



# **Hardware Installation Guide for Cisco NCS 5500 Series Fixed Routers**

**First Published: 2017-09-15**

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# Preface

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- [Obtaining Documentation and Submitting a Service Request, 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
August 2017	<p>Initial release of the cumulative hardware document covering NCS 5500 Series Fixed-Port Routers from 6.3.1 release onwards.</p> <p>Fixed-port routers include the NCS 5501, NCS 5501 SE, NCS 5501-24H, NCS 5501-36H, NCS 55A1-24H, and NCS 55A1-36H.</p> <p><b>Note</b> Information for the NCS 5500 Series Modular Routers (NCS 5508, and NCS 5516) can be found in the Hardware Installation Guide for Cisco NCS 5500 Series Modular Routers.</p>

## Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see [What's New in Cisco Product Documentation](#).

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## Obtaining Documentation and Submitting a Service Request





## NCS 5500 Series Fixed-Port Router Overview

- [NCS 5500 Series Fixed-Port Routers, page 1](#)

### NCS 5500 Series Fixed-Port Routers

The Cisco NCS 5500 series fixed-port routers include:

- NCS-5501 chassis: It is a fixed port, high density, one rack unit form-factor router that supports a port density of 48 x SFP/SFP+ ports, each capable of supporting one Gigabit Ethernet or 10 Gigabit Ethernet, and 6 x QSFP+/QSFP28 ports, each capable of supporting 10 Gigabit Ethernet (via cable breakout), 40 Gigabit Ethernet, or 100 Gigabit Ethernet transceivers.
- NCS-5501-SE chassis: It is a fixed port, high density, one rack unit form-factor router that supports a port density of 48 x SFP/SFP+ ports, each capable of supporting one Gigabit Ethernet or 10 Gigabit Ethernet, and 6 x QSFP+/QSFP28 ports each, capable of supporting 10 Gigabit Ethernet (via cable breakout), 40 Gigabit Ethernet, or 100 Gigabit Ethernet transceivers. The router can support 24 x DWDM SFP+ ports. The router has additional TCAM to support large prefix scale.
- NCS-55A1-36H-S chassis: It is a fixed port, high density, one rack unit form-factor router that supports a port density of 36 x QSFP ports, each capable of supporting 10 GE (via cable breakout), 20 GE (via cable breakout), 40 GE (QSFP+), or 100 GE (QSFP28) transceivers.
- NCS-55A1-24H chassis: It is a fixed port, high density, one rack unit form-factor router that supports a port density of 24 x QSFP ports, each capable of supporting 10 GE (via cable breakout), 20 GE (via cable breakout), 40 GE (QSFP+), or 100 GE (QSFP28) transceivers.
- NCS-5502 chassis: It is a fixed port, high density, two rack unit form-factor router that supports a port density of 48 x QSFP ports, each of which is capable of supporting 10 GE (via cable breakout), 40 GE, or 100 GE transceivers.
- NCS-5502-SE chassis: It is a fixed port, high density, two rack unit form-factor router that supports a port density of 48 x QSFP ports, each of which is capable of supporting 10 GE (via cable breakout), 40 GE, or 100 GE transceivers. The router has additional TCAM to support large prefix scale.



**NCS 5500 Series Fixed-Port Routers**

**NCS 5500 Series Fixed-Port**



## Prepare for Installation

- [Review Installation Roadmap, page 3](#)
- [Review Safety Guidelines, page 4](#)
- [Review Installation Guidelines, page 5](#)
- [Procure Tools and Equipment, page 5](#)
- [Prepare Your Location , page 7](#)
- [Prepare Yourself , page 8](#)
- [Prepare Rack for Chassis Installation, page 10](#)

## Review Installation Roadmap

The figure, Installation Workflow, lists the steps to install Cisco NCS 5500 Series fixed-port chassis components and prepare the system for operation. Use this workflow as a reference to ensure that all components are installed and configured correctly.



are properly installed in the correct order. For information about a step, see the respective section of the installation guide.

**Figure 1: Installation Workflow**

## Review Safety Guidelines

Before you perform any procedure in this document, review the safety guidelines in this section to avoid injuring yourself or damaging the equipment. The following guidelines are for your safety and to protect the equipment. The guidelines do not include all hazards. Be alert.

- Keep the work area clear, smoke and dust-free during and after installation. Do not allow dirt or debris to enter into any laser-based components.
- Do not wear loose clothing, jewelry, or other items that could get caught in the router or other associated components.
- Cisco equipment operates safely when used in accordance with its specifications and product instructions.
- Be sure to power down a fixed configuration PDU or modular configuration power shelf before removing it from the chassis.
- Do not work alone if potentially hazardous conditions exist.





- Take care when connecting units to the supply circuit so that wiring is not overloaded.
- This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspector or an electrician if you are uncertain that suitable grounding is available.
- To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on modules (such as power supplies, fans, or cards); these types of handles are not designed to support the weight of the unit.
- Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing.
- When installing or replacing the unit, the ground connection must always be made first and disconnected last.
- The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before you remove the unit out for servicing. Failure to stabilize the rack can cause the rack to tip over.
- Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into or view directly with optical instruments.

## Review Installation Guidelines

Before installing the chassis, verify that these guidelines are met:

- Site is properly prepared so that there is sufficient room for installation and maintenance. For space requirements on the clearances required for chassis installation, see [Clearance Requirements, on page 60](#).
- Operating environment is within the ranges listed in [Environmental and Physical Requirements, on page 61](#).
- Chassis is mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting the chassis in a partially filled rack, load the rack from the bottom to the top, with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the chassis in the rack.
- Airflow around the chassis and through the vents is unrestricted.
- Cabling is away from sources of electrical noise, such as radios, power lines, and fluorescent light fixtures. Make sure that the cabling is safely away from other devices that might damage the cables.
- For cable requirements for SFP+ module connections, see the [Transceivers, Connectors, and Cables, on page 68](#) section. Each port must match the wave-length specifications on the other end of the cable and the cable must not exceed the maximum cable length.

## Procure Tools and Equipment

Obtain these necessary tools and equipment for installing the chassis:

- Number 1 and number 2 Phillips screwdrivers with torque capability to rack-mount the chassis.



#### Procure Tools and Equipment

- 3/16-inch flat-blade screwdriver
- Tape measure and level
- ESD wrist strap or other grounding device
- Antistatic mat or antistatic foam
- A Torx T15 screwdriver, or the Torx T15 key to install adapters.
- Grounding cable (6 AWG recommended), sized according to local and national installation requirements. The required length depends on the proximity of the switch to proper grounding facilities
- Ground lug (1)
- Crimping tool large enough to accommodate the girth of the lug
- Wire-stripping tool
- (ANSI) Pair of 19-inch mounting brackets
- M4 screws to fix brackets (16)
- M4 screws to fix ground lug (2)



## Prepare Your Location

This section illustrates how the building that houses the chassis must be properly grounded to the earth.  
(See [Prepare Your Location](#) , on page 7 .)

**Figure 2: Building with Rack Room Connected to Earth Ground**



## Prepare Yourself

This section illustrates how to prepare yourself before removing the chassis from the sealed antistatic bag. The figures show how to cuff the ESD strap around the wrist and the ground cord that connects the strap to the ground. ESD wrist straps are the primary means of controlling static charge on personnel.

**Figure 3: Wearing the ESD Strap**

**Note** These images are for only representation purposes. The chassis' actual appearance and size may vary.





**Prepare for Installation**

**Figure 4: Handling the Chassis**



## Prepare Rack for Chassis Installation

Install the NCS 5500 Series chassis into a four-post 19-inch (48.3-cm) standard rack with standard mounting rails. Before you move the chassis or mount the chassis into the rack, we recommend that you follow the following:

- Step 1

Place the rack where you plan to install the chassis. Ensure that the rack that the chassis is being installed is grounded to earth ground as instructed in [Prepare Your Location , on page 7](#).
- Step 2

Secure the rack to the floor.  
To bolt the rack to the floor, a floor bolt kit (also called an anchor embedment kit) is required. For information on the rack to the floor, consult a company that specializes in floor mounting kits (such as Hilti; see [Hilti.com](#) for details). Make sure that floor mounting bolts are accessible, especially if annual retorquing of bolts is required.



**Prepare for Installation**

**Prepare Rack for C**



**Prepare Rack for Chassis Installation**

**Pre**





## Install the Chassis

- [Rack-Mount the Chassis on a 4-Post Rack, page 13](#)
- [Rack-Mount the Chassis on a 2-Post Rack, page 22](#)
- [Install the Air Filter, page 23](#)
- [Ground the Chassis, page 25](#)
- [Connect AC Power to the Chassis, page 28](#)
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- [Connect DC Power to the Chassis - NCS-950W-DCFW and NC55-2KW-DC, page 32](#)

## Rack-Mount the Chassis on a 4-Post Rack

**Note** The Cisco NCS-55A1-24H, Cisco NCS 5501 and Cisco NCS 5501-SE can be installed in 4-post or 2-post rack.

This section describes how to use the rack-mount kit provided with the router to install the Cisco NCS-55A1-36H-S, Cisco NCS-55A1-24H, Cisco NCS 5501, Cisco NCS 5501-SE, Cisco NCS 5502, and Cisco NCS 5502-SE routers into a cabinet or rack.

**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 routers.

Table 2: Cisco NCS-55A1-24H, Cisco NCS 5501 and Cisco NCS 5501-SE Router Rack-Mount Kit

Quantity	Part Description
2	Rack-mount brackets
12	M4 x 6-mm Phillips flat-head screws



**Rack-Mount the Chassis on a 4-Post Rack**

Quantity	Part Description
2	M5 x 12mm Phillips pan-head screws
2	Rack-mount guides
2	Rack-mount slider rails
1	Grounding lug

**Table 3: Cisco NCS 55A1-36H-S Router Rack-Mount Kit**

Quantity	Part Description
2	Rack-mount brackets
14	M4 x 6-mm Phillips flat-head screws
2	M4 x 6-mm Phillips pan-head screws
2	Rack-mount guides
2	Rack-mount slider rails
1	Grounding cover plate
1	Grounding lug

**Table 4: Cisco NCS 5502 and Cisco NCS 5502-SE Router Rack-Mount Kit**

Quantity	Part Description
2	Rack-mount brackets
18	M4 x 8-mm Phillips flat-head screws
2	M4 x 8mm Phillips pan-head screws
2	Rack-mount guides
2	Rack-mount slider rails
1	Grounding cover plate
1	Grounding lug



## Install the Chassis

## Rack-Mount the Chassis on the Rack

### Step 1

Install two rack-mount brackets to 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 (fan modules with burgundy coloring), position the router so that the intake ports are in the cold aisle.
- If the router has port-side exhaust modules (fan modules with blue coloring), position the router so that the exhaust ports and power supply modules are in the cold aisle.

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

**Note** Cisco NCS 55A1-36H-S, NCS 5502, NCS 5502 SE: Remove the grounding cover label and align the grounding cover plate with the grounding holes in the chassis and attach the rack mount bracket to the chassis. You can align four of the holes in the rack-mount bracket to four of the screw holes on the front side of the chassis or four of the screw holes on the rear side of the chassis. The holes that you use depend on which side your chassis need to be put in the cold aisle.



#### **Rack-Mount the Chassis on a 4-Post Rack**

**Note** The following image shows the rack-mount brackets on the Cisco NCS 5501. The bracket installation is the same for the Cisco NCS 5501-SE and Cisco NCS 55A1-24H.

**Figure 5: Rack-mount brackets on the front side of Cisco NCS 5501**

**Figure 6: Rack-mount brackets on the rear side of Cisco NCS 5501**





**Install the Chassis**

**Rack-Mount the Chassis on**

- |   |                                    |   |                         |
|---|------------------------------------|---|-------------------------|
| 1 | Rack-mount bracket                 | 4 | Rack-mount slider rails |
| 2 | M4 x 6mm Phillips flat-head screws | 5 | Top plate               |
| 3 | Rack-mount guides                  |   |                         |



**Rack-Mount the Chassis on a 4-Post Rack**

**Figure 7: Rack-Mount Brackets on the Front Side of Cisco NCS 55A1-36H-S**



Figure 8: Rack-Mount Brackets on the Rear Side of Cisco NCS 55A1-36H-S

- |   |                                    |   |                                    |
|---|------------------------------------|---|------------------------------------|
| 1 | Grounding cover label              | 5 | M4 x 6mm Phillips flat-head screws |
| 2 | Grounding cover plate              | 6 | Rack-mount guide                   |
| 3 | Rack-mount brackets                | 7 | Rack-mount slider rails            |
| 4 | M4 x 6mm Phillips flat-head screws | 8 | Top plate                          |



**Rack-Mount the Chassis on a 4-Post Rack**

**Figure 9: Rack-Mount Brackets on the Front Side of Cisco NCS 5502 and NCS 5502 SE**

**Figure 10: Rack-Mount Brackets on the Rear Side of Cisco NCS 5502 and NCS 5502 SE**





Install the Chassis

Rack-Mount the Chassis on the Rack

- |   |                                    |   |                                    |
|---|------------------------------------|---|------------------------------------|
| 1 | Grounding cover label              | 5 | M4 x 8mm Phillips-Flat head screws |
| 2 | Grounding cover plate              | 6 | Rack-mount guide                   |
| 3 | Rack-mount brackets                | 7 | Rack-mount slider rails            |
| 4 | M4 x 8mm Phillips-Flat head screws |   |                                    |

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

**Step 2** Cisco NCS-55A1-24H, Cisco NCS 55A1-36H-S, NCS 5501, NCS 5501-SE: If you are installing the router so that the ports are in the cold aisle, install the top plate from the NEBS kit by pressing the ends of the plate on to the rack-mount brackets. The plate is required for NEBS compliance.

**Step 3** Install the two rack-mount guides on the chassis as follows:

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



Rack-Mount the Chassis on a 2-Post Rack

b) Repeat with the other rack-mount guides on the other side of the router.

**Step 4** 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 the slider rail before using a 12-24 screw.

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

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

**Step 5** 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 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 holes in the rack-mount brackets and into the cage nuts or threaded holes in the rack-mounting rail.

d) Tighten the 10-32 screws to 20 in-lb (2.26 N.m) or tighten the 12-24 screws to 30 in-lb (3.39 N.m).

## Rack-Mount the Chassis on a 2-Post Rack

**Note** The Cisco NCS-55A1-24H, Cisco NCS 5501 and Cisco NCS 5501-SE can be installed in 4-post rack or 2-post rack.

This section describes how to use the rack-mount kit provided with the router to install the Cisco NCS-55A1-24H, Cisco NCS 5501 and Cisco NCS 5501-SE router into a cabinet or 2-post rack.

**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 routers.

**Table 5: Cisco NCS-55A1-24H, Cisco NCS 5501 and Cisco NCS 5501-SE Router Rack-Mount Kit**

Quantity	Part Description
2	Rack-mount brackets
8	M4 x 0.7 x 6-mm Phillips flat-head screws

**Step 1** Install two rack-mount brackets to the router as follows:



## Install the Chassis

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 (fan modules with burgundy coloring), position the router so that the intake ports will be in the cold aisle.
- If the router has port-side exhaust modules (fan modules with blue coloring), position the router so that the exhaust ports and power supply modules will be in the cold aisle.

b) With the bracket ears facing toward the center of the chassis, position a front rack-mount bracket on the side of the chassis so that the four holes are aligned to four of the screw holes on the side of the chassis.

c) Use four M4 screws to attach the bracket to the chassis

d) Repeat Steps 1b and 1c with the other rack-mount bracket on the other side of the router.

**Note** The following image shows the rack-mount brackets on the Cisco NCS 5501. The bracket installation is the same for the Cisco NCS 5501-SE and Cisco NCS 55A1-24H.

**Figure 11: Rack-mount brackets on Cisco NCS 5501**

## Step 2

Install the router onto the 2-post rack as follows:

- a) With two people, lift the router into position between the two rack posts.
- b) Move the router until the rack-mount brackets come in contact with two rack posts.
- c) Hold the chassis level while the second person inserts two screws (12-24 or 10-32, depending on the rack) into each of the two rack-mount brackets (using a total of four screws) and into the cage nuts or threaded holes in the vertical rack-mounting rails.
- d) Tighten the 10-32 screws to 20 in-lb (2.26 N.m) or tighten the 12-24 screws to 30 in-lb (3.39 N.m).

## Install the Air Filter

**Note** Air filters are available for Cisco NCS-5502-SE and NCS-5502. The air filters are for one time use.



## **Install the Air Filter**

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

If air filters need replacement, follow this procedure.

**Step 1** Install the air filter on the port side inlet as follows:

- a) Using two hands to support the air filter, orient it so that the ridge on the front of the air filter faces outward from the front of the chassis and the wire-grid backing support is facing up.

**Figure 12: Port side Inlet Air Filter**

- b) Slide the air filter into the air filter slot until it is seated fully within the slot.
- c) Hold the filter cover plate in place and tighten the middle panel to the top and bottom panels with six thumb screws. And, tighten the top and bottom panels separately to the faceplate using four screws.

**Step 2** Install the air filter to the port side exhaust as follows:





#### Install the Chassis

- a) Install the two standoffs to the chassis.

Figure 13: Port Side Exhaust Air Filter

- b) Install the air filter to the chassis using two thumb screws.
- c) Install the side filter to the chassis using a thumb screw and a captive screw.

## Ground the Chassis

#### **Warning**      **Statement 1024**

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.

#### **Warning**      **Statement 1046**

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

#### **Warning**      **Statement 1025**

Use copper conductors only.



## Ground the Chassis

**Caution** Grounding the chassis is required, even if the rack is already grounded. A grounding pad with two threaded holes is provided on the chassis for attaching either a grounding lug or grounding cover plate. The grounding lug must be NRTL-listed. In addition, a copper conductor (wires) must be used and the copper conductor must comply with NEC code for ampacity.

**Caution** When terminating the frame ground, do not use soldering lug connectors, screwless (push-in) connectors, quick connect connectors, or other friction-fit connectors.

**Step 1** Verify that the office ground cable is connected to the top of the rack and the office ground, according to local site practice.

**Step 2** Attach the ground cable:

- Cisco NCS-55A1-24H, Cisco NCS 5501, Cisco NCS 5501-SE: Attach one end of the shelf ground cable (#14 AWG cable) to the ground point on the rear of the chassis using the specified dual-hole lug connector.

**Figure 14: Cisco NCS-55A1-24H, Cisco NCS 5501, Cisco NCS 5501-SE Ground Lug**

1 Grounding lug

2 M5 x 12mm pan-head screws



**Install the Chassis**

- Cisco NCS 55A1-36H-S, NCS 5502 and NCS 5502-SE: Attach one end of the shelf ground cable (#6 AWG) to the grounding cover plate using the specified dual-hole lug connector.

**Figure 15: NCS 55A1-36H-S Ground Lug**

- |   |               |   |                          |
|---|---------------|---|--------------------------|
| 1 | Grounding lug | 2 | M4 x 6mm pan-head screws |
|---|---------------|---|--------------------------|

**Figure 16: NCS 5502 Ground Lug**

- |   |               |   |                          |
|---|---------------|---|--------------------------|
| 1 | Grounding lug | 2 | M4 x 8mm pan-head screws |
|---|---------------|---|--------------------------|



#### Connect AC Power to the Chassis

- Step 3** Tighten the M4 pan-head screws to torque value of 11.5 in-lbs (1.3 N-m).
- Step 4** Attach the other end of the shelf ground cable to the bay frame using a dual-hole lug connector according to the equipment rack frame specifications.

## Connect AC Power to the Chassis

**Caution** The chassis relies on the protective devices in the building installation to protect against short circuit, overcurrent, and ground faults. Ensure that the protective devices comply with local and national electrical codes.

**Note** **Cisco NCS-55A1-24H, Cisco NCS 5501, Cisco NCS 5501-SE—To provide full output power of 2400 W, the nominal voltage rating value ranges between 100 V to 240 V, depending on the standards in various countries.**

**Cisco NCS 55A1-36H-S, Cisco NCS 5502, Cisco NCS 5502-SE—To provide full output power of 3600 W, the nominal voltage rating value ranges between 200V to 240V, depending on the standards in various countries.**





Install the Chassis

Connect DC Power to the Chassis - NCS-950W-DCFW-A

**Note** A dual pole breaker is needed for the installation. The rating of the dual pole breaker for 110 V is 16 A and for 220 V is 16 A. The minimum cable size is 14 AWG for 110 V and 16 AWG for 220 V.

- Step 1** Verify that the AC cable is installed in the correct AC source panel.
- Step 2** Attach the AC power cable to the cable connector in the AC power module.

Figure 17: Connecting AC Power

- Step 3** Place the cable through the opening in the cable clamp.
- Step 4** Slide the cable clamp toward the plug.
- Step 5** Close the cable clamp on the shoulder of the power cable to secure the power cable.

Connect DC Power to the Chassis - NCS-950W-DCFW-A

**Warning Statement 1003**  
Before performing any of the following procedures, ensure that power is removed from the DC circuit.

**Warning Statement 1022**  
A readily accessible two-poled disconnect device must be incorporated in the fixed wiring.



Connect DC Power to the Chassis - NCS-950W-DCFW-A

**Warning**      **Statement 1045**

This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.

**Warning**      **Statement 1046**

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

**Warning**      **Statement 1074**

Installation of the equipment must comply with local and national electrical codes.

Before installing a DC power supply to the switch, you will need to attach DC connection wires that you provide to the DC power connector included in the DC power supply's accessory kit. For 240-380 VDC power supply, the dual-pole breaker or fuse rating is 20 A. For 40-72 VDC power supply, the single breaker or fuse rating is 40 A.

**Before You Begin**

Each DC input power cable is terminated at the power distribution unit (PDU) by a cable lug, as shown in the following figure.

Figure 18: DC Input Power Cable Lug

**Note**      To avoid hazardous conditions, all components in the area where DC input power is accessible must be properly insulated. Therefore, before installing the DC cable lugs, be sure to insulate the lugs according to the manufacturer's instructions.

- Step 1**
- Turn off the circuit breaker from the power source.
- Step 2**
- Remove the plastic cover from the terminal block.
- Step 3**
- Insert the black (DC negative) wire into the right aperture on the connector and tighten down the connection set screw. Finger tight or about 3 ft./lbs should be sufficient.
- Step 4**
- Insert the red (DC positive) wire into the left aperture on the connector and tighten down the connection set screw. Finger tight or about 3 ft./lbs should be sufficient.



Install the Chassis

Connect DC Power to the Chassis - NC

Do not tighten over 0.7 Nm.

Figure 19: Connecting DC Power – NCS-950W-DCFW-A

- Step 5

Replace the terminal block plastic cover. The plastic cover is slotted and keyed to fit correctly over the terminal block.
- Step 6

Turn on the circuit breaker at the power source.



Connect DC Power to the Chassis - NCS-950W-DCFW and NC55-2KW-DC

## Connect DC Power to the Chassis - NCS-950W-DCFW and NC55-2KW-DC

**Caution** The chassis relies on the protective devices in the building installation to protect against short circuit, overcurrent, and ground faults. Ensure that the protective devices comply with local and national electrical codes.

- Step 1** Verify that the correct fuse panel is installed in the top mounting space.
- Step 2** Measure and cut the cables as needed to reach the chassis from the fuse panel.
- Step 3** Dress the power according to local practice.
- Step 4** Connect the office battery and return cables according to the fuse panel engineering specifications.
- Step 5** Insert the DC connector into the DC receptacle on the power supply:





**Install the Chassis**

**Connect DC Power to the Chassis - NCS-950W-DCFW and**

• **Figure 20: Connecting DC Power – NC55-2KW-DC**

Ensure that the locking mechanism has engaged to secure the cable.

• **Figure 21: Connecting DC Power – NCS-950W-DCFW**

Secure the terminal by using the screws on the left and right of the connector.



**Connect DC Power to the Chassis - NCS-950W-DCFW and NC55-2KW-DC**



## Connect Router to the Network

- [Page 35](#) [Guidelines for Connecting Ports](#)
- [Page 36](#) [Connecting to the Console Port](#)
- [Page 38](#) [Connecting to the Management Ethernet Port](#)
- [Page 39](#) [Performing the Initial Router Configuration](#)
- [Page 41](#) [Inserting and Removing Transceiver Modules](#)
- [Page 49](#) [Configuring Interface Ports](#)
- [Page 50](#) [Configuring Transceivers and Optical Cables](#)

## Guidelines for Connecting Ports

Depending on the chassis and installed line cards, you can use Quad Small Form-Factor Pluggable (QSFP+), QSFP28, SFP, SFP+, and RJ-45 connectors to connect the ports on the line cards to other devices.

To prevent damage to the fiber-optic cables that can separate from their cables, Cisco recommends that you keep the transceivers disconnected from their fiber-optic cables when installing the transceiver in a line card. Before removing such a transceiver from the router, remove the cable from the transceiver.

To maximize the effectiveness and life of your transceivers and optical cables, do the following:

- Wear an ESD-preventative wrist strap that is connected to an earth ground whenever handling transceivers or optical cables. The router is typically grounded during installation and provides an ESD port to which you can connect your wrist strap.
- Do not remove and insert a transceiver more often than is necessary. Repeated removals and insertions can shorten its useful life.
- Keep the transceivers and fiber-optic cables clean and dust free to maintain high signal accuracy and to prevent damage to the connectors. Attenuation (loss of light) is increased by contamination on the connectors. Attenuation should be kept below 0.35 dB.
  - Clean these parts before installation to prevent dust from scratching the fiber-optic connectors.



- Clean the connectors regularly; the required frequency of cleaning depends upon the environment. In addition, clean connectors if they are exposed to dust or accidentally touched. Both visual inspection and cleaning techniques can be effective; refer to your site's fiber-optic connection cleaning procedures.
  - Do not touch the ends of connectors. Touching the ends can leave fingerprints and cause other contamination.
- Inspect routinely for dust and damage. If you suspect damage, clean and then inspect fiber ends with a microscope to determine if damage has occurred.

**Warning****Statement 1051—Laser Radiation**

Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments.

## Connect to the Console Port

Before you create a network management connection for the router or connect the router to the network, you must create a local management connection through a console terminal and configure an IP address on the router. You also can use the console to perform the following functions (each of which can be performed through the management interface after you make that connection):

- Configure the router using the command-line interface (CLI).
- Monitor network statistics and errors.
- Configure Simple Network Management Protocol (SNMP) agent parameters.
- Download software updates.

The system console port is an RJ-45 receptacle for connecting a data terminal to perform the initial configuration of NCS 5500 fixed-port chassis. The console cable is shipped with the hardware.





- 1Management Ethernet port
- 2Console port

Follow this procedure to connect a data terminal to the console port.

Before You Begin

- The router must be fully installed in its rack, connected to a power source, and grounded.
- The necessary cabling for the console, management, and network connections must be available.
  - An RJ-45 rollover cable and DB9F/RJ-45 adapter are provided in the router accessories kit.
  - Network cabling should already be routed to the location of the installed router.

- Step 1

Set your terminal to these operational values: 115200 bps, 8 data bits, no parity, 2 stop bits (115200 8N1).
- Step 2

Attach the terminal end of the cable to the interface port on the data terminal.
- Step 3

Attach the other end of the cable to the console port.

Table 6: RJ-45 Straight-through Cable Pin-outs

RJ-45 Pin	Signal
1	—
2	—
3	Tx



RJ-45 Pin	Signal
4	Ground (GND)
5	GND
6	Rx
7	—
8	—

## Connect to the Management Ethernet Port

The management Ethernet port provides out-of-band management, which enables you to use the console interface (CLI) to manage the router by its IP address. This port uses a 10/100/1000 Ethernet connection over an RJ-45 interface.

**Note** To prevent an IP address conflict, do not connect the management Ethernet port until the initial configuration is complete.

To connect cables to the system management port, attach Category 5 cables directly to the RJ-45 receptacle on the management Ethernet port.



**Note** To comply with GR-1089-CORE, the intra-building port(s) of the equipment must use shielded intra-building cabling/wiring that is grounded at both ends.

### Before You Begin

You must have completed the initial router configuration.

- Step 1** Plug the cable directly into the RJ-45 receptacle.
- Step 2** Connect the network end of your RJ-45 cable to a switch, hub, repeater, or other external equipment.

## Creating the Initial Router Configuration

You must assign an IP address to the router management interface so that you can then connect the router to the network.

When you initially power up the router, it boots up and asks you a series of questions to configure the router. To enable you to connect the router to the network, you can use the default choices for each configuration question except the IP address, which you must provide.

**Note** You should also know the unique name needed to identify the router among the devices in the network.

### Before You Begin

- A console device must be connected with the router.
- The router must be connected to a power source.
- Determine the IP address and netmask needed for the Management interfaces: Management Ethernet 0/0 and MgmtEth0/RP1/CPU0/0.

- Step 1** Power up the router.
- The LEDs on each power supply light up (green) when the power supply units are sending power to the router. The router software asks you to specify a password to use with the router.

- Step 2** When the system is booted up for the first time, a new username and a password is to be created. The following prompt appears:

```
!!!!!!!!!!!!!!!!!!!! NO root-system username is configured. Need to configure root-system username.
!!!!!!!!!!!!!!!!!!!!
```

--- Administrative User Dialog ---



Creating the Initial Router Configuration

Enter root-system username:  
% Entry must not be null.

Enter root-system username: root  
Enter secret:  
Use the 'configure' command to modify this configuration.  
User Access Verification

Username: root  
Password:

RP/0/RP0/CPU0:ios#

**Step 3** Enter a new password to use for this router.  
The software checks the security strength of your password and rejects your password if it is not considered to be a strong password. To increase the security strength of your password, make sure that it adheres to the following guidelines:

- At least eight characters
- Minimizes or avoids the use of consecutive characters (such as "abcd")
- Minimizes or avoids repeating characters (such as "aaabbb")
- Does not contain recognizable words from the dictionary
- Does not contain proper names
- Contains both uppercase and lowercase characters
- Contains numbers as well as letters

**Note** Clear text passwords cannot include the dollar sign (\$) special character.

**Tip** If a password is trivial (such as a short, easy-to-decipher password), the software will reject your password and prompt you to enter a new password. Be sure to configure a strong password as explained in this step. Passwords are case sensitive. If you enter a strong password, the software asks you to confirm the password.

**Step 4** Enter the same password again.  
If you enter the same password, the software accepts the password .

**Step 5** Enter the IP address for the management interface.

**Step 6** Enter a network mask for the management interface.

**Step 7** The software asks if you need to edit the configuration. Enter no to not edit the configuration.

**Step 8** The software asks if you need to save the configuration. Enter yes to save the configuration.





# Installing and Removing Transceiver Modules

## Installing and Removing SFP Modules

Before you remove or install an SFP or SFP+ module, read the installation information in this section.

**Warning** Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into or view directly with optical instruments. Statement 1051

**Caution** Protect the line card by inserting a clean SFP/SFP+ module cage cover, shown in the figure below, into the optical module cage when there is no SFP or SFP+ module installed.

**Figure 22: SFP/SFP+ Module Cage Cover**

**Caution** Protect the SFP or SFP+ modules by inserting clean dust covers into them after the cables are removed. Be sure to clean the optic surfaces of the fiber cables before you plug them back into the optical ports of another module. Avoid getting dust and other contaminants into the optical ports of your SFP or SFP+ modules, because the optics do not work correctly when obstructed with dust.

**Caution** We strongly recommended that you do not install or remove the SFP or SFP+ module with fiber-optic cables attached to it because of the potential to damage the cable, the cable connector, or the optical interfaces in the module. Disconnect all cables before removing or installing an SFP or SFP+ module. Removing and inserting an module can shorten its useful life, so you should not remove and insert modules any more often than is absolutely necessary.



## Installing and Removing SFP Modules

**Note** When installing an SFP or SFP+ module, you should hear a click as the triangular pin on the bottom of the module snaps into the hole in the receptacle, indicating that the module is correctly seated and secured in the receptacle. Verify that the modules are completely seated and secured in their assigned receptacle on the line card by firmly pushing on each SFP or SFP+ module.

### Bale Clasp SFP or SFP+ Module

The bale clasp SFP or SFP+ module has a clasp that you use to remove or install the module (see the figure below).

Figure 23: Bale Clasp SFP or SFP+ Module

### Installing a Bale Clasp SFP or SFP+ Module

To install this type of SFP or SFP+ module, follow these steps:

- Step 1** Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.
- Step 2** Close the bale clasp before inserting the SFP module.
- Step 3** Line up the SFP module with the port and slide it into the port (see the figure below).

Figure 24: Installing a Bale Clasp SFP Module into a Port



**Note** When installing an SFP or SFP+ module, you should hear a click as the triangular pin on the bottom of the module snaps into the hole in the receptacle, indicating that the module is correctly seated and secured in the receptacle. Verify that the SFP modules are completely seated and secured in their assigned receptacles on the line card by firmly pushing on each SFP module.

## Removing a Bale Clasp SFP or SFP+ Module

To remove this type of SFP or SFP+ module, follow these steps:

- Step 1** Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.
- Step 2** Disconnect and remove all interface cables from the ports; note the current connections of the cables to the line card.
- Step 3** Open the bale clasp on the SFP module with your index finger, as shown in the figure below. If the bale clasp is obstructed and you cannot use your index finger to open it, use a small flat-blade screwdriver or other long, narrow instrument to open the bale clasp.
- Step 4** Grasp the SFP module between your thumb and index finger and carefully remove it from the port, as shown in the figure below.



Installing and Removing SFP Modules

Figure 25: Removing a Bale Clasp SFP or SFP+ Module

- Step 5

Place the removed SFP module on an antistatic mat, or immediately place it in a static shielding bag if you plan to return it to the factory.
- Step 6

Protect your line card by inserting clean SFP module cage covers into the optical module cage when there is no module installed.





## Installing and Removing QSFP+/QSFP28 Transceiver Modules

This section provides the installation, cabling, and removal instructions for the 40-Gigabit Quad Small Form-Factor Pluggable Plus (QSFP+) and 100 Gigabit (QSFP28) transceiver modules. The modules are hot-swappable input/output (I/O) devices that connect the system's module port electrical circuitry to a copper or a fiber-optic network.

### Overview

The 40-Gigabit (GE) QSFP+ and 100 Gigabit (QSFP28) transceiver module is a hot-swappable, fiber-optical module with four independent optical transmit and receive channels. These channels can be connected to another 40-Gigabit QSFP+ transceiver, or the channels can be broken out to four separate 100-Gigabit QSFP28 transceivers. The QSFP+ transceiver module connects the electrical circuitry of the system with an external network.

The following figure shows the 40-Gigabit optical QSFP+ transceiver. The transceiver is used primarily in short reach applications in switches, routers, and data center equipment where it provides higher performance than SFP+ modules. The 100-Gigabit optical QSFP28 transceiver is similar to the 40-Gigabit optical QSFP+ transceiver.

Figure 26: 40-Gigabit QSFP+ Transceiver Module (Optical)

- 1

40GBASE QSFP+ transceiver body
- 2

Bail-clasp latch
- 3

Electrical connection to the network

### Required Tools and Equipment

You need these tools to install the 40-Gigabit QSFP+ / 100-Gigabit QSFP28 transceiver module:

- Wrist strap or other personal grounding device to prevent ESD occurrences.
- Antistatic mat or antistatic foam to set the transceiver on.
- Fiber-optic end-face cleaning tools and inspection equipment.

For information on inspecting and cleaning fiber-optic connections, see [Inspecting and Cleaning Fiber-Optic Connections](#).

[Maintaining Transceiver Modules](#)



Installing the 40-Gigabit QSFP+ or 100-Gigabit Transceiver Module

The QSFP+ or QSFP28 transceiver module can have either a bail-clasp latch or a pull-tab latch. Instructions for both types of latches are provided.

**Caution** The QSFP+ or QSFP28 transceiver module is a static-sensitive device. Always use an ESD wrist strap or similar individual grounding device when handling QSFP+ or QSFP28 transceiver modules or coming into contact with system modules.

To install an QSFP+ or QSFP28 transceiver module, follow these steps:

- Step 1** Attach an ESD wrist strap to yourself and a properly grounded point on the chassis or the rack.
- Step 2** Remove the QSFP+ or QSFP28 transceiver module from its protective packaging.
- Step 3** Check the label on the QSFP+ or QSFP28 transceiver module body to verify that you have the correct model for your network.
- Step 4** For optical QSFP+ or QSFP28 transceiver modules, remove the optical bore dust plug and set it aside.
- Step 5** For QSFP+ or QSFP28 transceiver modules equipped with a pull-tab, hold the transceiver so that the identifier label is on the top.
- Step 6** For QSFP+ or QSFP28 transceiver modules equipped with a bail-clasp latch, keep the bail-clasp aligned in a vertical position.
- Step 7** Align the QSFP+ or QSFP28 transceiver module in front of the module's transceiver socket opening and carefully insert the QSFP+ or QSFP28 transceiver into the socket until the transceiver makes contact with the socket electrical contacts (see the figure below).

Figure 27: Installing the 40-Gigabit QSFP+ or 100-Gigabit QSFP28 Transceiver Module (Optical Transceiver Equipped with a Pull-Tab Latch Shown)



- Step 8** Press firmly on the front of the QSFP+ or QSFP28 transceiver module with your thumb to fully seat the transceiver module into the module's transceiver socket (see the below figure).

**Caution** If the latch is not fully engaged, you might accidentally disconnect the QSFP+ or QSFP28 transceiver module.

**Figure 28: Seating the 40-Gigabit QSFP+ or 100-Gigabit QSFP28 Transceiver Module (Optical Transceiver Equipped with a Dust Plug and Latch Shown)**

- Step 9** For optical QSFP+ or QSFP28 transceiver modules, reinstall the dust plug into the QSFP+ or QSFP28 transceiver module's optical bores until you are ready to attach the network interface cable. Do not remove the dust plug until you are ready to attach the network interface cable.

## Attaching the Optical Network Cable

### Before You Begin

Before removing the dust plugs and making any optical connections, follow these guidelines:

- Keep the protective dust plugs installed in the unplugged fiber-optic cable connectors and in the transceiver module's optical bores until you are ready to make a connection.
- Inspect and clean the MPO connector end faces just before you make any connections.



Installing and Removing QSFP+/QSFP28 Transceiver Modules

- Grasp the MPO connector only by the housing to plug or unplug a fiber-optic cable.

**Note** 40-Gigabit QSFP+ or QSFP28 transceiver modules are keyed to prevent incorrect insertion.

**Note** The multiple-fiber push-on (MPO) connectors on the optical QSFP+ or QSFP28 transceivers support network interface cables with either physical contact (PC) or ultra-physical contact (UPC) flat polished face types. The MPO connectors on the optical QSFP+ or QSFP28 transceivers do not support network interface cables with an angle-polished contact (APC) face type.

- Step 1** Remove the dust plugs from the optical network interface cable MPO connectors. Save the dust plugs for future use.
- Step 2** Inspect and clean the MPO connector's fiber-optic end faces.
- Step 3** Remove the dust plugs from the QSFP+ or QSFP28 transceiver module optical bores.
- Step 4** Immediately attach the network interface cable MPO connectors to the QSFP+ or QSFP28 transceiver module (see Figure 29 below).

Figure 29: Cabling a 40-Gigabit QSFP+ or QSFP28 Transceiver Module

Removing the 40-Gigabit QSFP+ or 100-Gigabit QSFP28 Transceiver Module

**Caution** The QSFP+ or QSFP28 transceiver module is a static-sensitive device. Always use an ESD wrist strap or similar individual grounding device when handling QSFP+ or QSFP28 transceiver modules or coming into contact with modules.





To remove a QSFP+ or QSFP28 transceiver module, follow these steps:

- Step 1** For optical QSFP+ or QSFP28 transceiver modules, disconnect the network interface cable from the QSFP+ transceiver connector.
- Step 2** For QSFP+ or QSFP28 transceiver modules equipped with a bail-clasp latch (see the below figure, top view):
- a) Pivot the bail-clasp down to the horizontal position.
  - b) Immediately install the dust plug into the transceivers optical bore.
  - c) Grasp the sides of the QSFP+ or QSFP28 transceiver and slide it out of the module socket.
- Step 3** For QSFP+ or QSFP28 transceivers equipped with a pull tab latch (see the below figure, bottom view):
- a) Immediately install the dust plug into the transceiver's optical bore.
  - b) Grasp the tab and gently pull to release the transceiver from the socket.
  - c) Slide the transceiver out of the socket.

**Figure 30: Removing the 40-Gigabit QSFP+ or 100-Gigabit QSFP28 Transceiver Module**

- Step 4** Place the QSFP+ or QSFP28 transceiver module into an antistatic bag.

## Connecting Interface Ports

You can connect optical interface ports on line cards with other devices for network connectivity.



## Connecting a Fiber-Optic Port to the Network

Depending on the line card model that you are using, you can use either QSFP+ or QSFP28 transceivers. Some of these transceivers work with fiber-optic cables that you attach to the transceivers and other transceivers work with pre-attached copper cables. When installing fiber-optic cables for a port, you must install QSFP+ transceivers for 1-Gigabit optical ports or install SFP+ transceivers for 10-Gigabit optical ports or QSFP28 transceivers for 100-Gigabit ports before installing the fiber-optic cable in the transceivers.

**Caution** Removing and installing a transceiver can shorten its useful life. Do not remove and insert transceivers more often than is absolutely necessary. It is recommended that you disconnect cables before installing or removing transceivers to prevent damage to the cable or transceiver.

## Disconnecting Optical Ports from the Network

When removing fiber-optic transceivers, you must remove the fiber-optic cables from a transceiver before removing the transceiver from the port.

## Maintaining Transceivers and Optical Cables

Transceivers and fiber-optic cables must be kept clean and dust free to maintain high signal accuracy and prevent damage to the connectors. Attenuation (loss of light) is increased by contamination and should be below 0.35 dB.

Consider the following maintenance guidelines:

- Transceivers are static sensitive. To prevent ESD damage, wear an ESD-preventative wrist strap connected to the grounded chassis.
- Do not remove and insert a transceiver more often than is necessary. Repeated removals and insertions can shorten its useful life.
- Keep all optical connections covered when not in use. Clean them before using to prevent dust from scratching the fiber-optic cable ends.
- Do not touch the ends of connectors. Touching the ends can leave fingerprints and cause other contamination.
- Clean the connectors regularly; the required frequency of cleaning depends upon the environment. In addition, clean connectors if they are exposed to dust or accidentally touched. Both wet and dry cleaning techniques can be effective; refer to your site's fiber-optic connection cleaning procedures.
- Inspect routinely for dust and damage. If you suspect damage, clean and then inspect fiber ends with a microscope to determine if damage has occurred.



## Verify Chassis Installation

After installing the NCS 5500 Series Chassis, use the show commands to verify the installation and configuration. If any issue is detected, take corrective action before making further configuration.

### Step 1 **show inventory**

#### **Example:**

```
sysadmin-vm:0_RP0 #show inventory
```

Displays information about the field replaceable units (FRUs), including product IDs, serial numbers, and version numbers.

### Step 2 **show environment**

#### **Example:**

```
sysadmin-vm:0_RP0 #show environment
```

Displays all of the environment-related router information.

### Step 3 **show environment temperature**

#### **Example:**

```
sysadmin-vm:0_RP0 #show environment temperature
```

Displays temperature readings for card temperature sensors. Each system controller, route processor, line card, and fabric card has temperature sensors with two thresholds:

- Minor temperature threshold-When a minor threshold is exceeded, a minor alarm occurs and the following occur for all four sensors:
  - Displays system messages
  - Sends SNMP notifications (if configured)
  - Log environmental alarm event that can be reviewed by running the show alarm command.
- Major temperature threshold-When a major threshold is exceeded, a major alarm occurs and the following occur:



- For sensors 1, 3, and 4 (outlet and onboard sensors), the following actions occur:
  - Displays system messages.
  - Sends SNMP notifications (if configured).
  - Logs environmental alarm event that can be reviewed by running the show alarm command.
- For sensor 2 (intake sensor), the following actions occur:
  - If the threshold is exceeded in a switching card, only that card is shut down.
  - If the threshold is exceeded in an active route processor card with HA-standby or standby present, on that route processor card is shut down and the standby route processor card takes over.
  - If you do not have a standby route processor card in your router, you have up to 2 minutes to decrease the temperature. During this interval, the software monitors the temperature every 5 seconds and continuously sends system messages as configured.

**Note** We recommend that you install dual route processor cards. If you are using a router without dual route processor cards, Cisco recommends that you immediately replace the fan card if just one fan is not working.

**Step 4** **show environment power**

**Example:**

```
sysadmin-vm:0_RP0 #show environment power
```

Displays the power usage information for the entire router.

**Step 5** **show environment voltage**

**Example:**

```
sysadmin-vm:0_RP0 #show environment voltage
```

Displays the voltage for the entire router.

**Step 6** **show environment current**

**Example:**

```
sysadmin-vm:0_RP0 #show environment current
```

Displays the current environment status.

**Step 7** **show environment fan**

**Example:**

```
sysadmin-vm:0_RP0 #show environment fan
```

Displays the status of the fan trays.

**Step 8** **hw-module location loc shutdown or [no] hw-module shutdown location loc**





#### **Verify Chassis Installation**

#### **Example:**

```
sysadmin-vm:0_RP0 #hw-module location <loc> shutdown
```

Powers up or shuts down a card gracefully.







## Replace Modules, Fan Trays, and Power Supply

- [Replace NCS 55A1-24H, NCS 55A1-36H-S, NCS 5501 and NCS 5501-SE Fan Modules, page 56](#)
- [Replace NCS 5502 and NCS 5502 SE Fans, page 57](#)
- [Replace Power Supply, page 58](#)

### Replace NCS 55A1-24H, NCS 55A1-36H-S, NCS 5501 and NCS 5501-SE Fan Modules

The fan module is designed to be removed and replaced while the system is operating without posing an electrical hazard or damage to the system, if the replacement is performed within 2 minutes.

**Note** The NCS 5501 and NCS 5501-SE routers support NCS-1RU-FAN-FW (port-side intake airflow) and NCS-1RU-FAN-RV (port-side exhaust airflow) fan modules.

The NCS 55A1-24H, NCS 55A1-36H-S routers support NC55-A1-FAN-FW (port-side intake airflow) and NC55-A1-FAN-RV (port-side exhaust airflow) fan modules.

**Note** The airflow direction must be the same for all power supply and fan modules in the chassis.

**Step 1** To remove a fan module, follow these steps:

- a) Press two latches on the fan module, grasp the handle of fan module.



**Note** The following figure shows the NCS 5501-SE router. The procedure is the same for NCS 5501 and 55A1 routers.

**Figure 31: Remove NCS 5501-SE Fans**

- b) Simultaneously press the latches, and pull the fan module fully out of the chassis.
- c) Pull the fan module clear of the chassis.

**Step 2**

To install a fan module, follow these steps:

- a) Hold the fan module with the LED and PID label at the top.
- b) Align the fan module to the open fan tray slot in the chassis and press the module all the way into the slot until the left and right latches click and locked on the chassis.

**Note** If the fan module does not go all the way into the slot, do not force it. Remove the fan module and verify that it is the correct type for your router and in the correct orientation.

- c) If the chassis is powered on, listen for the fans. You should immediately hear them operating. If you do not hear them, ensure that the fan module is inserted completely in the chassis.
- d) Verify that the fan module LED is green. If the LED is not green, one or more fans are faulty. If this situation occurs, contact your customer service representative for replacement parts.





## Replace NCS 5502 and NCS 5502 SE Fans

Cisco NCS 5502 and NCS 5502 SE has fan redundancy protection mechanism against a single fan failure. If a fan fails, these can work for unlimited time without any performance degrade. When the failed fan is replaced, the new fan must be physically placed within 10 minutes.

**Step 1** Unscrew the thumbscrew on the fan.

**Figure 32: Remove NCS 5502 and NCS 5502 SE Fans**

**Step 2** Pull the handle to remove the fan to be replaced.

**Step 3** Hold the fan module with the LED and PID label at the top.

**Step 4** Align the fan module to the open fan tray slot in the chassis and press the module all the way into the slot until the left and right latches click and locked on the chassis.

**Step 5** If the chassis is powered on, listen for the fans. You should immediately hear them operating. If you do not hear the fans, ensure that the fan module is inserted completely in the chassis.

**Step 6** Verify that the fan module LED is green. If the LED is not green, one or more fans are faulty. If this situation occurs, contact your customer service representative for replacement parts.



## Replace Power Supply

Use this procedure to replace both the AC and DC power supply units on Cisco NCS 5501, NCS 5501-SE, NCS 55A1-24H, NCS 55A1-36H-S, NCS 5502, NCS 5502 SE chassis.

- Step 1** If the power supply is connected to a DC circuit, shut off the circuit at the circuit breaker.
- Step 2** Disconnect the PSU cable.
- Step 3** Press the tab inward to unlatch the PSU, then pull the handle to remove the PSU.
- Step 4** Insert the new PSU.
- Note** If the PSU does not go all the way into the slot, do not force it. Remove the PSU and verify that it is the correct type for your router and in the correct orientation.
- Step 5** Connect the PSU cable.
- Step 6** If the power supply is connected to a DC circuit, turn on the circuit breaker for the DC power source.
- Note** The following figure shows the NCS 5501 router. The procedure is the same for the NCS 5501-SE and 55A1-24H router.

**Figure 33: Remove NCS 5501 Power Supply**



## Replace Modules, Fan Trays, and Power Supplies

Rep

**Figure 34: Remove NCS 55A1-36H-S Power Supply**

**Figure 35: Remove NCS 5502 and NCS 5502 SE Power Supply**



**Replace Power Supply**

**Replace Modules, Fan Trays, and**





## System Specifications

- [Page 61 Environmental and Physical Specifications](#)
- [Page 64 Requirements](#)
- [Page 64 Quantity and Power Consumption](#)
- [Page 68 Orientation](#)
- [Page 68 Ports, Connectors, and Cables](#)

## Environmental and Physical Specifications

Table 7: Environmental and Physical Specifications for NCS 5501

Environmental Ranges	
Operating Temperature	32 to 104°F (0 to 40°C)
Non-operating (storage) temperature	-40 to 158°F (-40 to 70°C)
Humidity	5 to 95% non-condensing
Altitude	0 to 9842 feet (0 to 3000 meters)



Environmental and Physical Specifications

Acoustic Noise

- Ambient temperature < 30°C, sound power = 70 dB; pressure = 56 dB
- Ambient temperature between 30°C and 42°C, sound power = 73 dB; sound pressure = 66 dB
- Ambient temperature > 42°C, sound power = 83 dB; pressure = 71 dB

**Note** NCS 5500 series employs a fan speed control algorithm on the environmental temperature to reduce the acoustic noise. Ambient temperature is measured 6" in front of the fan intake (cold aisle).

Physical Dimensions

Rack Unit	1
Width	17.4 in (44.19 cm)
Depth	21.7 in (55.11 cm)
Height	1.72 in (4.36 cm)
Weight	NCS 5501: 22.8 lbs (10.34 kgs) NCS 5501 SE: 23.5 lbs (10.66 kgs)

Table 8: Environmental and Physical Specifications for NCS 55A1

Environmental Ranges

Operating Temperature	32 to 104°F (0 to 40°C)
Non-operating (storage) temperature	-40 to 158°F (-40 to 70°C)
Humidity	5 to 95% non-condensing
Altitude	0 to 9842 feet (0 to 3000 meters)
Acoustic Noise	NEBS compliant. Less than 78 dB sound power at 27°C
	<b>Note</b> NCS 5500 series employs a fan speed control algorithm on the environmental temperature to reduce the acoustic noise. Ambient temperature is measured 6" in front of the fan intake (cold aisle).

Physical Dimensions

Rack Unit	1
Width	17.3 in (43.94 cm)



System Specifications

Environmental and Physical Specifications

Depth	NCS 55A1-24H: 21.7 in (55.12cm)
	NCS 55A1-36H-S: 30.0 in (76.20 cm)
Height	1.72 in (4.36 cm)
Weight	NCS 55A1-24H-S: 24 lbs (10.89 kgs)
	NCS 55A1-36H-S: 33 lbs (14.97 kgs)

Table 9: Environmental and Physical Specifications for NCS 5502

Environmental Ranges

Operating Temperature	32 to 104°F (0 to 40°C)
Non-operating (storage) temperature	-40 to 158°F (-40 to 70°C)
Humidity	5 to 95% (noncondensing)
Altitude	0 to 9842 feet (0 to 3000 meters)
Acoustic Noise	<ul style="list-style-type: none"><li>• Ambient temperature &lt; 30°C: Sound Power = 73 dB; Sound Pressure = 64 dB</li><li>• Ambient temperature between 30°C and 42°C: Sound Power = 78 dB; Sound Pressure = 75 dB</li><li>• Ambient temperature &gt; 42°C: Sound Power = 84 dB; Sound Pressure = 89 dB</li></ul>
	<b>Note</b> NCS 5500 series employs a fan speed control algorithm that adjusts fan speed based on the environmental temperature to reduce the noise. Ambient temperature is measured 6" in front of the fan intake (cold aisle).

Physical Dimensions

Rack Unit	2
Height	3.45 in (8.76 cm)
Width	17.3 in (43.94 cm)
Depth	30.0 in (76.20 cm)
Weight	NCS 5502: 52.5 lbs (23.8136 kgs)
	NCS 5502 SE: 55.5 lbs (25.17438 kgs)



## Clearance Requirements

The fixed-port chassis requires front-to-back airflow. Leave at least 6.0 in. (15.24 cm) front and rear clearance for air intake/exhaust. Leave an additional 6.0 in. (15.24 cm) rear clearance for removal and installation of power supplies and fan modules.

Figure 36: Clearances Required Around the Chassis

1	Chassis	4	6.0 in. (15.24 cm) rear clearance for air intake/exhaust.
2	6.0 in. (15.24 cm) front clearance for air intake/exhaust.	5	Additional 6.0 in. (15.24 cm) rear clearance for removal and installation of power supplies and fan modules.
3	Chassis depth		

## Weight, Quantity and Power Consumption

### NCS 5501 Fixed Chassis Weight, Quantity and Power Consumption

The NCS 5501 fixed chassis offers two hot-swappable power supplies providing 1+1 redundancy. For 1+1 redundancy mode, there must be two subsystems each, providing enough power supply to maintain the system.

Table 10: NCS 5501 and NCS 5501 SE Weight, Quantity and Power Consumption

Component	Weight per Unit	Typical Power	M
Chassis			





System Specifications

Weight, Quantity and Po

Component	Weight per Unit	Typical Power
Cisco NCS 5501 Chassis (NCS-5501)	22.8 lbs (10.34 kgs)	243W at 27°C
Cisco NCS 5501 SE Chassis (NCS-5501-SE)	23.5 lbs (10.66 kgs)	280W at 25°C
<b>Power Supply (2 maximum)</b>		
<ul style="list-style-type: none"><li>• NCS 5500 1100W AC Power Supply, Forward Airflow (Port side intake): NCS-1100W-ACFW</li><li>• NCS 5500 1100W AC Power Supply, Reverse Airflow (Port side exhaust): NCS-1100W-ACRV</li><li>• NCS 5500 950Watts DC Power Supply, Forward Airflow (Port side intake) NCS-950W-DCFW</li><li>• NCS 5500 1100W DC Power Supply, Reverse Airflow (Port side exhaust): NCS-1100W-DCRV</li></ul>	2.8 lb	NA
<b>Fan Tray (2 maximum)</b>	10 Oz	See the following table
<ul style="list-style-type: none"><li>• NCS-1RU-FAN-FW</li><li>• NCS-1RU-FAN-RV</li></ul>		

Table 11: NCS 5501 and NCS 5501 SE Fan Tray Power Consumption

Ambient Temperature	Power Consumption of Each Fan Tray	Quantity of Fan trays	Total Fan Tray Power
25°C	11W	2	22W
55°C	41W	2	82W

NCS 55A1 Fixed Chassis Weight, Quantity and Power Consumption

The NCS 55A1 fixed chassis offers two hot-swappable power supplies providing 1+1 redundant power. If the chassis is configured in 1+1 redundancy mode, there must be two subsystems each, providing enough power supply to maintain the

Table 12: NCS 55A1-24H, NCS 55A1-36H-S Weight, Quantity and Power Consumption

Component	Weight per Unit	Typical Power
<b>Chassis</b>		
Cisco NCS 55A1-24 Chassis (NCS-55A1-24H)	24 lbs (10.89 kgs)	600W at 27°C
Cisco NCS 55A1-36H-S Chassis (NCS-55A1-36H-S)	33 lbs (14.97 kgs)	1100W at 27°C



Weight, Quantity and Power Consumption

Component	Weight per Unit	Typical Power	M
<b>Power Supply (2 maximum)</b>			
<ul style="list-style-type: none"><li>• NCS 55A1-36H-S<ul style="list-style-type: none"><li>◦ Cisco NCS 5500 AC 2KW Power Supply Reverse Airflow (Port side exhaust): NC55-2KW-ACRV(=)</li><li>◦ Cisco NCS 5500 AC 2KW Power Supply Forward Airflow (Port side intake): NC55-2KW-ACFW(=)</li><li>◦ Cisco NCS 5500 DC 2KW Power Supply Reverse Airflow (Port side exhaust): NC55-2KW-DCRV(=)</li><li>◦ Cisco NCS 5500 DC 2KW Power Supply Forward Airflow (Port side intake): NC55-2KW-DCFW(=)</li></ul></li><li>• Cisco NCS 55A1-24 Chassis (NCS-55A1-24H)<ul style="list-style-type: none"><li>◦ Cisco NCS 5500 1100W AC Power Supply, Forward Airflow (Port side intake): NCS-1100W-ACFW</li><li>◦ Cisco NCS 5500 1100W AC Power Supply, Reverse Airflow (Port side exhaust): NCS-1100W-ACRV</li><li>◦ Cisco NCS 5500 950Watts DC Power Supply, Forward Airflow (Port side intake) NCS-950W-DCFW</li><li>◦ Cisco NCS 5500 1100W DC Power Supply, Reverse Airflow (Port side exhaust): NCS-1100W-DCRV</li></ul></li></ul>	2.8 lb	NA	N
<b>Fan Tray (3 maximum)</b>			
<ul style="list-style-type: none"><li>• NC55-A1-FAN-FW</li><li>• NC55-A1-FAN-RV</li></ul>	10 Oz	See <a href="#">Fan Tray Power Consumption in NCS 55A1</a> for details.	S C N d

Table 13: NCS-55A1-24H, NCS 55A1-36H-S Fan Tray Power Consumption

Ambient Temperature	Power Consumption of Each Fan Tray	Quantity of Fan trays	Total Fan Tray Power C
25°C	9W	3	27W
55°C	36W	3	108W



NCS 5502 Fixed Chassis Weight, Quantity and Power Consumption

The NCS 5502 fixed chassis offers four hot-swappable power supplies providing n+n redundancy. In n+n redundancy mode, there must be two equal sets of power supplies, each of which can power all of the modules in the chassis and each set is connected to a separate power source. If one power source goes down, the power supplies connected to the other power source can power the router. The maximum number of power supplies is the number of power supplies required for combined power plus the same number of power supplies for redundancy.

Table 14: NCS 5502 and NCS 5502 SE Weight, Quantity and Power Consumption

Component	Weight per Unit	Typical Power	Maximum Power
Chassis			
Cisco NCS 5502 Chassis (NCS-5502)	52.5 lbs (23.8136 kgs)	1450W at 27°C	2000W
Cisco NCS 5502 SE Chassis (NCS-5502-SE)	55.5 lbs (25.17438 kgs)	1850W at 27°C	2400W
Power Supply			
<ul style="list-style-type: none"><li>Cisco NCS 5500 DC 2KW Power Supply Reverse Airflow (Port side exhaust): NC55-2KW-DCRV(=)</li><li>Cisco NCS 5500 DC 2KW Power Supply Forward Airflow (Port side intake): NC55-2KW-DCFV(=)</li><li>Cisco NCS 5500 AC 2KW Power Supply Reverse Airflow (Port side exhaust): NC55-2KW-ACRV(=)</li><li>Cisco NCS 5500 DC 2KW Power Supply Forward Airflow (Port side intake): NC55-2KW-ACFV(=)</li></ul>	2.8 lb	NA	NA
Fan Tray (3 maximum)			
<ul style="list-style-type: none"><li>Cisco NCS 5500 Fan Tray 2RU Chassis Port-S Intake / Front-to-back: NC55-2RU-FAN-FW(=)</li><li>Cisco NCS 5500 Fan Tray 2RU Chassis Port-S Exhaust / Back-to-Front: NC55-2RU-FAN-RV(=)</li></ul>	1.8 lb	75W	260W



## Airflow Direction

The airflow through the fan trays and power supplies on the Cisco NCS 5000 series router is either front side exhaust or the front side intake, depending on how the modules were ordered. To ensure proper airflow, you must make sure that when you install the switch its air intake is positioned in a cold aisle and the air exhaust is positioned in a hot aisle for your data center.

## Transceivers, Connectors, and Cables

### Transceiver and Cable Specifications

To determine which transceivers and cables are supported by this router, see [Cisco Transceiver Compatibility](#) Information.

[Cisco Transceiver](#)

To see the transceiver specifications and installation information, see [Cisco Transceiver Module Upgrade](#) Guides.

[Cisco Transceiver Module](#)

### RJ-45 Connectors

The RJ-45 connector connects Category 3, Category 5, Category 5e, Category 6, or Category 6A foil twisted-pair or unshielded twisted-pair cable from the external network to the following module interface connectors:

- Router chassis
  - CONSOLE port
  - MGMT ETH port

**Caution** To comply with GR-1089 intrabuilding, lightning immunity requirements, you must use a foil twisted-pair (FTP) cable that is properly grounded at both ends.

The following figure shows the RJ-45 connector.

**Figure 37: RJ-45 Connector**





## System Specifications



**RJ-45 Connectors**

**Sy**



## LEDs

- [Chassis LEDs, page 71](#)
- [Fan Tray LED, page 73](#)
- [Power Supply LEDs, page 74](#)

## Chassis LEDs

**NCS 5501:** Attention (ATTN), STATUS, and ALARM LEDs are located on the bottom left front of the chassis.

**NCS 5501 SE and NCS 55A1-24H:** Attention (ATTN), STATUS, ALARM, and SYNC LEDs are located along the left front of the chassis.

**NCS 55A1-36H-S:** Attention (ATTN), Status (STAT), Alarm (ALRM), and SYNC LEDs are located on the left front of the chassis.

**NCS 5502:** Attention (ATTN), STATUS, and ALARM LEDs are located on the upper left front of the chassis.

Table 15: Fixed-Port Chassis LED Descriptions

LED	Color	Status
ATTN	Flashing blue	The operator has activated this LED to identify this chassis.
	Off	This chassis is not being identified.



## Chassis LEDs

LED	Color	Status
STATUS or STAT	Green	The module is operational and has no active major or critical alarms.
	Amber	Host kernel booted and is ready to start SysAdmin VM.
	Red	Power-up failure which prevents the CPU from booting.
	Flashing Amber (Slow)	The module is booting up.
	Flashing Amber (Fast)	The module is booting up, shutting down, or the SysAdmin VM is reloaded.
	Flashing Red	RP0 has active major or critical alarms.
	Off	The module is powered-off.
ALARM or ALRM	Red	Critical alarm - system-scope (including RP0).
	Flashing green (Applies to NCS 5502 only)	Critical alarm. The source can be any of the following: <ul style="list-style-type: none"> <li>• Less than 2 PSUs</li> <li>• Power cord not plugged in</li> <li>• PSU not inserted properly</li> <li>• Input power not good</li> </ul>
	Flashing Red	Critical alarm - Relating to voltage rail failures.
	Amber	Major alarm - system-scope (including RP0).
	Flashing Amber	Minor alarm - system-scope (including RP0).
	Off	No alarm.
SYNC  (Does not apply to NCS 5501 or 5502)	Green	Time core is synchronized to an external source including NTP.
	Flashing Green	System is in Synchronous Ethernet Mode.
	Amber	Free run/Holdover - Time core is in free run or holdover mode.
	Off	Time core clock synchronization is disabled.
STATUS + ALARM (Both LEDs)	Flashing Red	Secure Boot validation failure state. This case is only applicable immediately after power on.





LEDs

## Fan Tray LED

**NCS-55A1-24H, NCS 55A1-36H-S, NCS 5501 and NCS 5501 SE Fan Tray LED**

Fan tray modules are located on the back side of the chassis. Each NCS-55A1-24H, NCS 55A1-36H-S, NCS 5501, and NCS 5501 SE fan tray module has a Status LED.

**NCS 5502 Fan Tray LED**

Fan tray modules are located on the back side of the chassis. Each NCS 5502 fan tray module has a Status LED.

LED	Color	Status
STATUS	Green	Fans are operating normally.
	Flashing Amber	One or more fans are failed.
	Amber	Fan tray is inserted and pending to come online.
	Off	Fan tray is not receiving power.



# Power Supply LEDs

## NCS 55A1-24H, NCS 5501 and NCS 5501 SE Power Supply LEDs

Power modules are located on the back side of the chassis. Each NCS 55A1-24H, NCS 5501 and NCS 5501 SE power module has an OK and a FAIL LED.

Table 16: Power Supply LED Descriptions

OK LED	FAIL LED	Status
Green	Off	Power supply is on and outputting power to the router.
Flashing green	Off	Power supply is connected to input power source but not outputting power to the router. The power supply might not be properly installed in the chassis.
Off	Off	Either all of the installed power supplies are not receiving power or an uninstalled power supply is not receiving power.
Off	Flashing amber	Power supply is operating but a warning condition has occurred—possibly one of the following conditions: <ul style="list-style-type: none"><li>• High temperature</li><li>• High power</li><li>• Slow power supply fan</li><li>• Low voltage</li><li>• Power supply is installed in the chassis but was disconnected from the power source</li></ul>
Off	Amber	Power supply failure—possibly one of the following conditions: <ul style="list-style-type: none"><li>• Over voltage</li><li>• Over current</li><li>• Over temperature</li><li>• Power supply fan failure</li></ul>



LEDs

NCS 55A1-36H-S, NCS 5502 Power Supply LED

Power modules are located on the back side of the chassis. Each power module has a Status LED.

Table 17: Power Supply LED Descriptions

LED	Color	Status
STATUS	Green	Power supply is on and outputting power to the router.
	Flashing Green	Power supply is connected to input power source but not outputting power to the router.
	Amber	Power supply failure, due to one of the following conditions: <ul style="list-style-type: none"><li>• Over voltage</li><li>• Over current</li><li>• Over Temperature</li><li>• Fan failure</li></ul>
	Flashing Amber	Power supply is operating but a warning condition has occurred due to one of the following conditions: <ul style="list-style-type: none"><li>• High temperature</li><li>• High power</li><li>• Slow fan</li></ul>
	Off	Power supplies are not receiving power.



**Power Supply LEDs**