:22:ff:00:3b:69:b1 score:4986
[22917.830103] wlan: [0:I:ANY] ieee80211_connection_state_init_event: AP list found. move to connecting state
[22917.840681] wlan: [0:I:ANY] ieee80211_connection_state_connecting_entry: vdev:5(0x913e0060) entry
[22917.850223] wlan: [0:I:ANY] wlan_candidate_list_get: Selected candidate is ssid:mesh_00ff003b69b0 bssid:22:ff:00:3b:69:b1
[22917.859294] wlan: [0:E:CMN_MLME] wlan_pdev_mlme_vdev_sm_seamless_chan_change: Starting MVR Vdev 4 Pdev 0
[22917.870204] wlan: [0:E:CMN_MLME] mlme_multivdev_restart: Sending MVR for Pdev 0
[22917.879715] wlan: [0:E:CMN_MLME] mlme_vdev_multivdev_restart_fw_send_cb: (vdev-id:0) des chan(161)
[22917.886740] wlan: [0:I:CMN_MLME] phymode for mvr: 18
[22918.425195] wlan: [0:I:CMN_MLME] vdev[0] ieee chan:161 freq:5805
[22918.425925] wlan: [0:I:ANY] vdev[0]: Mgt Rate:6000(kbps)
[22918.430317] wlan: [0:I:ANY] ol_ath_vap_set_param: Now supported BCAST RATE is 6000(kbps) rate code: 0x10000003
[22918.435628] wlan: [0:I:ANY] ol_ath_vap_set_param: Now supported MCAST RATE 6000(kbps), rate code: 0x10000003
[22918.445560] wlan: [0:I:CMN_MLME] vdev[1] ieee chan:161 freq:5805
[22918.456025] wlan: [0:I:ANY] vdev[1]: Mgt Rate:6000(kbps)
[22918.461405] wlan: [0:I:ANY] ol_ath_vap_set_param: Now supported BCAST RATE is 6000(kbps) rate code: 0x10000003
[22918.466716] wlan: [0:I:ANY] ol_ath_vap_set_param: Now supported MCAST RATE 6000(kbps), rate code: 0x10000003
[22918.476589] wlan: [0:I:CMN_MLME] vdev[4] ieee chan:161 freq:5805
[22918.905637] wlan: [0:I:ANY] wlan_bss_node_freed_handler: wlan_bss_node_freed_handler for vap: 5 (0x913e0060)
[22918.906155] wlan: [0:I:ANY] [NODE] vap-5(sta1):ieee80211_setup_node forcing sta to associate in 30 mode
[22918.914637] wlan: [0:I:ANY] wlan_bss_node_freed_handler: wlan_bss_node_freed_handler for vap: 5 (0x913e0060)
[22918.928619] wlan: [0:I:ANY] wlan_scan_update_channel_list: num_chan: 25
[22918.937149] wlan: [0:E:ANY] ol_get_rate_code: Rate code not found
[22918.943302] wlan: [0:I:ANY] ieee80211_connection_state_connecting_event: vdev:5(0x913e0060) event: 14
[22918.950900] wlan: [0:I:ANY] ieee80211_connection_state_connecting_event: vdev:5(0x913e0060) event: 14
[22919.008553] wlan: [0:I:ANY] ol_ath_vap_set_param: Setting SGI value: 1
[22919.015588] wlan: [0:I:ANY] wlan_mlme_connection_up:
[22919.015588]    Number of STA VAPs connected: 0
[22919.028874] wlan: [0:I:ANY] ieee80211_connection_state_connecting_event: vdev:5(0x913e0060) event: 4
[22919.031914] wlan: [0:I:ANY] ssid: mesh_00ff003b69b0 len: 17 bssid:22:ff:00:3b:69:b1
[22919.134562] br0: port 2(sta1) entered forwarding state
[22919.134655] br0: port 2(sta1) entered forwarding state
```

2. If the device is currently working on fixed channel 161, when we configure its channel as Auto, it will perform auto-channel-select process, and then adjust the working channel to channel 157 on its own. The following is the detailed output of the command **dmesg** of the device performing the auto-channel-select process.

```
/bin $ dmesg
……
[70364.413490] Set_AutoChannelSel_Proc: Alg = 3
[70364.418573] [AutoChSelBuildChannelListFor5G] ChListNum5G = 9
[70364.424331] AutoChSelScanStart: IsABand = 1, ChannelListNum = 8
[70364.430442] mt7915_apply_dpd_flatness_data: eeprom 0x62 bit 0 is 0, do runtime cal
[70364.430588] ExtEventBeaconLostHandler::FW EVENT (00:ff:00:3b:69:b1), Reason 0x10
[70364.430591]      AP Beacon OFF!!!
[70364.431493] ExtEventBeaconLostHandler::FW EVENT (06:ff:00:3b:69:b1), Reason 0x10
[70364.431496]      AP Beacon OFF!!!
[70364.431755] ExtEventBeaconLostHandler::FW EVENT (22:ff:00:3b:69:b1), Reason 0x10
[70364.431757]      AP Beacon OFF!!!
[70364.469519] MtCmdChannelSwitch: ctrl_chl=36, ctrl_ch2=0, cent_ch=36 DBDCIdx=1, ChBand=1, BW=0, TXStream=2, RXStream=2, scan(1)
[70364.489425] MtCmdSetTxRxPath: ctrl_chl=36, ctrl_ch2=0, cent_ch=36, RxPath=3, BandIdx=1, ChBand=1, BW=0,TXStream=2, RXStream=3, scan(1)
[70364.632083] ExtEventBeaconLostHandler::FW EVENT (00:ff:00:3b:69:b1), Reason 0x10
[70364.639492]      AP Beacon OFF!!!
[70364.642743] ExtEventBeaconLostHandler::FW EVENT (06:ff:00:3b:69:b1), Reason 0x10
[70364.650136]      AP Beacon OFF!!!
```

```
[70364.653385] ExtEventBeaconLostHandler::FW EVENT (22:ff:00:3b:69:b1), Reason 0x10
[70364.660779]      AP Beacon OFF!!!
[70364.701496] mt7915_apply_dpd_flatness_data: eeprom 0x62 bit 0 is 0, do runtime cal
[70364.709092] MtCmdChannelSwitch: ctrl_chl=40, ctrl_ch2=0, cent_ch=40 DBDCIdx=1, ChBand=1, BW=0, TXStream=2, RXStream=2, scan(1)
[70364.728966] MtCmdSetTxRxPath: ctrl_chl=40, ctrl_ch2=0, cent_ch=40, RxPath=3, BandIdx=1, ChBand=1, BW=0,TXStream=2, RXStream=3,
scan(1)
[70364.941559] mt7915_apply_dpd_flatness_data: eeprom 0x62 bit 0 is 0, do runtime cal
[70364.949166] MtCmdChannelSwitch: ctrl_chl=44, ctrl_ch2=0, cent_ch=44 DBDCIdx=1, ChBand=1, BW=0, TXStream=2, RXStream=2, scan(1)
[70364.969051] MtCmdSetTxRxPath: ctrl_chl=44, ctrl_ch2=0, cent_ch=44, RxPath=3, BandIdx=1, ChBand=1, BW=0,TXStream=2, RXStream=3,
scan(1)
[70365.181535] mt7915_apply_dpd_flatness_data: eeprom 0x62 bit 0 is 0, do runtime cal
[70365.189143] MtCmdChannelSwitch: ctrl_chl=48, ctrl_ch2=0, cent_ch=48 DBDCIdx=1, ChBand=1, BW=0, TXStream=2, RXStream=2, scan(1)
[70365.209011] MtCmdSetTxRxPath: ctrl_chl=48, ctrl_ch2=0, cent_ch=48, RxPath=3, BandIdx=1, ChBand=1, BW=0,TXStream=2, RXStream=3,
scan(1)
[70365.421496] mt7915_apply_dpd_flatness_data: eeprom 0x62 bit 0 is 0, do runtime cal
[70365.429102] MtCmdChannelSwitch: ctrl_chl=149, ctrl_ch2=0, cent_ch=149 DBDCIdx=1, ChBand=1, BW=0, TXStream=2, RXStream=2,
scan(1)
[70365.449164] MtCmdSetTxRxPath: ctrl_chl=149, ctrl_ch2=0, cent_ch=149, RxPath=3, BandIdx=1, ChBand=1, BW=0,TXStream=2,
RXStream=3, scan(1)
[70365.661520] mt7915_apply_dpd_flatness_data: eeprom 0x62 bit 0 is 0, do runtime cal
[70365.669123] MtCmdChannelSwitch: ctrl_chl=153, ctrl_ch2=0, cent_ch=153 DBDCIdx=1, ChBand=1, BW=0, TXStream=2, RXStream=2,
scan(1)
[70365.689152] MtCmdSetTxRxPath: ctrl_chl=153, ctrl_ch2=0, cent_ch=153, RxPath=3, BandIdx=1, ChBand=1, BW=0,TXStream=2,
RXStream=3, scan(1)
[70365.901538] mt7915_apply_dpd_flatness_data: eeprom 0x62 bit 0 is 0, do runtime cal
[70365.909145] MtCmdChannelSwitch: ctrl_chl=157, ctrl_ch2=0, cent_ch=157 DBDCIdx=1, ChBand=1, BW=0, TXStream=2, RXStream=2,
scan(1)
[70365.929178] MtCmdSetTxRxPath: ctrl_chl=157, ctrl_ch2=0, cent_ch=157, RxPath=3, BandIdx=1, ChBand=1, BW=0,TXStream=2,
RXStream=3, scan(1)
[70366.141510] mt7915_apply_dpd_flatness_data: eeprom 0x62 bit 0 is 0, do runtime cal
[70366.149113] MtCmdChannelSwitch: ctrl_chl=161, ctrl_ch2=0, cent_ch=161 DBDCIdx=1, ChBand=1, BW=0, TXStream=2, RXStream=2,
scan(1)
[70366.169141] MtCmdSetTxRxPath: ctrl_chl=161, ctrl_ch2=0, cent_ch=161, RxPath=3, BandIdx=1, ChBand=1, BW=0,TXStream=2,
RXStream=3, scan(1)
[70366.381445] ========================================================================
[70366.388867] Channel    36 : Busy Time =      1924, Skip Channel = FALSE, BwCap = TRUE
[70366.396287] Channel    40 : Busy Time =      1934, Skip Channel = FALSE, BwCap = TRUE
[70366.403696] Channel    44 : Busy Time =      3103, Skip Channel = FALSE, BwCap = TRUE
[70366.411103] Channel    48 : Busy Time =      4298, Skip Channel = FALSE, BwCap = TRUE
[70366.418497] Channel 149 : Busy Time =      1465, Skip Channel = FALSE, BwCap = TRUE
[70366.425903] Channel 153 : Busy Time =      1800, Skip Channel = FALSE, BwCap = TRUE
[70366.433312] Channel 157 : Busy Time =       429, Skip Channel = FALSE, BwCap = TRUE
[70366.440706] Channel 161 : Busy Time =       437, Skip Channel = FALSE, BwCap = TRUE
[70366.448107] ========================================================================
[70366.455524] Rule 3 Channel Busy time value : Select Primary Channel 157
[70366.462149] Rule 3 Channel Busy time value : Min Channel Busy = 1800
[70366.468501] Rule 3 Channel Busy time value : BW = 80
……
```

4 Public commands

The commands described in this chapter are some of the common commands natively supported (not including the commands **iwconfig/ifconfig/dmesg** mentioned in the previous sections) by the Linux system. The specific commands supported can be obtained by typing **help** in the terminal, and a more detailed description of each command can be found in the manpage of Linux.

```
/bin $ help
Built-in commands:
------------------
        . : [ [[ alias bg break cd chdir command continue echo eval exec
        exit export false fg hash help jobs kill let local printf pwd
        read readonly return set shift source test times trap true type
        ulimit umask unalias unset wait
```

4.1 top

Description:

The top program provides a dynamic real-time view of a running system. It can display system summary information as well as a list of processes or threads currently being managed by the Linux kernel. For a more detailed description you can refer to the manpage of the Linux.

Syntax:

top

Note:

Although we can also click on the device in the Controller to go to *Details* > *Overview* in the right column to view the CPU and memory utilization as the picture below, due to the limitation of the refresh rate, it is more accurate to use the command **top** to view the CPU and memory utilization of the device in real time.

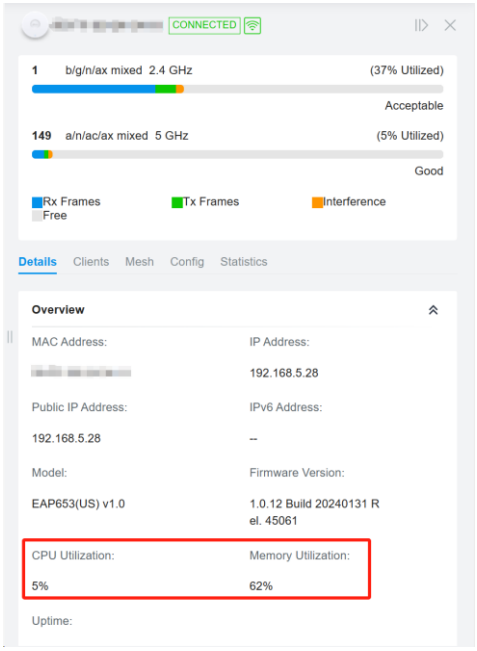


Figure 4-1 CPU and Memory Utilization displayed in Controller

Example:

```
/bin $ top
Mem: 259816K used, 154840K free, 0K shrd, 1100K buff, 1804K cached
CPU:   0% usr   1% sys   0% nic  94% idle   0% io   1% irq   3% sirq
Load average: 1.32 1.31 1.09 2/151 31237
  PID  PPID USER     STAT   VSZ %VSZ %CPU COMMAND
27704  6198 1        R     1240   0%   2% top
  417     2 0        SW<      0   0%   1% [scheduler_threa]
 2433     1 0        S     7552   2%   0% /usr/bin/eap-cs
  283     1 0        S     7288   2%   0% /usr/bin/uclited
 3137     1 0        S     5440   1%   0% wpa_supplicant -g /var/run/wpa_supplic
  556     1 0        S     5140   1%   0% hostapd -g /var/run/hostapd/global -P
 2414     1 0        S     4616   1%   0% /usr/bin/httpd_portal
 2417     1 0        S     4588   1%   0% /usr/bin/cloud-brd -c /etc/cloud_confi
  281     1 0        S     3224   1%   0% /usr/bin/eap-mesh
  318     1 0        S     3208   1%   0% /usr/bin/tpsyslogd
 2420     1 0        S     2792   1%   0% /usr/bin/tdpd
  274     1 0        S     1832   0%   0% /usr/bin/radius
  270     1 0        S     1636   0%   0% /usr/bin/dhcp6c -fd br0
10923     1 0        S     1496   0%   0% nrd -d -C /tmp/nrd.conf
  275     1 0        S     1400   0%   0% /usr/bin/auth-time
  375     1 0        S     1392   0%   0% /usr/sbin/snmpd -L -c /tmp/snmp/snmpd.
  307     1 0        S     1376   0%   0% /usr/bin/client-state
  272     1 0        S     1316   0%   0% /usr/bin/msg-center
  306     1 0        S     1264   0%   0% /usr/bin/cliserverd
  352     1 0        S     1240   0%   0% syslogd -C -l 7
```

4.2 ps

Description:

Entering **ps** can obtain the information about a selection of the active processes. For a more detailed description you can refer to the manpage of the Linux.

Syntax:

ps

Example:

```
/bin $ ps
PID   USER     COMMAND
    1 0        init
    2 0        [kthreadd]
    3 0        [ksoftirqd/0]
    5 0        [kworker/0:0H]
    7 0        [rcu_preempt]
    8 0        [rcu_sched]
    9 0        [rcu_bh]
   10 0        [migration/0]
……
10923 0        nrd -d -C /tmp/nrd.conf
24820 0        [kworker/u4:3]
29451 0        [kworker/u4:0]
31607 0        [kworker/u4:1]
32637 0        [kworker/u4:2]
32643 0        sleep 10
32655 1        ps
```