Hardware Installation Guide for Cisco NCS 5000 Series Routers

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Preface

- Changes to This Document, on page vii
- Communications, Services, and Additional Information, on page vii

Changes to This Document

This table lists the technical changes made to this document since it was first released.

Table 1: Changes to This Document

Date	Summary
December 2015	Initial release of this document for the 6.0 release.
April 2016	Added information about NCS 5011.
November 2016	Republished with documentation updates for Release 6.1.2 features.
February 2017	Republished with documentation updates for Release 6.2.1 features.

Communications, Services, and Additional Information

- To receive timely, relevant information from Cisco, sign up at Cisco Profile Manager.

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Cisco Bug Search Tool

Cisco Bug Search Tool (BST) is a web-based tool that acts as a gateway to the Cisco bug tracking system that maintains a comprehensive list of defects and vulnerabilities in Cisco products and software. BST provides you with detailed defect information about your products and software.

CHAPTER 1

Overview

This chapter provides an overview of the Cisco 5000 Series routers.

The Network Convergence System 5000 Series offers a high-density, small-form-factor MPLS aggregation router for metro aggregation. It is designed to economically scale large enterprise, over-the-top (OTT), and service provider Data Center networking architectures.

Overview

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The Network Convergence System 5000 Series offers a high-density, small-form-factor MPLS aggregation router for metro aggregation. It is designed to economically scale large enterprise, over-the-top (OTT), and service provider Data Center networking architectures.

Cisco NCS 5001

Cisco NCS 5001 Overview

The Cisco NCS 5001 router is an extension to Cisco's routing platform portfolio enabling Service Providers and MPLS enabled data center architectures to offer elastic networks with improved business agility and simplified operations to deliver high-bandwidth mobile, video, and cloud services.

It can also operate as an extension shelf of Cisco ASR 9000 Series Aggregation Services Routers using Network Virtualization (nV) technology, consolidating multiple layers in the network and dramatically reducing operational costs.

The Cisco NCS 5001 router is a small form factor dense GE/10GE aggregation systems. Powered by industry leading routing operation system, IOS-XR, the system also offers rich functions such as third party application hosting, machine-to-machine interface, telemetry and flexible package delivery.

Figure 1: Cisco NCS 5001 Router - Back (Fan Side) View
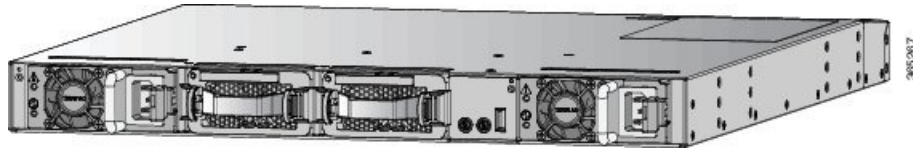
Figure 2: Cisco NCS 5001 Router - Front (Port Side) View
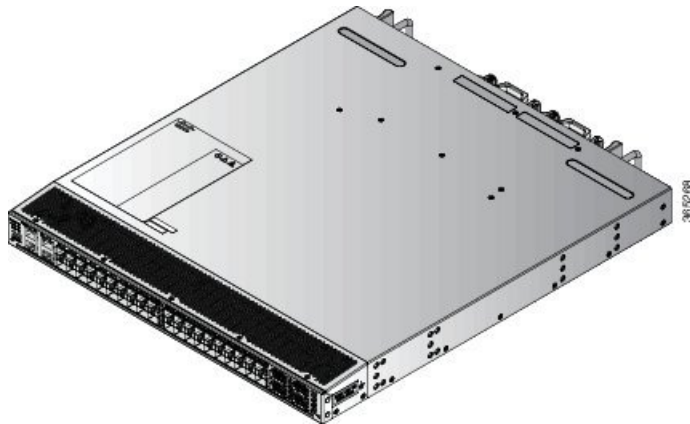
Ports

Cisco NCS 5001 router consists of the following ports:

- 40 x One GE/10GE SFP+ ports

    - 16 x Regular 10G SFP+ Ports

    - 24 x DWDM and ZR Capable 10G SFP+ Ports (Purple in color)

- 4 x 100G QSFP28 ports (Light Green in color)

Features

The Cisco NCS 5001 router has the following features:

- Two 1+1 redundant, hot-swappable power supplies, which provide port side intake or exhaust for cooling

- Two 1+1 redundant, hot-swappable fan modules, which provide port side intake or exhaust for cooling

- A management and console interface are on the port (front) side of the router whereas the USB interface on the fan (back) side of the router.

Power Supply

The Cisco NCS 5001 chassis has slots for two 1+1 redundant power supplies. Power supply options need to be configured with the base chassis. A minimum of one power supply is required for normal operation. The following table lists the power supplies that are configurable with the Cisco NCS 5001 router.

Table 2: Power Supplies for the Cisco NCS 5001 router

Part Number	Power Supply
NC5K-PDC-930W-FR	Cisco NCS 5000 Power DC 930W Front to Back Airflow
NC5K-PDC-930W-FR=	Cisco NCS 5000 Power DC 930W Front to Back Airflow, spare
NC5K-PDC-930W-BK	Cisco NCS 5000 Power DC 930W Back to Front Airflow
NC5K-PDC-930W-BK=	Cisco NCS 5000 Power DC 930W Back to Front Airflow, spare
NC5K-PAC-650W-FR	Cisco NCS 5000 Series Router Power AC 650W Front to Back Airflow
NC5K-PAC-650W-FR=	Cisco NCS 5000 Series Router Power AC 650W Front to Back Airflow, spare
NC5K-PAC-650W-BK	Cisco NCS 5000 Series Router Power AC 650W Back to Front Airflow
NC5K-PAC-650W-BK=	Cisco NCS 5000 Series Router Power AC 650W Back to Front Airflow, spare

Fan Modules

The Cisco NCS 5001 chassis has slots for two 1+1 redundant fan modules. The fan modules are hot-swappable. Fan modules operate in an 1+1 redundancy mode. Fan options need to be configured with the base chassis. The Cisco NCS 5001 system supports both forward and reverse airflow. The system can work with a single fan failure. More than one fan failure leads to system shutdown. The following table lists the fan modules that are configurable with the Cisco NCS 5001 router.

Table 3: Fan Modules for the Cisco NCS 5001 router

Part Number	Fan Module
NCS-5001-FN-FR	Cisco NCS 5001 Router Fan Front to Back Airflow
NCS-5001-FN-FR=	Cisco NCS 5001 Router Fan Front to Back Airflow, spare
NCS-5001-FN-BK	Cisco NCS 5001 Router Fan Back to Front Airflow
NCS-5001-FN-BK =	Cisco NCS 5001 Router Fan Back to Front Airflow, spare

Cisco NCS 5002

Cisco NCS 5002

The Cisco NCS 5002 router is also an extension to Cisco's routing platform portfolio enabling Service Providers and MPLS enabled data center architectures to offer elastic networks with improved business agility and simplified operations to deliver high-bandwidth mobile, video, and cloud services.

It can also operate as an extension shelf of Cisco ASR 9000 Series Aggregation Services Routers using Network Virtualization (nV) technology, consolidating multiple layers in the network and dramatically reducing operational costs.

The Cisco NCS 5002 router is a small form factor dense GE/10GE aggregation systems in 2RU form factor. Powered by industry leading routing operation system, IOS-XR, the system also offers rich functions such as third party application hosting, machine-to-machine interface, telemetry and flexible package delivery.

Figure 3: Cisco NCS 5002 - Back (Fan Side) View
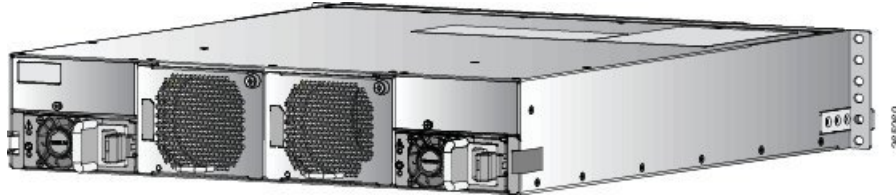
Figure 4: Cisco NCS 5002 - Front (Port Side) View

Ports

Cisco NCS 5002 router consists of the following ports:

- 80 x One GE/10GE SFP+ ports
  - 40 x Regular 10G SFP+ Ports, on baseboard
  - 40 x DWDM and ZR Capable 10G SFP+ Ports, on mezzanine (Cisco Metallic Grey in color)
- 4 x 100G QSFP28 ports (Light Green in color)

Features

The Cisco NCS 5002 router has the following features:

- Two 1+1 redundant, hot-swappable power supplies, which provide port side intake or exhaust for cooling
- Two 1+1 redundant, hot-swappable fan modules, which provide port side intake or exhaust for cooling
- A management, console, and the USB interface on the port (front) side of the router

Power Supply

The Cisco NCS 5002 chassis has slots for two 1+1 redundant power supplies. Power supply options need to be configured with the base chassis. A minimum of one power supply is required for normal operation. The following table lists the power supplies that are configurable with the Cisco NCS 5002 router.

Table 4: Power Supplies for the Cisco NCS 5002 router

Part Number	Power Supply
NC5K-PDC-930W-FR	Cisco NCS 5000 Power DC 930W Front to Back Airflow
NC5K-PDC-930W-FR=	Cisco NCS 5000 Power DC 930W Front to Back Airflow, spare
NC5K-PDC-930W-BK	Cisco NCS 5000 Power DC 930W Back to Front Airflow
NC5K-PDC-930W-BK=	Cisco NCS 5000 Power DC 930W Back to Front Airflow, spare
NC5K-PAC-650W-FR	Cisco NCS 5000 Series Router Power AC 650W Front to Back Airflow
NC5K-PAC-650W-FR=	Cisco NCS 5000 Series Router Power AC 650W Front to Back Airflow, spare
NC5K-PAC-650W-BK	Cisco NCS 5000 Series Router Power AC 650W Back to Front Airflow
NC5K-PAC-650W-BK=	Cisco NCS 5000 Series Router Power AC 650W Back to Front Airflow, spare

Fan Modules

The Cisco NCS 5002 chassis has slots for two 1+1 redundant fan modules. The fan modules are hot-swappable. Fan modules operate in an 1+1 redundancy mode. Fan options need to be configured with the base chassis. The Cisco NCS 5002 system supports both forward and reverse airflow. The system can work with a single fan failure. More than one fan failure leads to system shutdown. The following table lists the fan modules that are configurable with the Cisco NCS 5002 router.

Table 5: Fan Modules for the Cisco NCS 5002 router

Part Number	Fan Module
NCS-5002-FN-FR	Cisco NCS 5002 Router Fan Front to Back Airflow
NCS-5002-FN-FR=	Cisco NCS 5002 Router Fan Front to Back Airflow, spare
NCS-5002-FN-BK	Cisco NCS 5002 Router Fan Back to Front Airflow
NCS-5002-FN-BK=	Cisco NCS 5002 Router Fan Back to Front Airflow, spare

Cisco NCS 5011

Cisco NCS 5011

The Cisco NCS 5011 router is also an extension to Cisco's routing platform portfolio enabling Service Providers and MPLS enabled data center architectures to offer elastic networks with improved business agility and simplified operations to deliver high-bandwidth mobile, video, and cloud services.

The Cisco NCS 5011 router consists of 32 QSFP+/QSFP28 ports. The NCS 5011 system supports 10GE, 25GE, 40GE, 50GE, and 100GE.

The Cisco NCS 5011 system extends 4x10G, 4x25G, and 2x50G breakout support for Copper Optics.

Configure Breakout

Log into the router in the config mode, and type the following command (in this example, the breakout optics is inserted in port 0):

```
RP/0/RP0/CPU0:router(config)# controller optics 0/0/0/0 breakout 4x10
RP/0/RP0/CPU0:router(config)# controller optics 0/0/0/0 breakout 4x25
RP/0/RP0/CPU0:router(config)# controller optics 0/0/0/0 breakout 2x50
```

Note

- The broken out interfaces are named as follows:

    - tenGigE 0/0/0/0/0, tenGigE 0/0/0/0/1, tenGigE 0/0/0/0/2, and tenGigE 0/0/0/0/3

    - twentyFiveGigE 0/0/0/0/0, twentyFiveGigE 0/0/0/0/1, twentyFiveGigE 0/0/0/0/2, and twentyFiveGigE 0/0/0/0/3

    - FiftyGigE 0/0/0/0/0, FiftyGigE 0/0/0/0/1

- The above commands fail if the optics inserted do not support breakout. Only copper optics are currently supported.

- The commands succeed if there are no optics inserted, and the breakout is executed whenever optics are inserted at a later stage.

Figure 5: Cisco NCS 5011 - Back (Fan Side) View
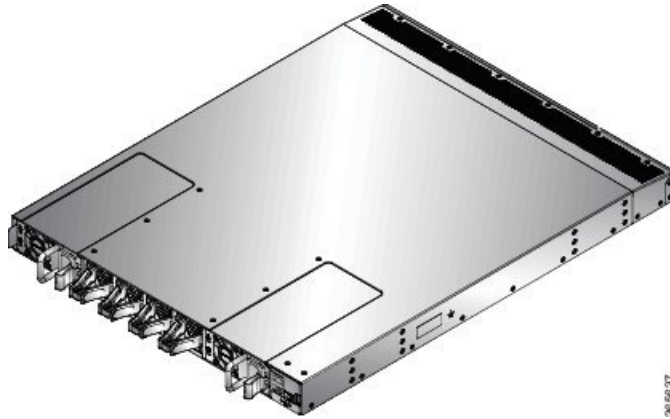
Figure 6: Cisco NCS 5011 - Front (Port Side) View
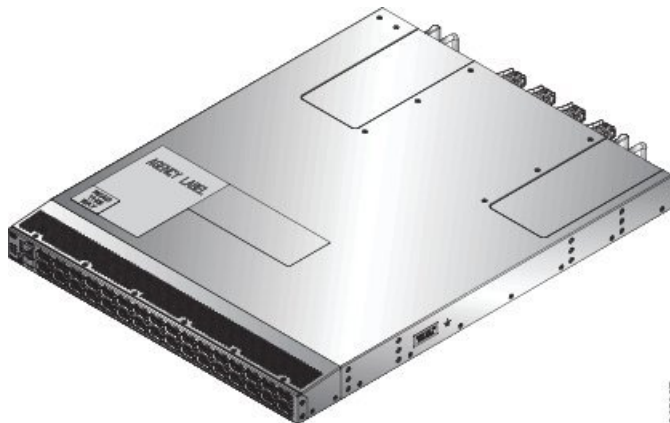
Ports

Cisco NCS 5011 router consists of the following ports:

- 2 x 10GE SFP + ports
- 32 x 100G QSFP28-100 ports

Features

The Cisco NCS 5011 router has the following features:

- Two 1+1 redundant, hot-swappable power supplies, which provide port side intake or exhaust for cooling
- Four 3+1 redundant, hot-swappable fan modules, which provide port side intake or exhaust for cooling
- A management, console, and the USB interface on fan side of the router

Power Supply

The Cisco NCS 5011 chassis has slots for two 1+1 redundant power supplies. Power supply options need to be configured with the base chassis. A minimum of one power supply is required for normal operation. The following table lists the power supplies that are configurable with the Cisco NCS 5011 router.

Table 6: Power Supplies for the Cisco NCS 5011 router

Part Number	Power Supply
NC5K-PDC-930W-FR	Cisco NCS 5000 Power DC 930W Front to Back Airflow
NC5K-PDC-930W-FR=	Cisco NCS 5000 Power DC 930W Front to Back Airflow, spare
NC5K-PDC-930W-BK	Cisco NCS 5000 Power DC 930W Back to Front Airflow
NC5K-PDC-930W-BK=	Cisco NCS 5000 Power DC 930W Back to Front Airflow, spare
NC5K-PAC-650W-FR	Cisco NCS 5000 Series Router Power AC 650W Front to Back Airflow
NC5K-PAC-650W-FR=	Cisco NCS 5000 Series Router Power AC 650W Front to Back Airflow, spare
NC5K-PAC-650W-BK	Cisco NCS 5000 Series Router Power AC 650W Back to Front Airflow
NC5K-PAC-650W-BK=	Cisco NCS 5000 Series Router Power AC 650W Back to Front Airflow, spare

Fan Modules

The Cisco NCS 5011 chassis has slots for four 3+1 redundant fan modules. The fan modules are hot-swappable. Fan options need to be configured with the base chassis. The Cisco NCS 5011 system supports both forward and reverse airflow. The system can work with a single fan failure. More than one fan failure leads to system shutdown. The following table lists the fan modules that are configurable with the Cisco NCS 5011 router.

Table 7: Fan Modules for the Cisco NCS 5011 router

Part Number	Fan Module
NCS-5011-FN-FR	Cisco NCS 5011 Router Fan Front to Back Airflow
NCS-5011-FN-FR=	Cisco NCS 5011 Router Fan Front to Back Airflow, spare
NCS-5011-FN-BK	Cisco NCS 5011 Router Fan Back to Front Airflow
NCS-5011-FN-BK=	Cisco NCS 5011 Router Fan Back to Front Airflow, spare

CHAPTER 2

Safety Guidelines

This chapter lists and describes all the safety guidelines for Cisco NCS 5000 Series routers. Read these safety guidelines before installing Cisco NCS 5000 routers.

Cisco NCS 5000 Safety Guidelines

Note

Caution

When handling router components, wear an ESD strap and handle modules by their handles and carrier edges only. An ESD socket is provided on the chassis. For the ESD socket to be effective, the chassis must be grounded through the power cable, the chassis ground, or the metal-to-metal contact with a grounded rack.

Note

Caution

If the rack is on wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized.

Note

Caution

To prevent loss of input power, ensure the total maximum loads on the circuits supplying power to the router are within the current ratings for the wiring and breakers.

Note

Caution

To prevent loss of input power, ensure the total maximum loads on the circuits supplying power to the router are within the current ratings for the wiring and breakers.

Note   **Warning**

When installing or replacing the unit, the ground connection must always be made first and disconnected last.

Prepare to Install Cisco NCS 5000

This chapter describes how to prepare the Cisco NCS 5000 series router for installation. This chapter includes the following topics:

Installation Options with Racks and Cabinets

The Cisco NCS 5000 series routers can be installed in the following types of racks using a rack-mount kit shipped with the router:

- Open EIA rack

- Perforated EIA cabinet

To enable you to easily mount your router in any qualifying rack, you can attach the rack-mount brackets accommodate racks of different depths.

Airflow Direction

The airflow direction of the Cisco NCS 5000 series routers can be configured as front-to-back (port side intake), or back-to-front (port side exhaust). This is dependent on the type of fan modules and power supplies configured with the chassis. It is not possible to mix airflow directions. In other words, all fan modules and power supplies must either be configured to the same front-to-back, or back-to-front airflow directions.

Chassis Weight

When lifting the router chassis, follow these guidelines.:

- Disconnect all power and external cables before lifting the router.

- Ensure that two people lift the router. The Cisco NCS 5001 router with two power supplies, weighs 22 lb, and the Cisco NCS 5002 with two power supplies, weighs 46 lbs. The Cisco NCS 5011 with two power supplies, weighs 22.2 lbs. Ensure that your footing is solid and the weight of the router is evenly distributed between your feet.

- Lift the router slowly, keeping your back straight. Lift with your legs, not with your back. Bend at the knees, not at the waist.

Required Equipment

Before beginning the installation, ensure that you have the following items available:

- Four 12-24 or 10-32 screws for attaching slider rails to the rack

- Number 1 and number 2 Phillips screwdrivers with torque capability

- 3/16-inch flat-blade screwdriver

- Tape measure and level

- ESD wrist strap or other grounding device

- Antistatic mat or antistatic foam

Also, the following additional items (not found in the accessory kit) are required to ground the chassis:

- Grounding cable (6 AWG recommended), sized according to local and national installation requirements; the required length depends on the proximity of the router to proper grounding facilities

- Crimping tool, large enough to accommodate the girth of the lug

- Wire-stripping tool

Unpack and Inspect the New Router

Before you install a new chassis, you need to unpack and inspect it to be sure that you have all the items that you ordered and verify that the router was not damaged during shipment.

⚠️

Caution   When handling router components, wear an ESD strap and handle modules by their handles and carrier edges only. An ESD socket is provided on the chassis. For the ESD socket to be effective, the chassis must be grounded through the power cable, the chassis ground, or the metal-to-metal contact with a grounded rack.

🔍

Tip   Do not discard the shipping container when you unpack the router. Flatten the shipping cartons and store them with the pallet used for the system. If you need to move or ship the system in the future, you will need these containers.

✎

Note   The router is thoroughly inspected before shipment. If any damage occurred during transportation or any items are missing, contact your customer service representative immediately.

To inspect the shipment, follow these steps:

Procedure

Step 1   Compare the shipment to the equipment list provided by your customer service representative and verify that you have received all items ordered (optional items as well), including the following:

- Grounding lug kit

- Rack mount kit

- ESD wrist strap

- Cables with connectors

- Filters (According to air flow direction)

- Any optional items ordered

Step 2   Check the contents of each box for damage.

Step 3   If you notice any discrepancies or damage, send the following information to your customer service representative by email:

- Invoice number of the shipper (see the packing slip)

- Model and serial number of the missing or damaged unit

- Description of the problem and how it affects the installation

- Photos of the damage to external packaging, internal packaging, and product

- Effect of damage on the installation

Installing the NCS 5000 Router

This chapter describes how to install the Cisco NCS 5000 Series routers. This chapter includes the following sections:

Installation Guidelines

When installing the Cisco NCS 5000 routers, follow these guidelines:

- Ensure that there is adequate space around the router to allow for servicing the router and for adequate airflow Technical Specifications, on page 41,lists the service and airflow requirements.

- Ensure that the air-conditioning meets the heat dissipation requirements listed in Technical Specifications, on page 41

- Ensure that the cabinet or rack meets the requirements listed in Cabinet and Rack Installation , on page 39

Note Jumper power cords are available for use in a cabinet. See the Jumper Power Cord, on page 51 section.

- Ensure that the chassis can be adequately grounded. If the router is not mounted in a grounded rack, we recommend connecting both the system ground on the chassis and the power supply ground directly to an earth ground.

- Ensure that the site power meets the power requirements listed in Technical Specifications, on page 41. If available, you can use an uninterruptible power supply (UPS) to protect against power failures.

- Ensure that circuits are sized according to local and national codes. For North America, the power supply requires a 15-A or 20-A circuit.

The input fuse rating for each 650W AC power supply is either 12.5A or 15A/250V. The recommended current rating of the protective device as part of the building installation is 16A (20A for US/CSA). The

input fuse rating for each 930W DC power supply is 40A/80V. The recommended current rating of the protective device as part of the building installation is 50A.

Note **Caution**

To prevent loss of input power, ensure the total maximum loads on the circuits supplying power to the router are within the current ratings for the wiring and breakers.

Installing Cisco NCS 5000

The following sections describe how to install the Cisco NCS 5000 Series routers.

Installing Cisco NCS 5001

This section describes how to use the rack-mount kit provided with the router to install the Cisco NCS 5001 router into a cabinet or rack that meets the requirements described in .

Note **Warning**

If the rack is on wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized.

The following table lists the items contained in the rack-mount kit provided with the Cisco NCS 5001 router.

Table 8: Cisco NCS 5001 Router Rack-Mount Kit

Quantity	Part Description
4	Rack-mount brackets
16	M4 x 0.7 x 7-mm Phillips flat-head screws
4	Rack-mount guides
2	Slider rails

Procedure

Step 1 Install the front rack-mount brackets on the chassis as follows:

a) Position a front rack-mount bracket on the side of the chassis with its four holes aligned to four of the six screw holes on the front side of the chassis, and then use four M4 screws to attach the bracket to the chassis.

Note You can align any four of the holes in the front rack-mount bracket to four of the six screw holes in the chassis. The holes that you use depend on the requirements of your rack.

b) Repeat Step 1a with the other front rack-mount bracket on the other side of the router.

Figure 7: Rack-mount brackets at the front on Cisco NCS 5001
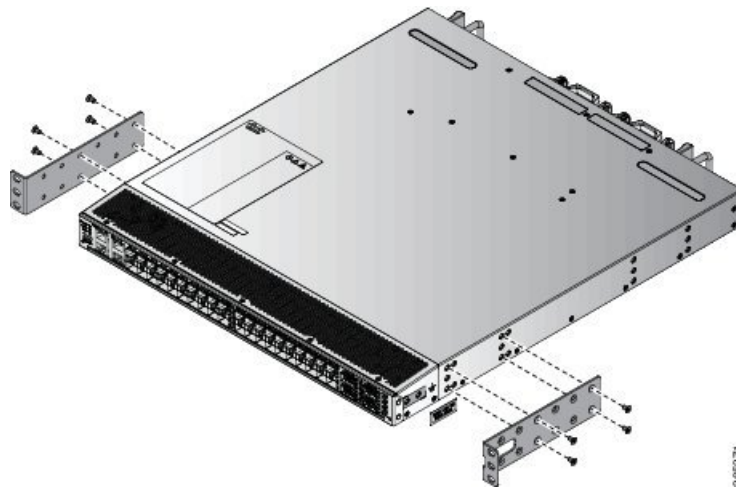
Step 2 Install the rear rack-mount guides on the chassis as follows:

a) Position a rear rack-mount bracket on the side of the chassis with its four holes aligned to four of the six screw holes on the side of the chassis, and then use four M4 screws to attach the bracket to the chassis.

b) Repeat Step 2a with the other rear rack-mount bracket on the other side of the router.

Figure 8: Rack-mount brackets at the rear side on Cisco NCS 5001
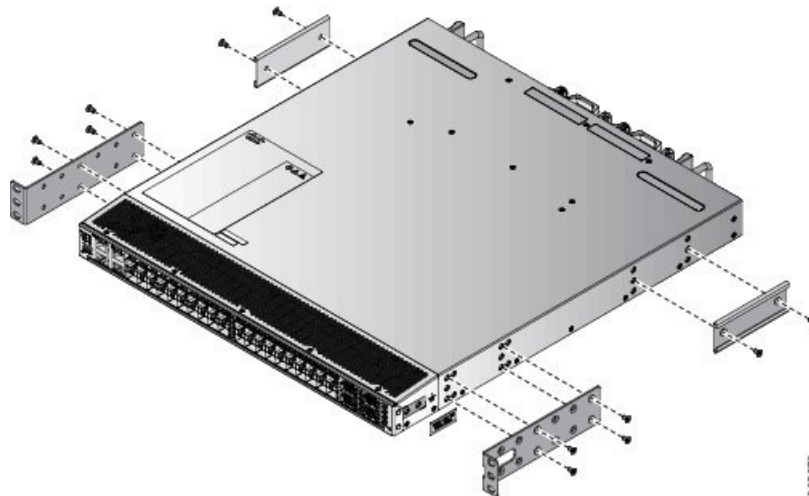
Step 3 Install the slider rails to the rack as follows:

a) Position the slider rails at the desired levels on the back side of the rack and use two 12-24 screws or two 10-32 screws, depending on the rack thread type, to attach the rails to the rack.

Note For racks with square holes, you might need to position a 12-24 cage nut behind each mounting hole in a slider rail before using a 12-24 screw.

b) Repeat with the other slider rail on the other side of the rack.

   c) Use the tape measure and level to verify that the rails are at the same height and horizontal.

Step 4 Insert the router into the rack and attach it as follows:

   a) Holding the router with both hands, position the back of the router between the front posts of the rack.

   b) Align the two rear rack-mount guides on either side of the router with the slider rails installed in the rack. Slide the rack-mount guides onto the slider rails, and then gently slide the router all the way into the rack.

     Note   If the router does not slide easily, try realigning the rack-mount guides on the slider rails.

   c) Holding the chassis level, insert two screws (12-24 or 10-32, depending on the rack type) through the cage nuts and the holes in one of the front rack-mount brackets and into the threaded holes in the rack-mounting rail.

   d) Repeat for the other front rack-mount bracket on the other side of the router.

Installing Cisco NCS 5002

This section describes how to use the rack-mount kit provided with the router to install the Cisco NCS 5002 router into a cabinet or rack that meets the requirements described in .

Note **Caution**

   If the rack is on wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized.

The following table lists the items contained in the rack-mount kit provided with the Cisco NCS 5002 router.

Table 9: Cisco NCS 5002 Router Rack-Mount Kit

| Quantity	Part Description
4	Rack-mount brackets
16	M4 x 0.7 x 7-mm Phillips flat-head screws
4	Rack-mount guides
2	Slider rails

Procedure

Step 1 Install the front rack-mount brackets on the router as follows:

   a) Position a front rack-mount bracket on the side of the router with its two holes aligned to two holes on the front side of the router, and then use two M4 screws to attach the bracket to the router.

   b) Repeat Step 1a with the other front rack-mount bracket on the other side of the router.

Figure 9: Rack-Mount Brackets on the Front Side on Cisco NCS 5002
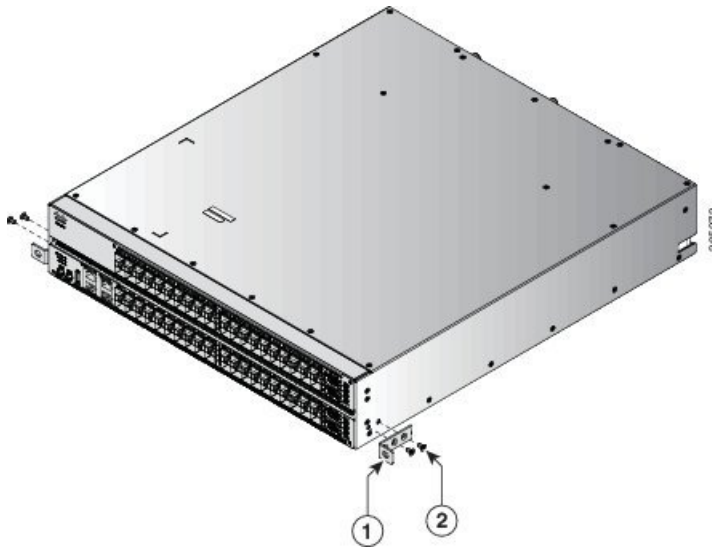
1 - Rack mount bracket	2 - Screws

Step 2   Install the rear rack-mount guides on the rack as follows:

a) Assemble the rack mount and slider using 5 screws (12-24 screws or 10-32 screws depending on the rack type) in front and 2 screws (12-24 screws or 10-32 screws depending on the rack type) on the back.

b) Repeat Step 2a for the other side of the router.

Figure 10: Assembling Rack Mount and Slider
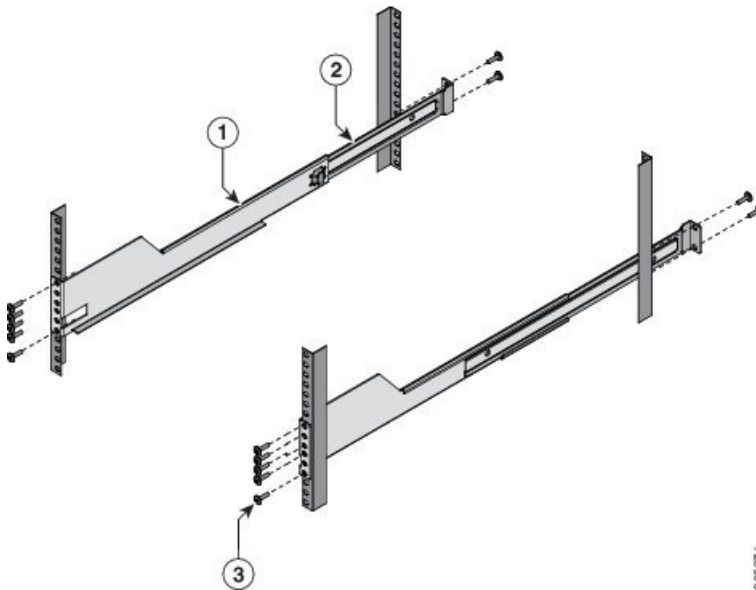
1 - Slider	2 - Rack mount
3 - Screws	

Step 3 Install the slider rails to the rack as follows:

a) Position the router with the front rack mounts aligned at the location shown in the following image and assemble on rack using one screw on either side (12-24 screws or 10-32 screws depending on the rack type.

Figure 11: Slide the Cisco NCS 5002 Router

| **Note** | For racks with square holes, you might need to position a 12-24 cage nut behind each mounting hole in a slider rail before using a 12-24 screw. |

b) Repeat with the other slider rail on the other side of the rack.

c) Use the tape measure and level to verify that the rails are at the same height and horizontal.

Step 4 Insert the router into the rack and attach it as follows:

a) Holding the router with both hands, position the back of the router between the front posts of the rack.

b) Align the two rear rack-mount guides on either side of the router with the slider rails installed in the rack. Slide the rack-mount guides onto the slider rails, and then gently slide the router all the way into the rack.

| **Note** | If the router does not slide easily, try realigning the rack-mount guides on the slider rails. |

c) Holding the router level, insert two screws (12-24 or 10-32, depending on the rack type) through the cage nuts and the holes in one of the front rack-mount brackets and into the threaded holes in the rack-mounting rail.

d) Repeat for the other front rack-mount bracket on the other side of the router.

Installing Cisco NCS 5011

This section describes how to use the rack-mount kit provided with the router to install the Cisco NCS 5011 router into a cabinet or rack that meets the requirements described in Cabinet and Rack Installation , on page 39.

⚠️

Caution   If the rack is on wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized.

The following table lists the items contained in the rack-mount kit provided with the Cisco NCS 5011 router.

*Table 10: Cisco NCS 5011 Router Rack-Mount Kit*

Quantity	Part Description
4	Rack-mount brackets
16	M4 x 0.7 x 7-mm Phillips flat-head screws
4	Rack-mount guides
2	Slider rails

Procedure

Step 1   Install the front rack-mount brackets on the router as follows:

a) Determine which end of the chassis is to be located in the cold aisle as follows:

- If the router has port-side intake modules, position the module so that its ports will be in the cold aisle.

- If the router has port-side exhaust modules, position the module so that its fan and power supply modules will be in the cold aisle.

b) Position a front rack-mount bracket so that four of its screw holes are aligned to the screw holes on the side of the router, and then use four M4 screws to attach the bracket to the router.

Note   You can align any four of the holes in the front rack-mount bracket to four of the six screw holes in the chassis. The holes that you use depend on the requirements of your rack.

c) Repeat Step 1a with the other front rack-mount bracket on the other side of the router.

*Figure 12: Rack-Mount Brackets on the Front Side on Cisco NCS 5011*
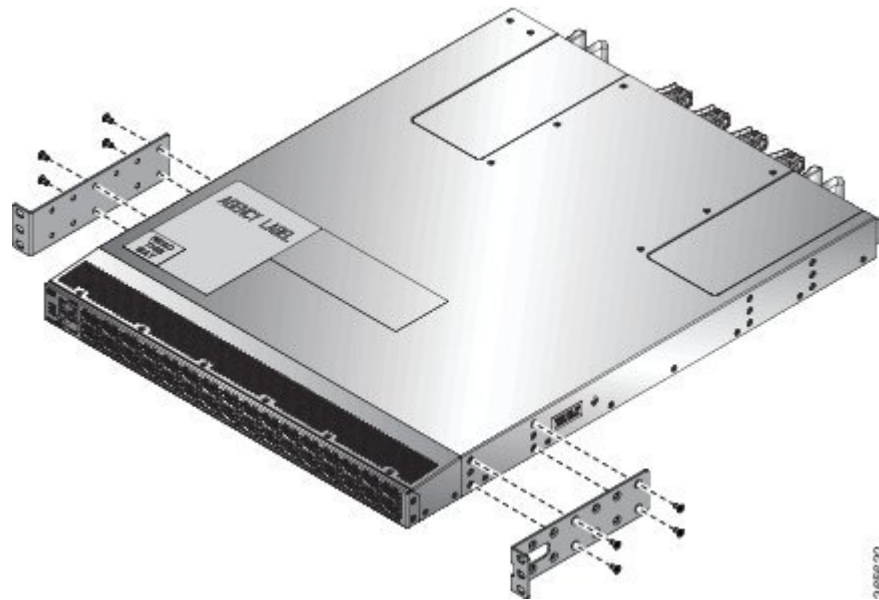
Step 2 Install the rear rack-mount brackets on the rack as follows:

a) Align the two screw holes on a rear rack-mount bracket to the middle two screw holes in the remaining six screw holes on a side of the chassis, and use two M4 screws to attach the bracket to the router.

b) Repeat Step 2a for the other side of the router.

Figure 13: Rack-mount brackets at the rear side on Cisco NCS 5011
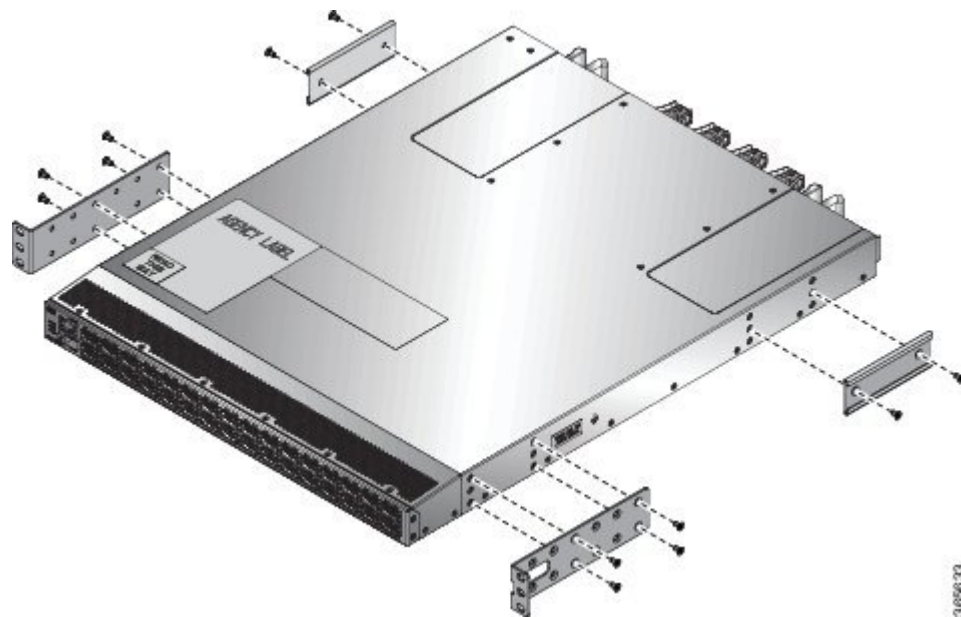
Step 3 Install the slider rails to the rack as follows:

a) Position the router with the front rack mounts aligned at the location shown in the following image and assemble on rack using one screw on either side (12-24 screws or 10-32 screws depending on the rack type.

b) Repeat with the other slider rail on the other side of the rack.

c) Use the tape measure and level to verify that the rails are at the same height and horizontal.

Step 4 Insert the router into the rack and attach it as follows:

a) Holding the router with both hands, position the back of the router between the front posts of the rack.

b) Align the two rear rack-mount guides on either side of the router with the slider rails installed in the rack. Slide the rack-mount guides onto the slider rails, and then gently slide the router all the way into the rack.

Note If the router does not slide easily, try realigning the rack-mount guides on the slider rails.

c) Holding the router level, insert two screws (12-24 or 10-32, depending on the rack type) through the cage nuts and the holes in one of the front rack-mount brackets and into the threaded holes in the rack-mounting rail.

Grounding Cisco NCS 5000

This section describes how to ground the Cisco NCS 5000 series routers.

Procedure

Step 1 On Cisco NCS 5001, NCS 5011 remove the label on the rear side (fan side) of the router to expose the ground mounting holes (as shown in the figure). On Cisco NCS 5002, remove the label on the right side of the front side (port side) of the router to expose the ground mounting holes (as shown in the figure).

Figure 14: Grounding the Cisco NCS 5001 Router
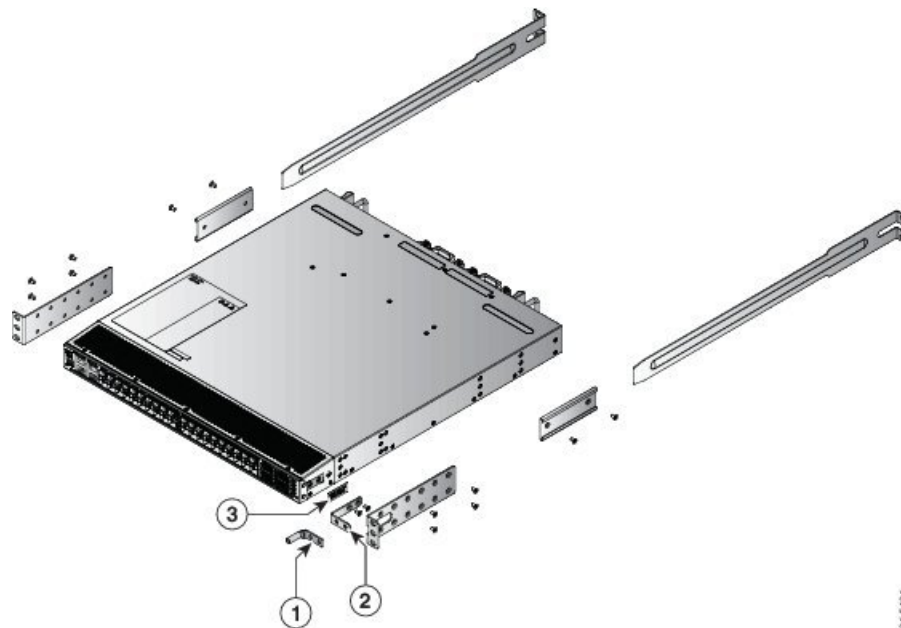
1 - Ground Lug	2 - Ground Lug bracket
3 - Label	

Figure 15: Grounding the Cisco NCS 5002 Router
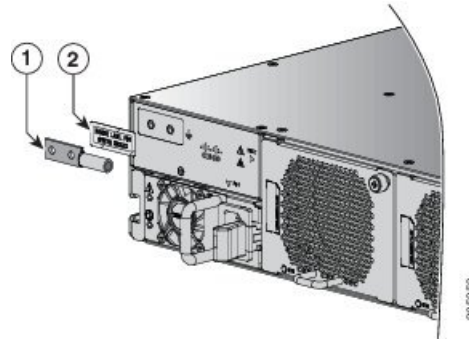
1 - Ground Lug	2 - Label

Figure 16: Grounding the Cisco NCS 5011 Router
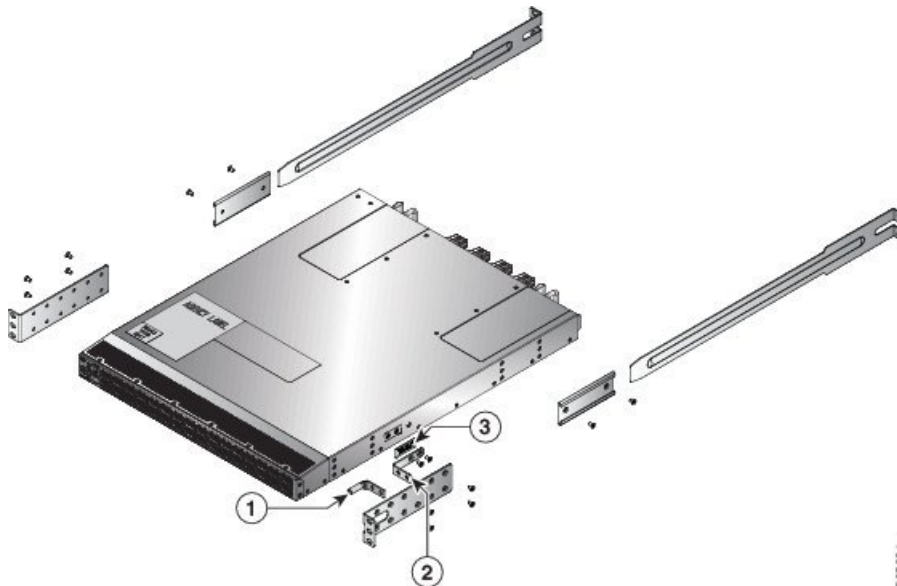
1 - Ground Lug	2 - Ground Lug bracket
3 - Label	

Step 2 (Only for NCS 5001 and NCS 5011) Install the ground lug bracket to the mounting holes with two flat head M4 X 7mm screws.

Step 3 (Only for NCS 5001 and NCS 5011) Install ground lug to the ground lug bracket with two pan head M4 screws.

Step 4 (Only for NCS 5002) Place the grounding lug against the grounding pad so that there is solid metal-to-metal contact, and insert the two M4 screws with washers through the holes in the grounding lug and into the grounding pad.

Step 5 Using a wire-stripping tool, remove the covering from one end of the grounding cable and insert the stripped end of the grounding cable to the open end of the grounding lug.

Step 6 Prepare the other end of the ground cable and connect it to an appropriate grounding point in your site to ensure adequate earth ground.

Starting Cisco NCS 5000

This section provides instructions for powering up the Cisco NCS 5000 series routers and verifying their component installation.

Note Do not connect the Ethernet port to the LAN until the initial router configuration has been performed.

Note **Warning**

When installing or replacing the unit, the ground connection must always be made first and disconnected last.

To power up the router and verify hardware operation, follow these steps:

Procedure

Step 1 Verify that the power supply and the fan modules are installed.

Note Depending on the outlet receptacle on your power distribution unit, you may need the optional jumper power cord to connect the router to your outlet receptacle. See the Jumper Power Cord, on page 51 section.

Step 2 Ensure that the router is adequately grounded as described in the Grounding Cisco NCS 5000, on page 23, and that the power cables are connected to outlets that have the required AC power voltages (see Power Specifications, on page 43)

Step 3 For the router, insert each end of the power clip (from the accessory kit) into holes on tabs located on either side of the power connectors.

Step 4 Connect each power cable to the power connectors on the router and an AC power source. Press the power cable into the power clip to ensure that the power cable stays connected to the router when bumped. The router should power on as soon as you connect the power cable.

Step 5 Check if the fans are operational; they should begin operating when the power cable is plugged in.

Step 6 After the router boots up, verify that the power supply Status LED is green. After initialization, the system status LED is green, indicating that all router environmental monitors are reporting that the system is operational. If this LED is orange or red, then one or more environmental monitor is reporting a problem.

Note The Link LEDs for the Ethernet connector should not be ON unless the cable is connected.

Step 7   Try removing and reinstalling a component that is not operating correctly. If it still does not operate correctly, contact your customer service representative for a replacement.

| Note | If you purchased this product through a Cisco reseller, contact the reseller directly for technical support. If you purchased this product directly from Cisco, contact Cisco Technical Support at this URL: http://www.cisco.com/en/US/support/tsd_cisco_worldwide_contacts.html. |

Step 8   Verify that the system software has booted and the router has initialized without error messages.

If you cannot resolve an issue, contact your customer service representative.

Replacing NCS 5000 Router Components

This chapter describes how to replace modules in the Cisco NCS 5000 Series routers. This chapter includes the following sections:

Replacing a Fan Module

(For NCS 5001, NCS 5002, and NCS 5011) The fan tray is designed to be removed and replaced while the system is operating without causing an electrical hazard or damage to the system if the replacement is performed within five minutes. If you do not have the appropriate replacement fan module, leave the original fan module in its slot to preserve the designed airflow for the router until you have the replacement fan module.

Warning The fans might still be turning when you remove the fan assembly from the chassis. Keep fingers, screwdrivers, and other objects away from the openings in the fan assembly's housing. **Statement 263**

Note
- Only one fan tray can be removed and replaced each time without disrupting the system.

- (For NCS 5001, NCS 5002, and NCS 5011) Once you remove the fan tray, it must be replaced within 5 minutes.

Replacing a 1 (RU) Fan Module

The fan tray is designed to be removed and replaced while the system is operating without causing an electrical hazard or damage to the system if the replacement is performed within five minutes. If you do not have the appropriate replacement fan tray, leave the original fan tray in its slot to preserve the designed airflow for the router until you have the replacement fan module.

Before you begin

- Verify that you have an ESD wrist strap or other device to prevent ESD damage for components that you touch.

- Verify that you have an antistatic surface or bag for placing the fan module that you remove from the chassis.

- Verify that the replacement fan module has the correct direction of airflow (it has the same coloring as the other fan and power supply modules in the same chassis).

Procedure

Step 1 Remove the fan module that you are replacing as follows:

a) On the fan module that you are removing, press the two sides of the fan module handle next to where it connects to the fan module and pull on the handles enough to unseat the module from its connectors.

Figure 17: Replacing Fan Tray on NCS 5001

b) Holding the handle, pull the module out of the chassis and set it on an antistatic surface or in a antistatic bag.

Caution Do not touch the electrical connectors on the back side of the module and prevent anything else from coming into contact with and damaging the connectors.

Step 2 Install the replacement fan module as follows:

a) Holding the fan module by its handle, align the back of the fan module (the side with the electrical connectors) to the open fan slot in the chassis.

b) Slide the fan module into the slot until it clicks in place.

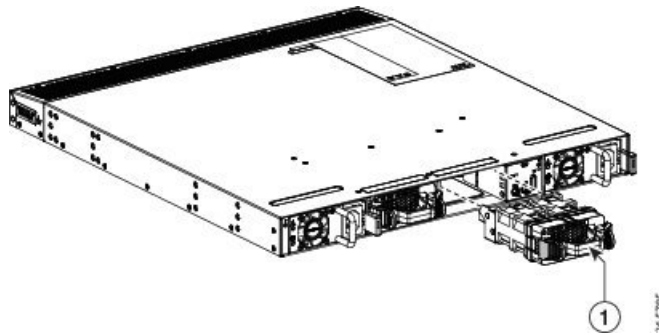# Replacing a 2 (RU) Fan Module

Before you begin

- Verify that you have an ESD wrist strap or other device to prevent ESD damage for components that you touch.

- Verify that you have an antistatic surface or bag for placing the fan module that you remove from the chassis.

- Verify that the replacement fan module has the correct direction of airflow (it has the same coloring as the other fan and power supply modules in the same chassis).

Procedure

Step 1 Remove the fan module that you are replacing as follows:

a) Loosen the captive screws on the fan module by turning them counterclockwise, using a flat-blade or number 2 Phillips screwdriver if required.

Figure 18: Replacing Fan Module on NCS 5002
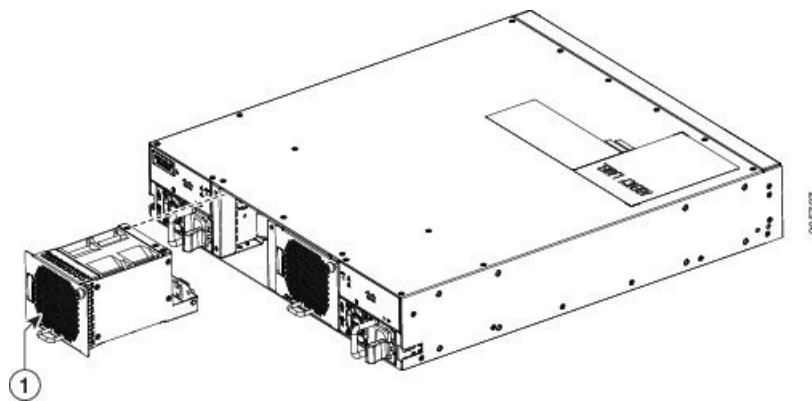
b) Grasp the captive screws of the fan module and pull it outward.

c) Pull the fan module clear of the chassis and set it on an antistatic surface or repack it in packing materials.

Step 2 Install the replacement fan module as follows:

a) Hold the fan module with the sheet metal flange holding the connector on the bottom.

b) Place the fan module into the front chassis cavity so it rests on the chassis, and then push the fan module into the chassis as far as it can go until the captive screw makes contact with the chassis.

c) Tighten the captive screw.

d) Listen for the fans if the device is powered on. You should immediately hear them operating. If you do not hear them, ensure that the fan module is inserted completely in the chassis and the faceplate is flush with the outside surface of the chassis.

Replacing an AC Power Supply

You can replace an AC power supply during operations so long as there is another power supply installed and operating during the replacement. The router requires only one power supply for operations, so you can hot swap the redundant power supply during operations. If there is only one power supply installed in the chassis, you can replace it by installing the new power supply in the open power supply slot before removing the other power supply.

Before you begin

- Verify that you have an ESD wrist strap or other device to prevent ESD damage for components that you touch.

- Verify that you have an antistatic surface or bag for placing the power supply module that you remove from the chassis.

- Verify that the replacement power supply module has the correct direction of airflow (it has the same coloring as the other fan and power supply modules in the same chassis). Otherwise the router can overheat and shut down.

- If fan filters are used for port side exhaust, then filters must be removed before removing the power supply.

Procedure

Step 1   Remove the power supply as follows:

a) Pull the power cord out from the power receptacle on the power supply to be removed and verify that the OK LED turns off.

b) Remove the power supply from the chassis by pushing and holding its thumb latch to the left and pulling the power supply part way out of the chassis.

Figure 19: Replacing Power Supply Module on NCS 5001
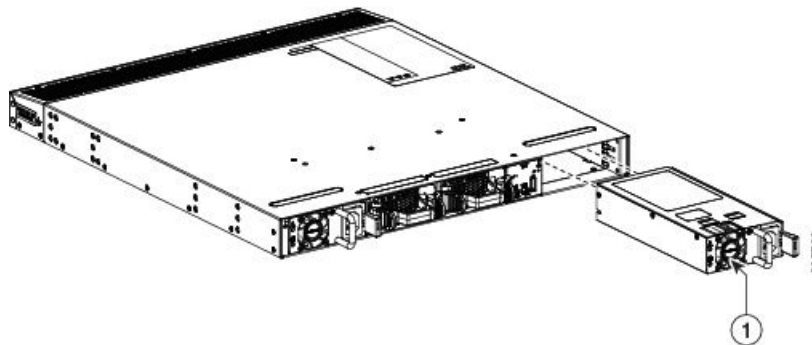
Figure 20: Replacing Power Supply Module on NCS 5002
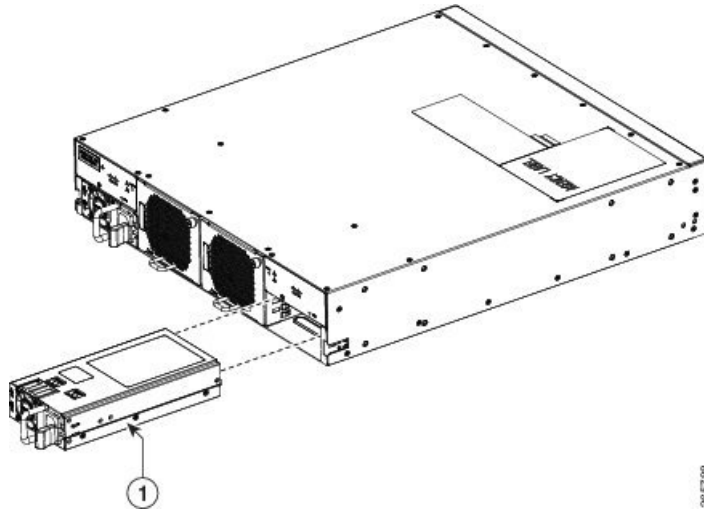
c) Place your other hand under the power supply to support it while you slide it out of the chassis. Either place the power supply on an antistatic surface or pack it in its packing materials.

Step 2 Install the replacement power supply as follows:

a) Holding the replacement power supply with one hand underneath the module and the other hand holding the handle, align the back end of the power supply (the end with the electrical connections) to the open power supply slot and slide the power supply all the way into the slot until it clicks into place.

b) Test the installation by trying to pull the power supply out of the slot without using the release latch. If the power supply does not move out of place, it is secured in the slot. If the power supply moves, press it all the way into the slot until it clicks in place.

Step 3 Connect the new power supply to an AC power source as follows

a) Attach the power cable to the electrical outlet on the front of the power supply.

b) Connect the other end of the power cable to an AC power source.

c) Verify that the power supply is operational by checking that the power supply OK LED is green.

What to do next

Replace the filters after replacing the power supply.

Replacing a DC Power Supply

Note   Before you begin the wiring procedure, turn off the DC power source from your facility's circuit breaker to avoid electric shock hazard.

Procedure

Step 1	Turn off the DC power at its source to avoid electric shock hazard.
Step 2	Remove the power cord from the power cord retainer.
Step 3	Remove the power cord from the power connector.
Step 4	Press the release latch at the right side of the power supply module inward and slide the power supply out.
Step 5	Insert the new power supply into the power-supply slot, and gently push it into the slot.
Step 6	Connect the power cord to the power supply and to an DC power outlet. Turn on the power at the power source.

Figure 21: Connect Power Cord to DC Power Outlet
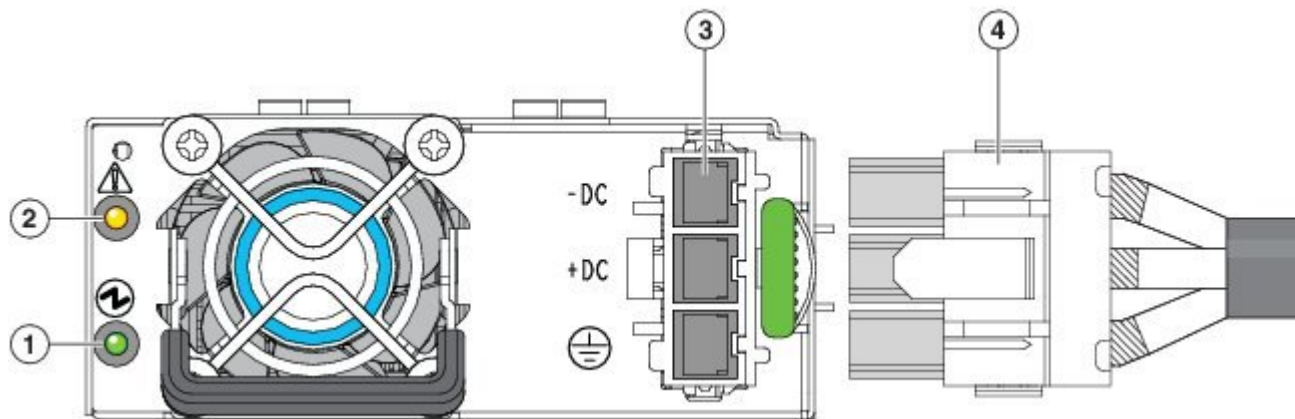
Step 7	Verify that the power supply OK LED is green.

Replacing the Air Filter for Port Side Intake

A replaceable air filter is located on the front of the chassis. How often the air filters should be replaced depends on the facility environment. In a dirty environment, or when you start getting frequent temperature alarms, you should always check the intake grills for debris, and then check the air filters to see if they need to be replaced.

Note   In general, we recommend that you inspect the air filter every three months and replace, if necessary, every 6 months.

Procedure

Step 1	Remove the air filter that you are replacing as follows:

a) Loosen the captive screws that secure the fan filter. The air filter attaches to the front of the chassis for port side inlet, in three parts (Piece A, Piece B and piece C as shown in the figure below). Remove piece C first, followed by piece B and then piece A.

Figure 22: Replacing port side inlet air filter
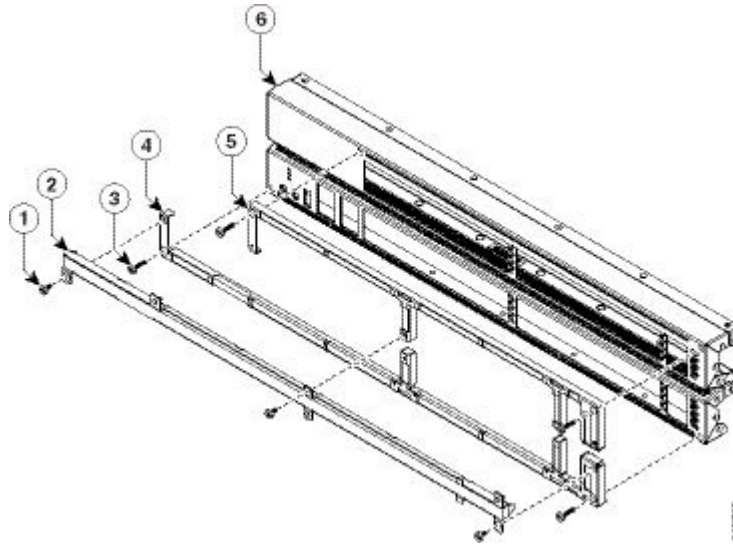
1	3x5 captive screws	2	Mid Panel (Piece C)
3	4x4 captive screws	4	Bottom Panel (Piece B)
5	Top Panel (Piece A)	6	Unit Faceplate

b) Slide out each of the air filter panels from the slot, and carefully set it aside.

Step 2 Install the air filter panels to the faceplate as follows:

a) Attach the upper filter panel to the lower filter panel using four long captive screws.

b) Attach the mid filter panel installed to the upper and lower filter panels using three short captive screws.

Note Screws to be tightened to 2.0 ± 0.5 in-lbs of torque.

Replacing Air Filter for Port Side Exhaust

Procedure

Step 1 To remove a power module air filter, follow these steps:

a) Place the screwdriver under the edge of the air filter clip-on holder.

b) Gently pry the holder loose with the screwdriver; it should pop off easily.

c) Remove the air filter from the front of the power module and set it carefully aside.

Step 2 To replace a power module air filter, follow these steps:

a) Place the air filter in position on the front of the power module.

b) Place the holder in position on the front of the power module over the air filter.

c) Press the holder firmly but gently until it snaps into place.

d) Slide in the power supply panel and tighten it using one screw.

Figure 23: Replacing the power module air filter
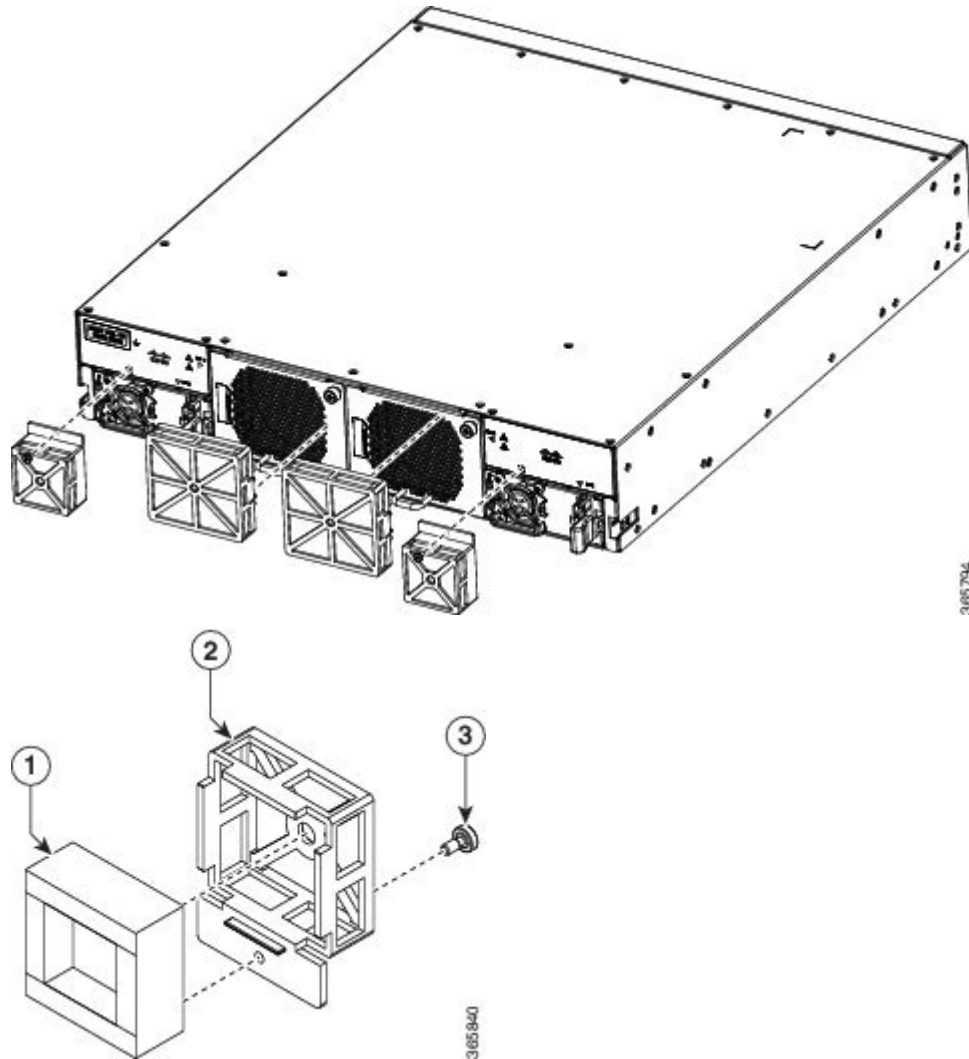
e) Gently snap in the fan filter into the clip-on holder.

Figure 24: Replacing the fan filter
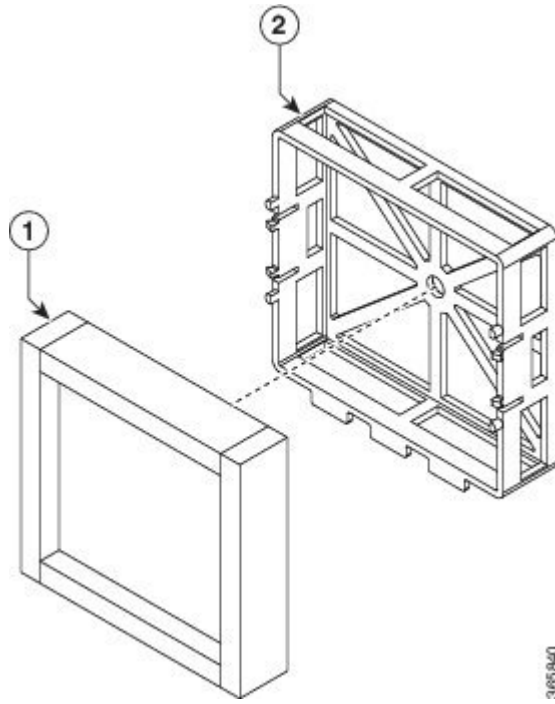
APPENDIX **A**

Accessory Kits

Accessory Kit Contents

This appendix describes the contents of the accessory kits for the Cisco NCS 5000 Series routers.

Cisco NCS 5001 Router Accessory Kit

This section describes the accessory kit contents for the Cisco NCS 5001 router accessory kit (NCS-5001-ACSR). The Cisco NCS 5001 router accessory kit includes the following items:

- 2 rack-mount guides
- 2 rack-mount brackets
- 2 rack-mount sliders
- 16 M4 x 0.7 x 6-mm Phillips flat-head screws
- 1 console cable with an RJ-45-RS-232 adapter and a DB9 adapter
- 1 ground lug kit
- 1 ESD wrist strap

Note Additional parts can be ordered from your customer service representative.

Cisco NCS 5002 Router Accessory Kit

This section describes the accessory kit contents for the Cisco NCS 5002 router accessory kit (NCS-5002-ACSR). The Cisco NCS 5002 router accessory kit includes the following items:

- 2 rack-mount guides
- 2 rack-mount brackets

- 2 rack-mount sliders

- 16 M4 x 0.7 x 6-mm Phillips flat-head screws

- 1 console cable with an RJ-45-RS-232 adapter and a DB9 adapter

- 1 ground lug kit

- 1 ESD wrist strap

Note Additional parts can be ordered from your customer service representative.

Cisco NCS 5011 Router Accessory Kit

This section describes the accessory kit contents for the Cisco NCS 5011 router accessory kit (NCS-5011-ACSR). The Cisco NCS 5011 router accessory kit includes the following items:

- 2 rack-mount guides

- 2 rack-mount brackets

- 2 rack-mount sliders

- 16 M4 x 0.7 x 6-mm Phillips flat-head screws

- 1 console cable with an RJ-45-RS-232 adapter and a DB9 adapter

- 1 ground lug kit

- 1 ESD wrist strap

Note Additional parts can be ordered from your customer service representative.

Cabinet and Rack Installation

This appendix provides the requirements for cabinet and rack installation for the Cisco NCS 5000 router and includes the following sections:

Cabinet and Rack Requirements

This section provides the requirements for the following types of cabinets and racks, assuming an external ambient air temperature range of 0° F to 104° F (0° C to 40° C):

- Standard perforated cabinets

- Standard open racks

Note   If you are selecting an enclosed cabinet, we recommend one of the thermally validated types: standard perforated or solid-walled with a fan tray.

Note   Do not use racks that have obstructions (such as power strips), because the obstructions could impair access to field-replaceable units (FRUs).

This section includes the following topics:

General Requirements for Cabins and Racks

The cabinet or rack must be one of the following types:

- Standard 19-in. (48.3 cm) (four-post EIA cabinet or rack, with mounting rails that conform to English universal hole spacing per section 1 of ANSI/EIA-310-D-1992. See the "Requirements Specific to Perforated Cabinets, on page 40".

The cabinet or rack must also meet the following requirements:

- The minimum vertical rack space for the Cisco NCS 5000 router chassis must be one RU (rack units).

- The width between the rack-mounting rails must be at least 19 inches if the rear of the router is not attached to the rack. For four-post EIA racks, this is the distance between the two front rails.

- For four-post EIA cabinets (perforated or solid-walled), the requirements are as follows:

  - The minimum spacing for the bend radius for fiber-optic cables should have the front-mounting rails of the cabinet offset from the front door by a minimum of 3 inches (7.6 cm), and a minimum of 5 inches (12.7 cm) if cable management brackets are installed on the front of the chassis.

  - The distance between the outside face of the front mounting rail and the outside face of the back mounting rail should be 23.5 to 34.0 inches (59.7 to 86.4 cm) to allow for rear-bracket installation.

  - A minimum of 2.5 inches (6.4 cm) of clear space should exist between the side edge of the chassis and the side wall of the cabinet. No sizeable flow obstructions should be immediately in the way of chassis air intake or exhaust vents.

Note   Optional jumper power cords are available for use in a cabinet. See the Jumper Power Cord section on page C-8

Requirements Specific to Perforated Cabinets

A perforated cabinet is as a cabinet with perforated front and rear doors and solid side walls. In addition to the requirements listed in the "General Requirements for Cabins and Racks, on page 39" , perforated cabinets must meet the following requirements:

- The front and rear doors must have at least a 60 percent open area perforation pattern, with at least 15 square inches (96.8 square cm) of open area per rack unit of door height.

- The roof should be perforated with at least a 20 percent open area.

- The cabinet floor should be open or perforated to enhance cooling.

Cisco provides an R-Series rack that conforms to these requirements.

Cable Management Guidelines

To help with cable management, you might want to allow additional space in the rack above and below the chassis to make it easier to route as many as 56 fiber or copper cables through the rack.

Technical Specifications

This appendix describes the technical specifications for the Cisco NCS 5001 and 5002 routers. This appendix includes the following sections:

Router Specifications

The following table lists the physical specifications for the Cisco NCS 5001 router.

Table 11: Physical Specifications for the Cisco NCS 5001 Router

Description	Specification
Dimensions (H x W x D)	1.72 x 17.42 x 19.3 in. (4.37 cm x 44.3 cm x 49.0 cm)
Cisco NCS 5001 with two 650W power supplies, and two fan modules	21 lb (9.5 kg)

The following table lists the physical specifications for the Cisco NCS 5002 router.

Table 12: Physical Specifications for the Cisco NCS 5002 Router

Description	Specification
Dimensions (H x W x D)	3.5 x 17.42 x 19.28 in. (8.9 cm x 44.3 cm x 48.97 cm)
Cisco NCS 5002 with two 650W power supplies, and two fan modules	46 lb (20.9 kg)

Table 13: Physical Specifications for the Cisco NCS 5011 Router

Description	Specification
Dimensions (H x W x D)	1.72 x 17.3 x 22.5 in. (4.4 cm x 43.9 cm x 57.15 cm)
Cisco NCS 5011 with two 650W power supplies, and four fan modules	22.2 lb (10.6 kg)

Environment Specification

The following table lists the environmental specifications for the Cisco NCS 5001 Router.

Table 14: Environmental Specifications for the Cisco NCS 5001 Router

Property	Cisco NCS 5001 Router
Operating temperature	32 to 104°F (0 to 40°C)
Nonoperating (storage) temperature	-40 to 158°F (-40 to 70°C)
Humidity	5 to 95% (non condensing)
Altitude	0 to 10,000 ft (0 to 3000 m)

Table 15: Environmental Specifications for the Cisco NCS 5002 Router

Property	Cisco NCS 5002 Router
Operating temperature	32 to 104°F (0 to 40°C)
Nonoperating (storage) temperature	-40 to 158°F (-40 to 70°C)
Humidity	5 to 95% (non condensing)
Altitude	0 to 10,000 ft (0 to 3000 m)

Table 16: Environmental Specifications for the Cisco NCS 5011 Router

Property	Cisco NCS 5011 Router
Operating temperature	32 to 104°F (0 to 40°C)
Nonoperating (storage) temperature	-40 to 158°F (-40 to 70°C)
Humidity	5 to 95% (non condensing)
Altitude	0 to 10,000 ft (0 to 3000 m)

Power Specifications

This section describes the power specifications for the Cisco NCS 5000 Series routers.

Specifications for the Cisco NCS 5001 Power Supply

The following table lists the Power supply specifications for the Cisco NCS 5001 Series routers.

The input fuse rating for each 650W AC power supply is either 12.5A or 15A/250V. The recommended current rating of the protective device as part of the building installation is 16A (20A for US/CSA).

Table 17: Specifications for the Cisco NCS 5001 AC Power Supply

AC Power Supply Properties	Specifications
Typical operating power	357 W
Maximum Power	650 W
Input Voltage	110/220
Frequency	47 Hz to 53 Hz
Efficiency	94% (At 50% Load)
RoHS Compliance	Yes
Hot Swappable	Yes
Port side exhaust air flow power supply	Yes
Port side intake air flow power supply	Yes

The input fuse rating for each 930W DC power supply is 40A/80V. The recommended current rating of the protective device as part of the building installation is 50A.

Table 18: Specifications for the Cisco NCS 5001 DC Power Supply

DC Power Supply Properties	Specifications
Typical operating power	511 W
Maximum Power	930 W
Input Voltage	-48/-60
Efficiency	94% (At 50% Load)
RoHS Compliance	Yes

Note   The minimum cable sizing required for DC power supply is 10 AWG.

Specifications for the Cisco NCS 5002 Power Supply

The following table lists the Power supply specifications for the Cisco NCS 5002 Series router.

Table 19: Specifications for the Cisco NCS 5002 AC Power Supply

AC Power Supply Properties	Specifications
Typical operating power	357 W
Maximum Power	650 W
Input Voltage	110/220
Frequency	47 Hz to 53 Hz
Efficiency	94% (At 50% Load)
RoHS Compliance	Yes
Hot Swappable	Yes
Port side exhaust air flow power supply	Yes
Port side intake air flow power supply	Yes

Table 20: Specifications for the Cisco NCS 5002 DC Power Supply

DC Power Supply Properties	Specifications
Typical operating power	511 W
Maximum Power	930 W
Input Voltage	-48/-60
Efficiency	94% (At 50% Load)
RoHS Compliance	Yes

Note   The minimum cable sizing required for DC power supply is 10 AWG.

Specifications for the Cisco NCS 5011 Power Supply

The following table lists the Power supply specifications for the Cisco NCS 5011 Series router.

Table 21: Specifications for the Cisco NCS 5011 AC Power Supply

AC Power Supply Properties	Specifications
Typical operating power	357 W
Maximum Power	650 W
Input Voltage	110/220
Frequency	47 Hz to 53 Hz
Efficiency	94% (At 50% Load)
RoHS Compliance	Yes
Hot Swappable	Yes
Port side exhaust air flow power supply	Yes
Port side intake air flow power supply	Yes

Table 22: Specifications for the Cisco NCS 5011 DC Power Supply

DC Power Supply Properties	Specifications
Typical operating power	511 W
Maximum Power	930 W
Input Voltage	-48/-60
Efficiency	94% (At 50% Load)
RoHS Compliance	Yes

Note   The minimum cable sizing required for DC power supply is 10 AWG.

APPENDIX **D**

Cable and Port Specification

This appendix provides cable and port specifications for the Cisco NCS 5001 and 5002 Series routers.

Console Port

The console port is an asynchronous RS-232 serial port with an RJ-45 connector.

Supported Power Cords and Plugs

Each power supply has a separate power cord. Standard power cords or jumper power cords are available for connection to a power distribution unit that has IEC 60320 C19 outlet receptacles. The standard power cords have an IEC C13 connector on the end that plugs into the router. The optional jumper power cords, for use in cabinets, have an IEC C13 connector on the end that plugs into the router and an IEC C14 connector on the end that plugs into an IEC C13 outlet receptacle.
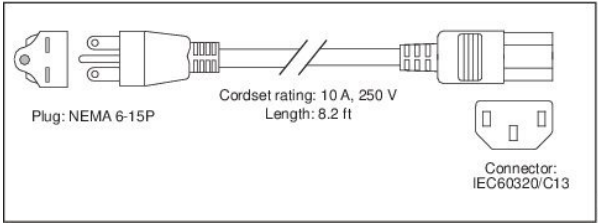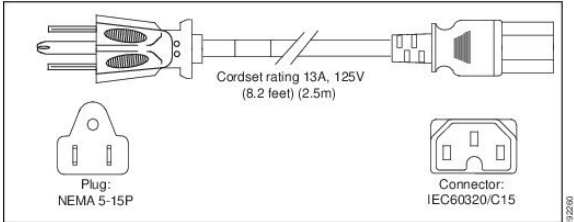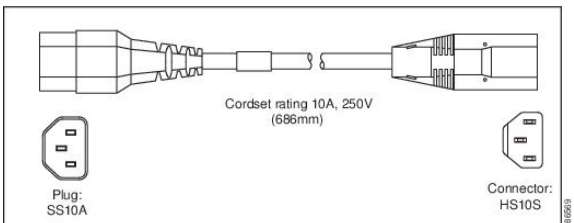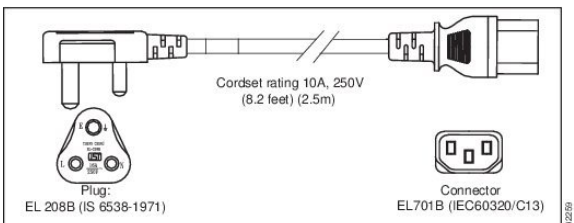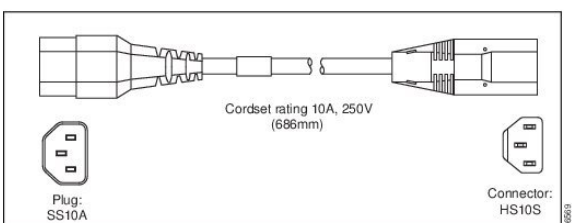
Note Only the regular power cords or jumper power cords provided with the router are supported.

The following table lists the power cords for the Cisco NCS 5000 Series router and provides their lengths in feet and meters.

Table 23: Power Cords for the Cisco NCS 5000 Series Router

Description	Length		Power Cord Reference Illustration
	Feet	**Meters**	
CAB-250V-10A-AR Power cord 250 VAC 10 A, IRAM 2073 plug Argentina	8.2	2.5	
CAB-9K10A-AU Power cord 250 VAC 10 A, 3112 plug, Australia	8.2	2.5	
CAB-250V-10A-CN Power cord 250 VAC 10 A, GB 2009 plug China	8.2	2.5	
CAB-9K10A-EU Power cord, 250 VAC 10 A, M 2511 plug Europe	8.2	2.5	
CAB250V-10A-ID Power cord 250 VAC 16A, EL-208 plug South Africa, United Arab Emirates, India	8.2	2.5	

Description	Length		Power Cord Reference Illustration
	Feet	Meters	
CAB-250V-10A-IS Power cord 250 VAC 10 A, SI-32 plug Israel	8.2	2.5	Plug: EL 212 (SI-32); Cordset rating 10A, 250V/500V MAX (2500 mm); Connector: EL 701B (IEC60320/C13)
CAB-9K10A-IT Power cord 250 VAC 10 A, CEI 23-16 plug Italy	8.2	2.5	Plug: I/3G (CEI 23-16); Cordset rating: 10 A, 250 V Length: 8 ft 2 in. (2.5 m); Connector C15M (EN60320/C15)
CAB-9K10A-SW Power cord 250 VAC 10 A, MP232 plug Switzerland	8.2	2.5	Plug: EL 210 (BS 1363A) 13 AMP fuse; Cordset rating: 10 A, 250 V/500 V MAX Length: 2500mm; Connector: EL 701C (EN 60320/C15)
CAB-9K10A-UK Power cord 250 VAC 10 A, BS1363 plug (13 A fuse) United Kingdom	8.2	2.5	Plug: EL 210 (BS 1363A) 13 AMP fuse; Cordset rating: 10 A, 250 V/500 V MAX Length: 2500mm; Connector: EL 701C (EN 60320/C15)
CAB-AC-250V/13A Power cord 250 VAC 13 A, NEMA L6-20 plug North America	6.6	2.0	Plug: EL312 Molded Twistlock (NEMA L6-20); Cordset rating 13A, 250V (6.6 feet) (79±2m); Connector: EL 701 (IEC60320/C13)

Description	Length		Power Cord Reference Illustration
	Feet	**Meters**	
CAB-N5K6A-NA Power cord 250 VAC 10 A, NEMA 6-15 plug North America	8.2	2.5	Plug: NEMA 6-15P — Cordset rating: 10 A, 250 V, Length: 8.2 ft — Connector: IEC60320/C13
CAB-9K12A-NA Power cord 125 VAC 13 A, NEMA 5-15 plug North America	8.2	2.5	Cordset rating 13A, 125V (8.2 feet) (2.5m) — Plug: NEMA 5-15P — Connector: IEC60320/C15
CAB-C13-CBN Power cord 250 VAC 10 A, SS 10A plug	8.2	2.5	Cordset rating 10A, 250V (686mm) — Plug: SS10A — Connector: HS10S
CAB-IND-10A Power cord 250 VAC 10 A, EL 208B plug	8.2	2.5	Cordset rating 10A, 250V (8.2 feet) (2.5m) — Plug: EL 208B (IS 6538-1971) — Connector EL701B (IEC60320/C13)
CAB-C13-C14-JMPR Cabinet Jumper Power Cord 250 VAC 13 A, C13-C14 Connectors	2.2	0.7	Cordset rating 10A, 250V (686mm) — Plug: SS10A — Connector: HS10S

Jumper Power Cord

The following figure shows the plug connector on the optional jumper power cord for the Cisco NCS 5001 and 5002 Series routers. This cable plugs into the power supply, and the receptacle of a power distribution unit for a cabinet. This cable comes in 6- and 9-foot (2- and 3-meter) lengths.

Figure 25: CAB-C13-C14-JMPR, Jumper Power Cord

Cordset rating 10A, 250V
(686mm)

Plug:
SS10A

Connector:
HS10S

Jumper Power Cord
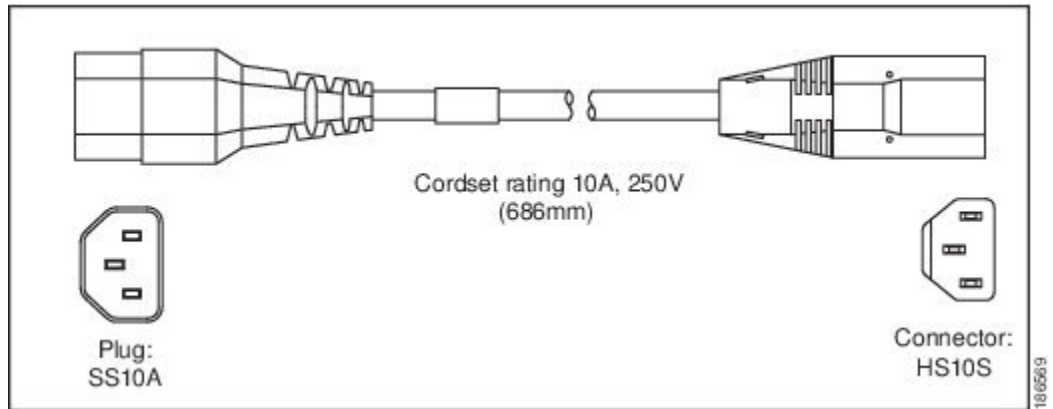
LEDs

This appendix describes the conditions indicated by the chassis and module LEDs on the Cisco NCS 5000 Series routers.

Chassis and Module LEDs for the Cisco NCS 5000 Series Routers

This section includes the following topics:

Chassis and Module LED Descriptions

This table describes the chassis LEDs for the Cisco NCS 5000 Series routers.

Indicator	Location	Function	Color	Status	State
Power LED	Front of Chassis	Chassis Power/Health	Green	Solid On	System is On and operating normally.
				Off	Router is powered off.
			Amber	On	Fault Condition.

Indicator	Location	Function	Color	Status	State
PSU Status Indicators	Power Supply(front)	PSU Health(Multi-Color)	Green	Off	No AC power to power supply.
				Solid On	power supply on and OK.
			Amber	Solid On	Power supply failures, over voltage, over current, over temperature
				1 Hz blinking	AC present, 3.3VSB on, PSU is off
				Off	Operating normally .

Conditions Indicated by the Power Supply LEDs

You can determine the power supply conditions by combining the LED states of the OK and FAIL LEDs .

Table 24: Power Supply LED Descriptions

AC Power Supply Condition	OK LED(Green)	FAILED LED(Amber)
No AC or DC power to all power supplies.	Off	Off
Power supply failure, including over voltage, over current, over temperature, and fan failure.	off	On
Power supply warning events where the power supply continues to operate. These events include high temperature, high power, and slow fan.	Off	Blinking
AC present, 3.3 voltage standby (VSB) on, and the power supply unit is off. For a DC power supply, it indicates that DC power is present.	Blinking	Off
Power supply on and OK.	On	Off

Troubleshooting Hardware Components

This appendix describes how to identify and resolve problems that might occur with the hardware components of a Cisco NCS 5000 Series routers.

Overview

The key to success when troubleshooting the system hardware is to isolate the problem to a specific system component. The first step is to compare what the system is doing to what it should be doing. Because a startup problem can usually be attributed to a single component, it is more efficient to isolate the problem to a subsystem rather than troubleshoot each separate component in the system.

Problems with the initial power up are often caused by a module that is not firmly connected to the backplane or a power supply that has been disconnected from the power cord connector.

Overheating can also cause problems with the system, though typically only after the system has been operating for an extended period of time. The most common cause of overheating is the failure of a fan module.

Router Hardware Best Practices

Use the recommendations in this section to ensure the proper installation, initialization, and operation of the router.

This section includes the following topics:

Installation Best Practices

When installing the router, follow these best practices:

- Plan your site configuration and prepare the site before installing the chassis.

- Verify that you have the appropriate power supplies for your chassis configuration.

- Install the chassis following the rack and airflow guidelines presented in this guide.

- Verify that the chassis is adequately grounded.

Initialization Best Practice

When the initial system boot is complete, verify the following:

- Power supplies are supplying power to the system.

- Fan modules are operating normally.

- The system software boots successfully.

Router Operation Best Practices

To ensure proper operation of your router, take the following actions:

- Make a copy of the running configuration to CompactFlash for a safe backup.

- Always enter the **copy running-config startup-config CLI** command after you modify the running configuration and ensure that the system is operating properly.

- Never use the **init system** CLI command unless you understand that you will lose the running and startup configuration as well as the files stored on bootflash.

- Keep backup copies of the running kickstart and the system images on CompactFlash.

Power Supply Conditions

The two LEDs on each power supply indicate the power status for each power supply. To determine the current status for a power supply unit, note which LED is on, blinking, or off and refer the following table.

Table 25: Power Supply Condition

Power Supply Condition	Power LED Status	Fail LED Status
No power to all power status.	Off	Off
Power supply failure, including overvoltage, overcurrent, overtemperature, and fan failure.	Off	On
Power supply warning events where the power supply continues to operate. These events include high temperature, high power, and slow fan.	Off	Blinking

Power Supply Condition	Power LED Status	Fail LED Status
AC present, 3.3 voltage standby (VSB) on, and the power supply unit is off.	Blinking	Off
Power supply on and OK.	On	Off