

Hardware Installation Guide for Cisco NCS 5500 Series Fixed-Port Routers

First Published: 2017-09-15

Last Modified: 2026-08-14

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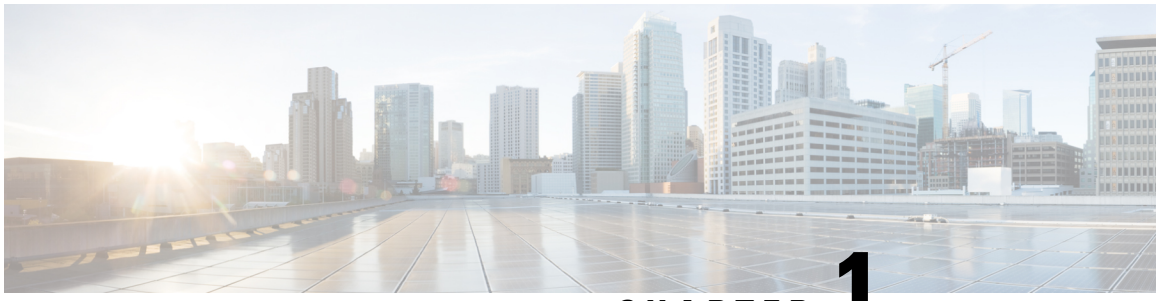
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CHAPTER 1

NCS 5500 Series Fixed-Port Router Overview

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NCS 5500 Series Fixed-Port Routers

The Cisco NCS 5500 series fixed-port routers include:

Note To determine which transceivers and cables are supported by these routers, see Cisco Transceiver Modules Compatibility Information.

- NCS-5501: Fixed port, high density, one rack unit form-factor router that supports 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: Fixed port, high density, one rack unit form-factor router that supports 40 x SFP/SFP+ ports, each capable of supporting one Gigabit Ethernet or 10 Gigabit Ethernet and 4 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-55A1-48Q6H: Fixed port, high density, one rack unit form-factor router that supports 48 x SFP/SFP+/SFP28G ports, each capable of supporting one Gigabit Ethernet or 10 Gigabit Ethernet or 25 Gigabit Ethernet and 6 x QSFP+/QSFP28 ports each, capable of supporting 10/25 Gigabit Ethernet (via cable breakout), 40 Gigabit Ethernet, or 100 Gigabit Ethernet transceivers.
- NCS-55A1-24Q6H-S: Fixed port, high density, one rack unit form-factor router that supports 48 x SFP/SFP+ ports, each capable of supporting one Gigabit Ethernet or 10 Gigabit Ethernet. Out of these 48 ports, last 24 ports support 25 Gigabit Ethernet. It also has 6 x QSFP+/QSFP28 ports each, capable of supporting 10/25 Gigabit Ethernet (via cable breakout), 40 Gigabit Ethernet, or 100 Gigabit Ethernet transceivers.

- NCS-55A1-24Q6H-SS: Fixed port, high density, one rack unit form-factor router that supports 48 x SFP/SFP+ ports, each capable of supporting one Gigabit Ethernet or 10 Gigabit Ethernet. Out of these 48 ports, last 24 ports support 25 Gigabit Ethernet. It also has 6 x QSFP+/QSFP28 ports each, capable of supporting 10/25 Gigabit Ethernet (via cable breakout), 40 Gigabit Ethernet, or 100 Gigabit Ethernet transceivers. All the ports are MACSec enabled. This chassis supports only port side intake installation configuration. Also, MACSec cannot be enabled if the rate of data transmission is 1 G.
- NCS-55A1-36H-S: Fixed port, high density, one rack unit form-factor router that supports port density of 36 x QSFP ports, each capable of supporting 10 GE (via cable breakout), 25 GE (via cable breakout), 40 GE (QSFP+), or 100 GE (QSFP28) transceivers. The router also supports the QSFP-to-SFP adapter (QSA) with 10 GE SFP+ (SR, SR-S, LR, and LR-S).
- NCS-55A1-36H-SE-S: Fixed port, high density, one rack unit form-factor router that supports port density of 36 x QSFP ports, each capable of supporting 10 GE (via cable breakout), 25 GE (via cable breakout), 40 GE (QSFP+), or 100 GE (QSFP28) transceivers. The router also supports the QSFP-to-SFP adapter (QSA) with 10 GE SFP+ (SR, SR-S, LR, and LR-S). The router has additional TCAM to support large prefix scale.
- NCS-55A1-24H: Fixed port, high density, one rack unit form-factor router that supports port density of 24 x QSFP ports, each capable of supporting 10 GE (via cable breakout), 25 GE (via cable breakout), 50 GE (via cable breakout), 40 GE (QSFP+), or 100 GE (QSFP28) transceivers. The router also supports the QSFP-to-SFP adapter (QSA) with 1GE SFP (GLC-SX-MMD, GLC-LH-SMD) and 10 GE SFP+ (SR, SR-S, LR, and LR-S).
- NCS-5502: Fixed port, high density, two rack unit form-factor router that supports 48 QSFP ports, each of which is capable of supporting 10 GE (via cable breakout), 40 GE, or 100 GE transceivers. The router also supports the QSFP-to-SFP adapter (QSA) with 10 GE SFP+ (SR, SR-S, LR, and LR-S).
- NCS-5502-SE: Fixed port, high density, two rack unit form-factor router that supports 48 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. The router also supports the QSFP-to-SFP adapter (QSA) with 10 GE SFP+ (SR, SR-S, LR, and LR-S).
- NCS-55A2-MOD-S: Fixed port, high density, two rack unit form-factor router that supports 24 SFP/SFP+ ports capable of supporting one Gigabit Ethernet or 10 Gigabit Ethernet, and 16 SFP/SFP+/SFP28 ports capable of supporting one Gigabit Ethernet, 10 Gigabit Ethernet, or 25 Gigabit Ethernet. The router also supports up to 2 modular port adapters (MPA). See the Modular Port Adapters, on page 4 section.
- NCS-55A2-MOD-HD-S: Temperature-hardened, fixed port, high density, two rack unit form-factor router that supports 24 SFP/SFP+ ports capable of supporting one Gigabit Ethernet or 10 Gigabit Ethernet, and 16 SFP/SFP+/SFP28 ports capable of supporting one Gigabit Ethernet, 10 Gigabit Ethernet, or 25 Gigabit Ethernet. The router also supports up to 2 modular port adapters (MPA). See the Modular Port Adapters, on page 4 section.



Note If you install commercial-temperature MPAs in the NCS-55A2-MOD-HD-S router, the router will operate within the commercial-temperature specifications.

- NCS-55A2-MOD-SE-S: Fixed port, high density, two rack unit form-factor router that supports 24 SFP/SFP+ ports capable of supporting one Gigabit Ethernet or 10 Gigabit Ethernet, and 16 SFP/SFP+/SFP28 ports capable of supporting one Gigabit Ethernet, 10 Gigabit Ethernet, or 25 Gigabit Ethernet. The router also supports up to 2 modular port adapters (MPA). See the Modular Port Adapters,

on page 4 section. The router has external TCAM to support expanded Forwarding Information Base (FIB), network Access Control Lists (ACLs), and QoS for scale-enhanced configuration needs.

- NCS-55A2-MOD-HX-S: Temperature-hardened, conformal coated, fixed port, high density, two rack unit form-factor router that supports 24 SFP/SFP+ ports capable of supporting one Gigabit Ethernet or 10 Gigabit Ethernet, and 16 SFP/SFP+/SFP28 ports capable of supporting one Gigabit Ethernet, 10 Gigabit Ethernet, or 25 Gigabit Ethernet. The router also supports up to 2 modular port adapters (MPA). See the Modular Port Adapters, on page 4 section.
- NC55A2-MOD-SE-H-S: Temperature-hardened, conformal coated, fixed port, high density, two rack unit form-factor router that supports 24 SFP/SFP+ ports capable of supporting one Gigabit Ethernet or 10 Gigabit Ethernet, and 16 SFP/SFP+/SFP28 ports capable of supporting one Gigabit Ethernet, 10 Gigabit Ethernet, or 25 Gigabit Ethernet. The router also supports up to 2 modular port adapters (MPA). See the Modular Port Adapters, on page 4 section. The router has external TCAM to support expanded Forwarding Information Base (FIB), network Access Control Lists (ACLs), and QoS for scale-enhanced configuration needs.

Note To determine which transceivers and cables are supported by these routers, see Cisco Transceiver Modules Compatibility Information.

Note The following fixed-port routers support configuration of four ports using one quad CLI, **hw-module quad**:

- NCS-55A1-48Q6H
- NCS-55A1-24Q6H-S
- NCS-55A1-24Q6H-SS
- NCS-55A2-MOD-S
- NCS-55A2-MOD-SE
- NCS-55A2-HD-MOD-S
- NCS-55A2-MOD-HX-S
- NC55A2-MOD-SE-H-S

Note We recommend to change the offset value of the **conf-offset** <*offset_value*> command (MACsec encryption command) in Cisco NCS 5500 fixed port routers only when the port is in **admin down** state (that is, when the interface is shut down). Changing the offset value otherwise may result in traffic loss.

Modular Port Adapters

The modular port adapters (MPAs) are supported in the NCS-55A2-MOD-S, NCS-55A2-MOD-SE-S, NCS-55A2-MOD-HX-S,NC55A2-MOD-SE-H-S, and NCS-55A2-MOD-HD-S routers. Each MPA has a STATUS and ATTN (attention) LED, and each port on the MPA has an adjacent A/L (Active/Link) LED.

To determine which transceivers and cables are supported by these MPAs, see Cisco Transceiver Modules Compatibility Information.

Note Before replacing an MPA card remove the port-range configurations that are applied on that MPA. If these configurations are not removed, interfaces in the new MPA card are not available.

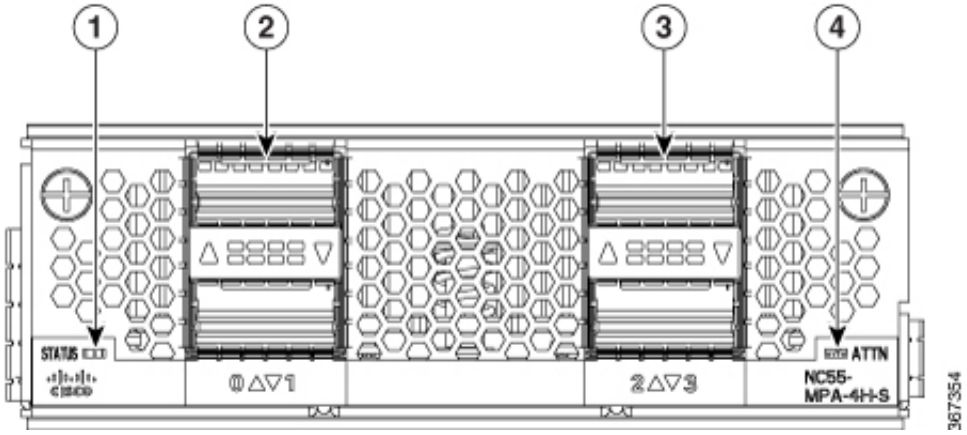
Note In Cisco NCS-55A2 routers, if the MPA ejectors are exposed to contaminants from the environment or other sources, the system will issue an ejector open alarm and shut down the MPA, even if the ejector is closed. From Release 25.3.1 onwards, in order to prevent the MPA from shutting down unexpectedly, execute the "**hw-module subslot {all|*location-id*} ejector-disable**" command. If you disable the MPA ejector function using this command, make sure to use the Managed OIR procedure when removing the MPA.

4-Port 40GE/100GE MPA with QSFP+/QSFP28

The 4-port 40GE/100GE MPA (NC55-MPA-4H-S/NC55-MPA-4H-HD-S/NC55-MPA-4H-HX-S) provides 4 ports for 4x25GE (via cable breakout), QSFP+ (40Gbps) or QSFP28 (100Gbps) transceivers.

Note The temperature-hardened NC55-MPA-4H-HD-S MPA operates within industrial temperature range when installed in the temperature-hardened routers.

Note The temperature-hardened conformal-coated NC55-MPA-4H-HX-S MPA operates within industrial temperature range when installed in the temperature-hardened routers.

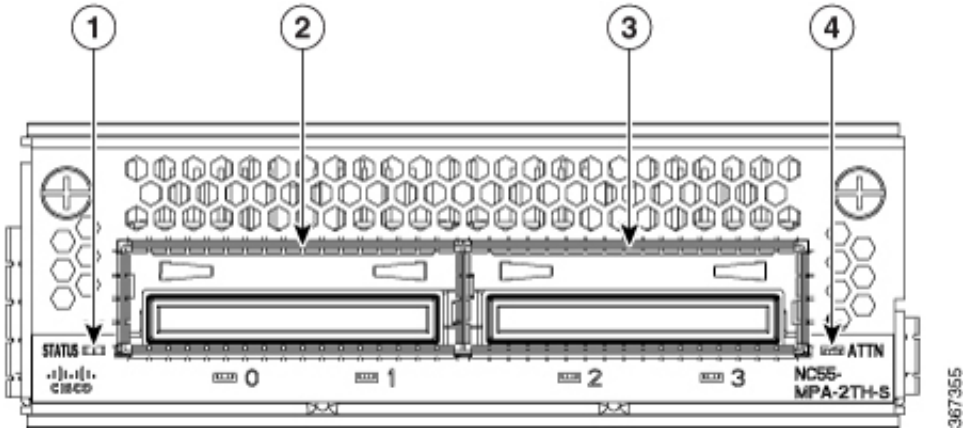


1	STATUS LED	3	QSFP port and Active/Link LED
2	QSFP port and Active/Link LED	4	ATTN LED

2-Port 100GE/200GE with CFP2-DCO

The 2-port 100GE/200GE MPA (NC55-MPA-2TH-S/NC55-MPA-2TH-HX-S) provides 2 ports for CFP2-DCO transceivers.

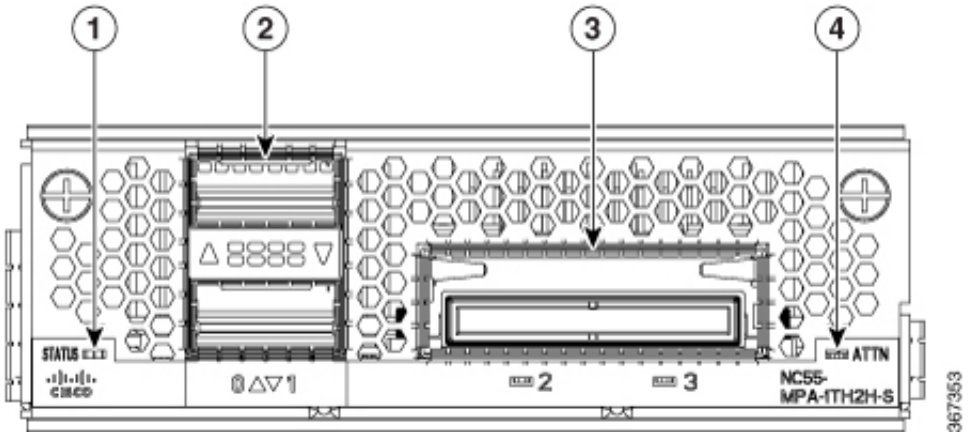
Note The temperature-hardened conformal-coated NC55-MPA-2TH-HX-S MPA operates within industrial temperature range when installed in the temperature-hardened routers.



1	STATUS LED	3	CFP2-DCO port and Active/Link LED
2	CFP2-DCO port and Active/Link LED	4	ATTN LED

1-port 100GE/200GE with CFP2-DCO + 2-Port 40GE or 100GE with QSFP+/QSFP28

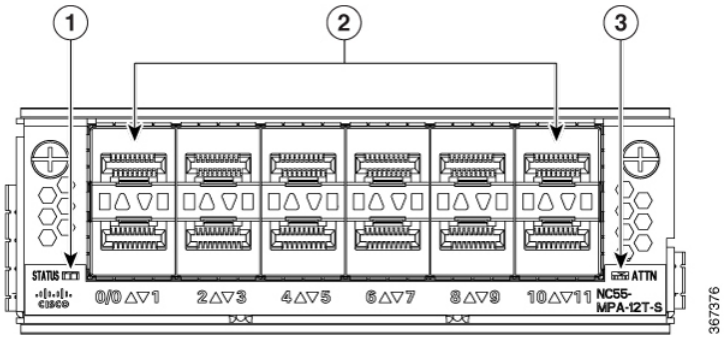
The 1-port 100GE/200GE + 2-Port 40GE/100GE combination MPA (NC55-MPA-1TH2H-S) provides 1 port for CFP2-DCO transceivers and 2 ports for 4x25GE (via cable breakout), QSFP+ (40Gbps) or QSFP28 (100Gbps) transceivers.



1	STATUS LED	3	CFP2-DCO port and Active/Link LED
2	QSFP port and Active/Link LED	4	ATTN LED

12-Port 10GE with SFP+

The 12-port 10GE MPA (NC55-MPA-12T-S) provides 12 ports for SFP+ transceivers.



1	STATUS LED	3	ATTN LED
2	SFP+ ports and LEDs		

Note The NCS-57C3 routers support 12-port 10GE MPA (NC55-MPA-12T-S); however, MPA slots 2 and 3 do not support 1G interfaces. On slot 1, ports 0-3 and 8-11 only support 1G. MACSec is not supported on these 1G interfaces.

4-Port 800GE MPA with QSFP28/QSFP-DD

Table 1: Feature History Table

Hardware	Release Information	Description
NC57-MPA-2D4H-S modular port adapter	Release 7.4.1	This release introduces a 4-port 800GE modular port adapter (NC57-MPA-2D4H-S) that supports QSFP28 and QSFP-DD optical transceivers. This MPA is supported in the NCS-55A2-MOD and NCS-57C3-MOD routers. This is the first modular port adapter to support the QSFP-DD optical transceiver.

The NC57-MPA-2D4H-S modular port adapter supports QSFP28 and QSFP-DD optical transceivers in the following configurations:

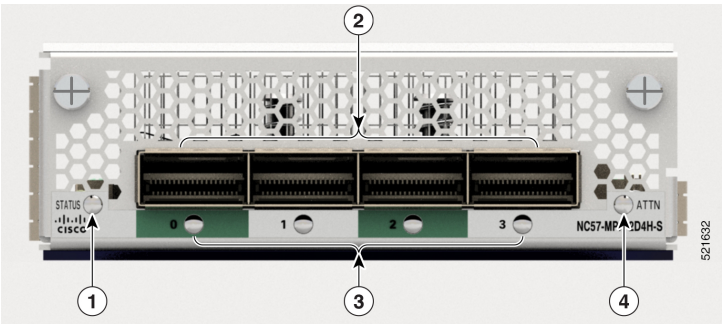
- Only one QDD-400GE transceiver is supported through port 0 in both the MPA slots of the NCS-55A2-MOD-HD-S, NC55-55A2-MOD-SE-S, NCS-55A2-MOD-S, or NCS-55A2-MOD-HX-S chassis.

The NC57-MPA-2D4H-S modular port adapter supports the following configurations of optical transceivers while operating on NC55-MOD-A-SE-S and NC57-MOD-S line cards.

Transceiver	MPA slot 1	MPA slot 2
	• Max bandwidth on NC55-MOD-A-SE-S line card = 400GE • Max bandwidth on NC57-MOD-S line card = 800GE	• Max bandwidth on NC55-MOD-A-SE-S line card = 400GE • Max bandwidth on NC57-MOD-S line card = 800GE
QSFP28-100GE	All ports	All ports
QDD-2x100GE	• On NC55-MOD-A-SE-S line card - Ports 0 and 2 **Note** When QDD-2x100GE transceivers are installed in ports 0 and 2, then ports 1 and 3 cannot be used. • On NC57-MOD-S line card - All ports	• On NC55-MOD-A-SE-S line card - Ports 0 and 2 **Note** When QDD-2x100GE transceivers are installed in ports 0 and 2, then ports 1 and 3 cannot be used. • On NC57-MOD-S line card - All ports

Transceiver	MPA slot 1	MPA slot 2
QDD-3x100GE	• On NC55-MOD-A-SE-S line card - Port 0 **Note** When QDD-3x100GE transceivers are installed in port 0, then ports 1, 2 and 3 cannot be used. • On NC57-MOD-S line card - Ports 0 and 2 **Note** When QDD-3x100GE transceivers are installed in ports 0 and 2, then ports 1 and 3 cannot be used.	• On NC55-MOD-A-SE-S line card - Port 0 **Note** When QDD-3x100GE transceivers are installed in port 0, then ports 1, 2 and 3 cannot be used. • On NC57-MOD-S line card - Ports 0 and 2 **Note** When QDD-3x100GE transceivers are installed in ports 0 and 2, then ports 1 and 3 cannot be used.
QDD-400GE	• On NC55-MOD-A-SE-S line card - Not supported • On NC57-MOD-S line card - Ports 0 and 2 **Note** When QDD-400GE transceivers are installed in ports 0 and 2, then ports 1 and 3 cannot be used.	• On NC55-MOD-A-SE-S line card - Not supported • On NC57-MOD-S line card - Ports 0 and 2 **Note** When QDD-400GE transceivers are installed in ports 0 and 2, then ports 1 and 3 cannot be used.
QDD-4x100GE	• On NC55-MOD-A-SE-S line card - Port 0 **Note** When QDD-4x100GE transceivers are installed in port 0, then ports 1, 2 and 3 cannot be used. • On NC57-MOD-S line card - Ports 0 and 2 **Note** When QDD-4x100GE transceivers are installed in ports 0 and 2, then ports 1 and 3 cannot be used.	• On NC55-MOD-A-SE-S line card - Port 0 **Note** When QDD-4x100GE transceivers are installed in port 0, then ports 1, 2 and 3 cannot be used. • On NC57-MOD-S line card - Ports 0 and 2 **Note** When QDD-4x100GE transceivers are installed in ports 0 and 2, then ports 1 and 3 cannot be used.

Figure 1: NC57-MPA-2D4H-S Modular Port Adapter (MPA)



1	STATUS LED	3	Active/Link LED

2	QSFP28/QSFP-DD port and LED	4	ATTN LED

12-Port 10GE/25GE/50GE MPA with SFP+/SFP28/SFP56

Table 2: Feature History Table

Hardware	Release Information	Feature Description
NCS57-MPA-12L-S modular port adapter	Release 7.6.1	A 12-port 600GE modular port adapter that supports SFP+, SPF28, and SFP56 optical transceivers, the NCS57-MPA-12L-S operates in 10GE, 25GE, and 50GE modes. The following command is modified to add support for the 50GE mode for even-numbered ports (port 4, port 6, port 8, and port 10): • **hw-module port-range** For more information, see the Cisco Network Convergence System 5700 Series: Modular Port Adapters Data Sheet.

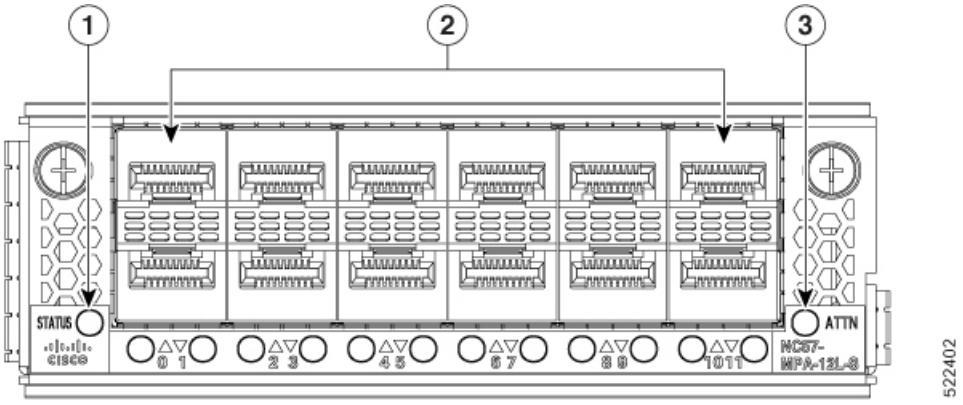
The NCS57-MPA-12L-S modular port adapter supports SFP+, SFP28 and SFP56 optical transceivers in these configurations:

Table 3: Supported SFP optical transceiver configurations

Port	MPA in NCS-55A2-MOD-SE-S
	Maximum bandwidth per MPA = 400GE
0 and 1	• 10G using **hw-module quad** command • 25G • 50G • Combination of 25G and 50G **Note** Combination of 10G with 25G or 50G is not supported.
2 and 3	

4, 5, 6 and 7	• 10G using **hw-module quad** command • 25G • Combination of 25G and 50G **Note** 50G can be enabled on even-numbered ports using **hw-module port-range** and the subsequent odd port will be disabled. **Note** Combination of 10G with 25G or 50G is not supported.
8, 9, 10 and 11	

Figure 2: NCS57-MPA-12L-S Modular Port Adapter (MPA)



1	STATUS LED	3	ATTN LED
2	SFP56 ports and LEDs		

8-Port MPA with SFP+

Table 4: Feature History Table

Hardware	Release Information	Description
NC55-OIP-02 Modular Port Adapter	Release 7.7.1	An 8-port MPA (NC55-OIP-02) that supports SFP+ optical transceivers, this MPA is available for the NC55A2-MOD-S and NC57C3-MOD-SYS routers. It supports the following port mode options: • Ethernet • FC • OTN • SDH • SONET The **port-mode** command is introduced to configure port mode option. For more information on PLE, see Private Line Emulation over EVPN-VPWS Single Homed section of the *L2VPN and Ethernet Services Configuration Guide for Cisco NCS 5500 Series Routers, IOS XR Release 7.7.x*. For more information on the MPA, see the Cisco Network Convergence System 5700 Series: Modular Port Adapters Data Sheet.

The NC55-OIP-02 modular port adapter supports SFP+ optical transceivers. The MPA supports the following port mode options:

- Ethernet - 1GbE and 10GbE
- Fiber channel (FC) - 1G, 2G, 4G, 8G, 16G, and 32G
- Optical Transport Network (OTN) - OTU2 and OTU2e
- Synchronous Digital Hierarchy (SDH) - STM16 and STM64
- SONET - OC48 and OC192

Note The NC55-OIP-02 supports circuit emulation (CEM) and does not support L3 VPN service termination.

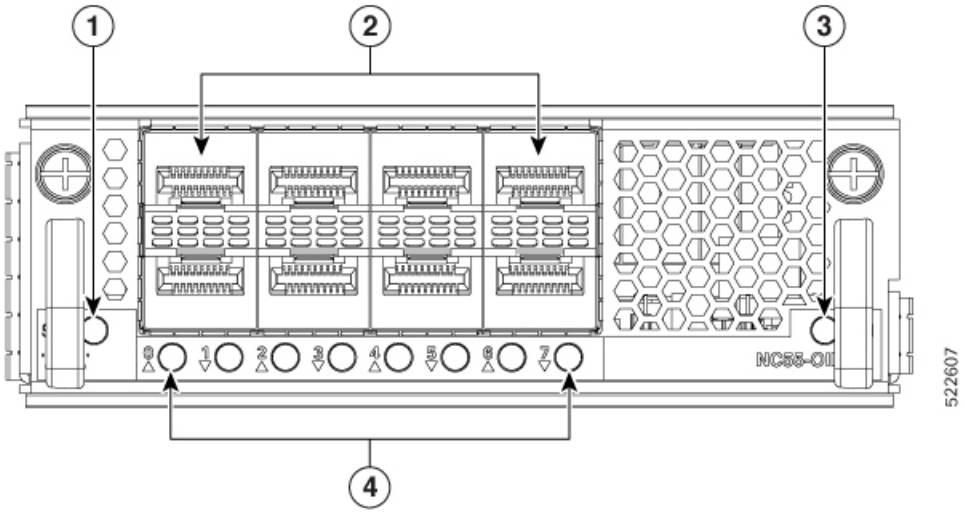
The MPA supports the following data rates:

Table 5: Port mode data rate options

Port mode	Data rate
1GbE	1.25 Gbps
10GbE	10.3125 Gbps
OC48	2.48832 Gbps
OC192	9.95328 Gbps
OTU2	10.709 Gbps
OTU2e	11.0957 Gbps
STM16	2.48 Gbps
STM64	9.95 Gbps
FC1	1.0625 Gbps
FC2	2.125 Gbps
FC4	4.25 Gbps
FC8	8.5 Gbps
FC16	14.025 Gbps
FC32	28.05 Gbps

Note Port mode FC32 is supported only on the even ports (Port 0, 2, 4, and 6) of the MPA.

Figure 3: NC55-OIP-02 Modular Port Adapter (MPA)



1	STATUS LED	3	ATTN LED
2	SFP+ port	4	Active/Link LED

GNSS Port

The routers that support GNSS receiver are:

- NCS-55A2-MOD-S
- NCS-55A2-MOD-HD-S
- NCS-55A2-MOD-HX-S
- NCS-55A2-MOD-SE-S
- NCS-55A1-48Q6H
- NCS-55A1-24Q6H-S
- NCS-55A1-24Q6H-SS

The built-in Global Navigation Satellite System (GNSS) port enables the router to determine its own location and get an accurate time from satellites.

GNSS Port RF Input Requirements

- The GNSS port requires an active GPS/GNSS antenna with built-in Low-Noise Amplifier (LNA) for optimal performance. The antenna LNA amplifies the received satellite signals for two purposes:
  - Compensation of losses on the cable
  - Lifting the signal amplitude in the suitable range for the receiver frontend

The Amplification required is 22dB gain + cable/connector loss + Splitter signal loss.

The recommended range of LNA gain (LNA gain minus all cable and connector losses) at the connector of the receiver module is 22dB to 30dB with a minimum of 20dB and a maximum of 35dB.

- GNSS port provides 5V to the active antenna through the same RF input.
- Surge requirement:
  - GNSS port has built-in ESD protections on all pins, including the RF-input pin. However, additional surge protection may be required if rooftop antennas are being connected, to meet the regulations and standards for lightning protection in the countries where the end-product is installed.
  - A lightning protection must be mounted at the place where the antenna cable enters the building. The primary lightning protection must be capable of conducting all potentially dangerous electrical energy to PE (Protective Earth).
  - Surge arrestors should support DC-pass and suitable for the GPS frequency range (1.575GHz) with low attenuation.
- Antenna Sky visibility:
  - GPS signals can only be received on a direct line of sight between antenna and satellite. The antenna must have a clear view of the sky. For proper timing, minimum of four satellites should be locked.



Note The antenna terminal should be earthed at the building entrance in accordance with the ANSI/NFPA 70, the National Electrical Code (NEC), in particular Section 820.93, Grounding of Outer Conductive Shield of a Coaxial Cable.

- Use a passive splitter if more than one GNSS ports are fed from a single antenna.



Note The splitter should have all the RF ports capable of DC-pass, if the antenna needs to feed power from GNSS module.

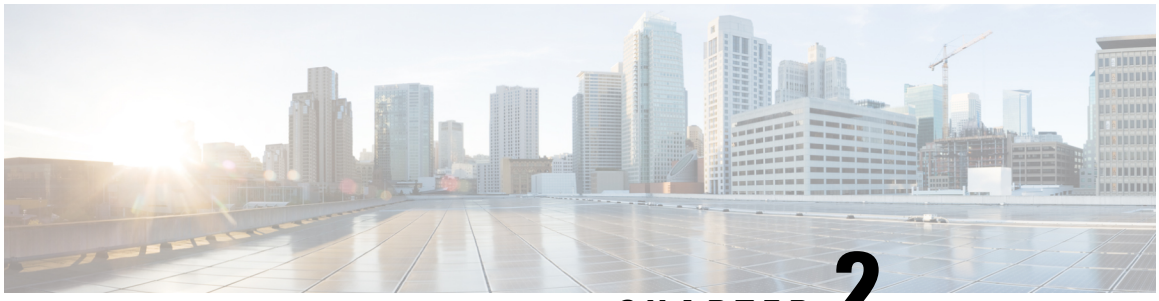
External Alarm Inputs

The router supports four dry contact alarm inputs through an RJ-45 jack on the front panel. The alarm port is present on the following routers:

- NCS-55A2-MOD-HD-S
- NCS-55A2-MOD-HX-S
- NC55A2-MOD-SE-H-S

It is normally in Open state to indicate that no current flows through the alarm circuit and the alarm is generated when the current is flowing.

Each alarm input can be provisioned as critical, major, or minor.



CHAPTER 2

Prepare for Installation

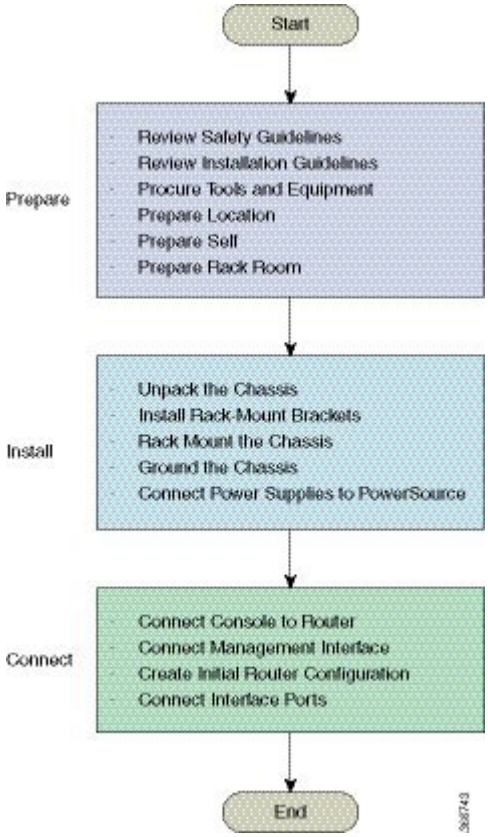
Note The images in this chapter are only for representation purposes, unless specified otherwise. The chassis' actual appearance and size may vary.

- Review Installation Roadmap, on page 15
- Review Safety Guidelines, on page 16
- Cautions and Regulatory Compliance Statements for NEBS, on page 17
- Review Site Selection Guidelines, on page 18
- Review Installation Guidelines, on page 20
- Procure Tools and Equipment, on page 23
- Accessory Kits for Fixed Port Routers, on page 24
- Prepare Your Location , on page 25
- Prepare Yourself , on page 26
- Prepare Rack for Chassis Installation, on page 28

Review Installation Roadmap

The figure, Installation Workflow, lists the steps to install Cisco NCS 5500 Series fixed-port chassis and its components and prepare the system for operation. Use this workflow as a reference to ensure that all components are properly installed in the correct order. For information about a step, see the respective section of this installation guide.

Figure 4: 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 equipment. Because the guidelines do not include all hazards, be constantly 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-usage instructions.
- Be sure to power down a fixed configuration PDU or modular configuration power shelf before removing it from the chassis.
- If potentially hazardous conditions exist, do not work alone.
- Take care when connecting multiple 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 inspection authority or an electrician if you are uncertain about whether 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 slide the unit out for servicing. Failure to stabilize the rack may cause the rack to tip over.



Warning **Statement 1071—**Warning Definition

IMPORTANT SAFETY INSTRUCTIONS

Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Read the installation instructions before using, installing, or connecting the system to the power source. Use the statement number at the beginning of each warning statement to locate its translation in the translated safety warnings for this device.

SAVE THESE INSTRUCTIONS





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.

Cautions and Regulatory Compliance Statements for NEBS

The following are NEBS GR-1089-CORE cautions, regulatory compliance statements, and requirements:

- The intra-building port(s) of the equipment or subassembly must use shielded intra-building cabling/wiring that is grounded at both ends.

Caution The intra-building port(s) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building port(s) of the equipment or subassembly must not be metallically connected to interfaces which connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection in order to connect these interfaces metallically to OSP wiring.

- Products that have AC power ports that are intended for deployments where an external Surge Protective Device (SPD) is utilized at the AC power service equipment (see definition in National Electric Code).
- This product is designed for a Common Bonding Network (CBN) installation.
- This product can be installed in network telecommunication facilities or locations where the National Electric Code applies.
- An electrical conducting path shall exist between the product chassis and the metal surface of the enclosure or rack in which it is mounted or to a grounding conductor. Electrical continuity shall be provided by using thread-forming type mounting screws that remove any paint or nonconductive coatings and establish a metal-to-metal contact. Any paint or other nonconductive coatings shall be removed on the surfaces between the mounting hardware and the enclosure or rack. The surfaces shall be cleaned and an antioxidant applied before installation.
- The DC return connection to this system should remain isolated from the system frame and chassis (DC-I).
- The nominal DC operating voltage -48 VDC.

Review Site Selection Guidelines

This equipment requires specific environmental operating conditions such as temperature, humidity, altitude, and vibration for better performance and reliability. The following sections provide guidelines for installation of the equipment to ensure operating conditions are within specified limits mentioned in the *Cisco Network Convergence System 5500 Series: 55A2 Chassis Data Sheet*. There are two categories of installation sites: Central Office and Outside Plant.

Central Offices (COs) and Similar Facilities

- Equipment qualified for GR-63-CORE is intended for installation in Central Offices (COs) and similar facilities.
- Temperature and humidity levels of central offices shall be as per GR-63-CORE - Issue 5, Table 4-4 and Figure 4-1. Maximum allowable temperature and humidity levels must be within the values mentioned in the data sheets. Always maintain absolute humidity levels less than 0.024 Kg of water vapor/Kg of dry air. We do not recommend installations where condensation may occur or where equipment is exposed to high humidity for long duration.
- Environmental pollutant limits of central offices shall be as per GR-63-CORE Table 2-4.

Outside Plant Installation (OSP)

- Equipment qualified for GR-3108-CORE is intended for installation in outside plant applications (OSP).
- Temperature and humidity levels of OSP installation sites shall be as per GR-3108-CORE Table 1-1. Maximum allowable inlet air temperature and humidity levels must be within the values mentioned in the data sheets. Environments with relative humidity above 85% or where condensation may occur is not acceptable for equipment qualified for GR-3108-CORE Class 1 and 2.
- Environmental pollutant limits of OSP sites shall be as per GR-63-CORE Table 2-3.
- See the Review Outside Plant (OSP) Guidelines, on page 19 for additional information.

Note We recommended that you check the concentration of pollutants periodically at CO and OSP sites. Equipment should be provided with necessary protection to ensure it is not exposed to high concentration level of pollutants.

Caution Installation in highly corrosive areas is not recommended. Examples of highly corrosive areas include: near the sea, rivers, and large bodies of water where high humidity persist for long peroids of time; highly polluted areas such as sites less than 10 meters from high traffic roadways; areas with high industrial pollutants.

Caution Equipment should be provided with necessary protection against insects, pests, etc.

Review Outside Plant (OSP) Guidelines

The following sections provide guidelines for the NCS 55A2 temperature-hardened, conformal coated chassis (NCS-55A2-MOD-HX-S, NC55A2-MOD-SE-H-S) for outside plant installation (OSP).

Cabinet Selection Guidelines

For an outside plant installation, it is required that the equipment be protected against airborne contaminants, dust, moisture, insects, pests, corrosive gases, polluted air, or other reactive elements present in the outside air. The table below provides guidelines for cabinet selection.

	Central Office (CO)	Outside Plant (OSP)
Open rack with no front and rear doors	Yes	No
Ventilated cabinets with normal air filter at intake and fans	Yes	No
Sealed cabinets with heat exchanger, meeting NEMA-4/IP66 or IP65 protection	Yes	Yes

	Central Office (CO)	Outside Plant (OSP)
Sealed cabinets with air-conditioners, meeting NEMA-4/IP66 or IP65 protection	Yes	Yes

Equipment (PID) Selection Guidelines

Data sheet provides details of PID, respective maximum operating conditions and standards that equipment comply with. This section provides guidelines of selection of PID based on environmental conditions. Below table shows PIDs and environmental conditions in which it can be installed.

PID	Central Office (CO)	Outside Plant (OSP)
NCS-55A2-MOD-S	Yes	No
NCS-55A2-MOD-SE-S	Yes	No
NCS-55A2-MOD-HD-S	Yes	No
NCS-55A2-MOD-HX-S	Yes	Yes
NC55A2-MOD-SE-H-S	Yes	Yes

Selection of Air Filter Box

Some sites may have high suspended dust concentration. Suspended dust flows into the air breathing equipment along with cooling and caus earlier failures. Air filters can be considered to minimize the course particles intrusion into the equipment and mitigate early failures. Table below show guidelines for selection of air filters.

	Central Office (CO)		Outside Plant (OSP)
Dust concentration levels	< 20µg/m3	>/= 20µg/m3	< 90µg/m3
NCS-55A2-FLTR-FW	Optional	Recommended	Recommended
Note µg/m3: Micrograms per cubic meter			

Air Filter Maintenance

A periodic health check of the filter, every three months based on the level of dust in the environment, helps in avoiding over clogging of the filters and provide a better life. This product's filter is used as a single-use component. If the product is installed in a controlled environment, check and replace the filter every three months, otherwise replace the filter every month with PID (NCS-55A2-FLTR=).

Review Installation Guidelines

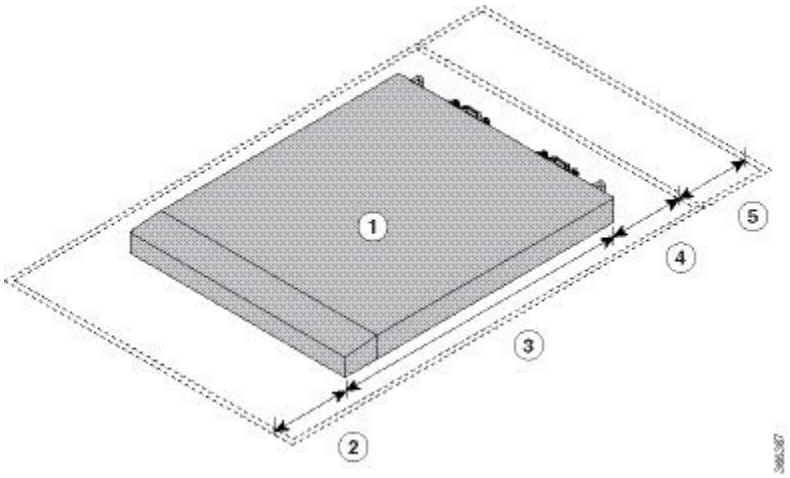
Before installing the chassis, verify that these guidelines are met:

- Site is properly prepared so that there is sufficient room for installation and maintenance. For specifications on the clearances required for chassis installation, see Clearance Requirements in a Solid Door Cabinet, on page 21.
- Operating environment is within the ranges listed in Environmental and Physical Specifications, on page 113
- 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 lighting fixtures. Make sure that the cabling is safely away from other devices that might damage the cables.
- For cable requirements for optical module connections, see the Transceivers, Connectors, and Cables, on page 113 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.

Clearance Requirements in a Solid Door Cabinet

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 at room temperature up to 55C, and leave at least 4.0 in. (10.16 cm) front and rear clearance for air intake/exhaust at room temperature up to 40C. Leave an additional 6.0 in. (15.24 cm)/4.0 in. (10.16 cm) rear clearance for removal and installation of power supplies and fan modules.

Figure 5: Clearances Required Around the Chassis



1	Chassis	4	• 6.0 in. (15.24 cm) front clearance for air intake/exhaust at room temperature up to 55C • 4.0 in. (10.16 cm) front clearance for air intake/exhaust at room temperature up to 40C

2	• 6.0 in. (15.24 cm) front clearance for air intake/exhaust at room temperature up to 55C • 4.0 in. (10.16 cm) front clearance for air intake/exhaust at room temperature up to 40C	5	Additional 6.0 in. (15.24 cm)/4.0 in. (10.16 cm) rear clearance for removal and installation of power supplies and fan modules.
3	Chassis depth		



Note Clearance for air intake and exhaust is not required if the fixed-port chassis is placed inside perforated door cabinet or an open cabinet.

Clearance Requirements for Outside Plant Enclosure (OSP)

NCS-55A2-MOD-HX-S and NC55A2-MOD-SE-H-S are temperature-hardened, conformal coated chassis that can be installed in OPT enclosures. Observe the following clearance requirements when installing these chassis in OSP enclosures:

Installation and Options	Front Clearance	Rear Clearance
Chassis with slider and air filter box, with 1RU space between chassis	6 in. (152.4 mm) @ 158°F (70°C)	2 in. (50.8 mm) @ 158°F (70°C)
Chassis with bracket and air filter box, with 1RU space between chassis		
Chassis with bracket, with 1RU space between chassis		
Chassis with slider and air filter box, with no space between chassis	6 in. (152.4 mm) @ 158°F (70°C)	2 in. (50.8 mm) @ all temperatures
Chassis with bracket and air filter box, with no space between chassis		
Chassis with bracket, with no space between chassis		

Installation and Options	Front Clearance	Rear Clearance
Note • The temperatures are measured at the air inlet to the equipment. • The temperatures are valid at sea level. The maximum allowable temperatures are reduced at higher altitudes. Altitude derating 1°C for every 300m. • The above mentioned maximum allowable temperatures assume that all optics are I-Temp (industrial grade) optics with allowable optics case temperature up to 85°C. • In case of a single fan failure, the maximum allowable temperature will be less than specified. • In case the air filter is clogged, the temperature alarm may be raised at temperatures below the listed temperatures.		

Airflow Direction

The airflow through the fan trays and power supplies on the Cisco NCS 5500 series router is either from the port side exhaust or the port side intake, depending on how the modules were ordered. To ensure proper airflow, you must make sure that when you install the router its air intake is positioned in a cold aisle and the air exhaust is positioned in a hot aisle.

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
- 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)

Accessory Kits for Fixed Port Routers

The following table contains the accessory kit PIDs and the items present in the accessory kits of the fixed port routers. The rack mount kit present in the accessory kit contains the screws and brackets required for installation.

Table 6: Accessory Kits Information

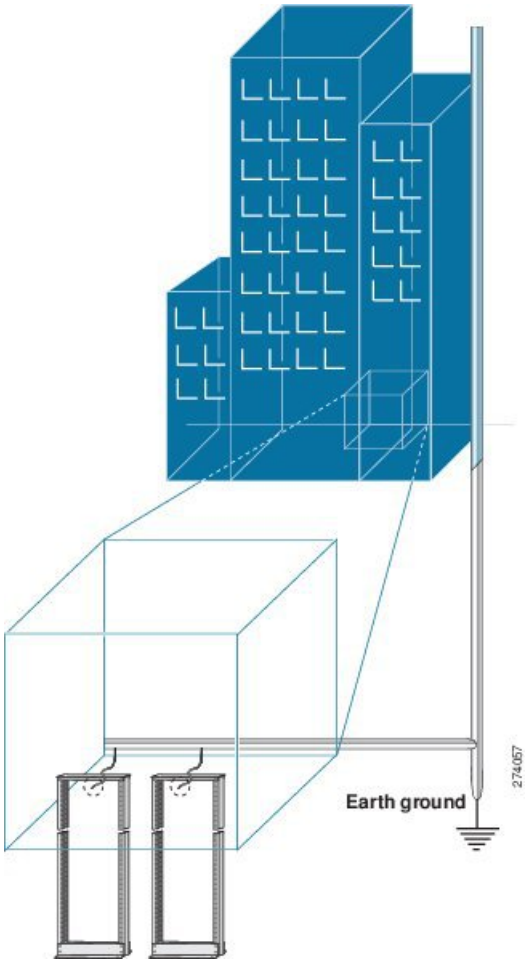
Router	Accessory Kit-1	Items in Accessory Kit -1	Accessory Kit – 2 (NEBS)	Items in Accessory Kit-2
Cisco NCS-55A1-24H	NCS-1RU-ACC-KIT	Rack mount kit and ground lug kit	NC55-24H-NEBS-KIT	Rack mount kit, ground lug kit, and air baffle for NEBS
Cisco NCS 5501	NCS-1RU-ACC-KIT	Rack mount kit and ground lug kit	NCS-1RU-NEBS-KIT	Rack mount kit, ground lug kit, and air baffle for NEBS
Cisco NCS 5501-SE	NCS-1RU-ACC-KIT	Rack mount kit and ground lug kit	NCS-1RU-NEBS-KIT	Rack mount kit, ground lug kit, ground bracket, and air baffle for NEBS
Cisco NCS-55A1-48Q6H	NCS-1RU-ACC-KIT	Rack mount kit and ground lug kit	-	-
Cisco NCS-55A1-24Q6H-S	NCS-1RU-ACC-KIT	Rack mount kit and ground lug kit	-	-
Cisco NCS-55A1-24Q6H-SS	NCS-1RU-ACC-KIT	Rack mount kit and ground lug kit	-	-
Cisco NCS 55A1-36H-S	NC55-A1-ACC-KIT	Rack mount kit and ground lug kit	NC55-A1-NEBS-KIT	Rack mount kit, ground lug kit, ground bracket, and air baffle for NEBS
Cisco NCS 55A1-36H-SE-S	NC55-A1-ACC-KIT	Rack mount kit and ground lug kit	NC55-A1-NEBS-KIT	Rack mount kit, ground lug kit, ground bracket, and air baffle for NEBS
Cisco NCS 5502	NCS-2RU-ACC-KIT	Rack mount kit and ground lug kit	-	-
Cisco NCS 5502-SE	NCS-2RU-ACC-KIT	Rack mount kit and ground lug kit	-	-
Cisco NCS 55A2-MOD-S	NCS-2RU-ACC-KIT	Rack mount kit and ground lug kit	-	-

Router	Accessory Kit-1	Items in Accessory Kit -1	Accessory Kit – 2 (NEBS)	Items in Accessory Kit-2
Cisco 55A2-MOD-HD-S	NCS-2RU-ACC-KIT	Rack mount kit and ground lug kit	-	-
Cisco NCS 55A2-MOD-SE-S	NCS-2RU-ACC-KIT	Rack mount kit and ground lug kit	-	-
Cisco NCS-55A2-MOD-HX-S	NC55-2RU-ACCX-KIT	Conformal Coated Rack mount kit and ground lug kit	-	-
Cisco NC55A2-MOD-SE-H-S	NC55-2RU-ACCX-KIT	Conformal Coated Rack mount kit and ground lug kit	-	-

Prepare Your Location

This section illustrates how the building that houses the chassis must be properly grounded to the earth ground.

Figure 6: 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 cuff to the ground. ESD wrist straps are the primary means of controlling static charge on personnel.

Figure 7: Wearing the ESD Strap

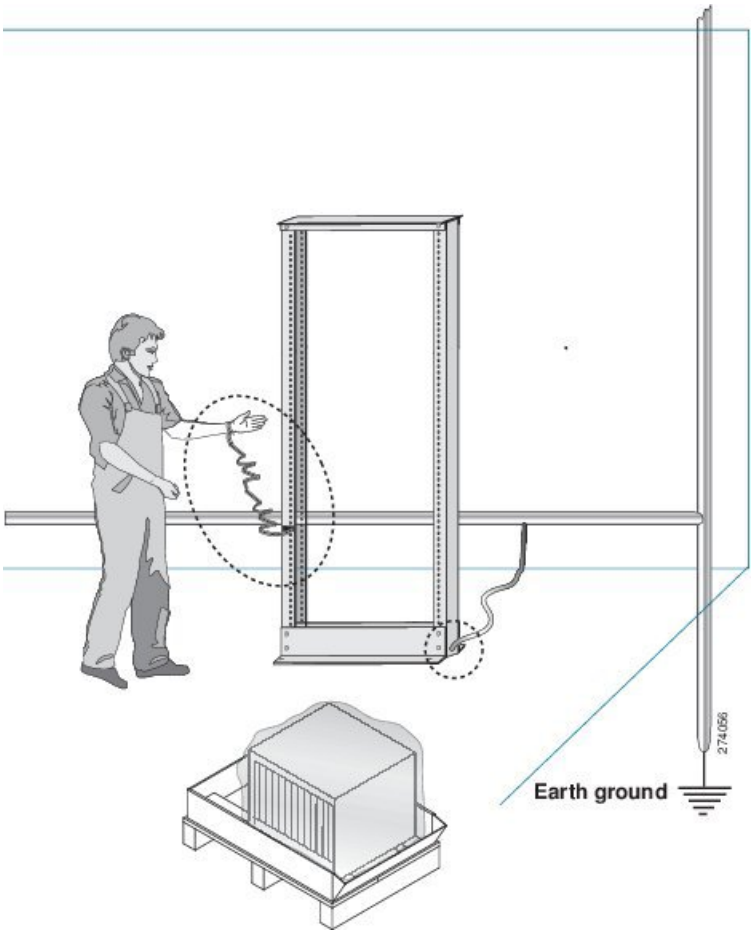
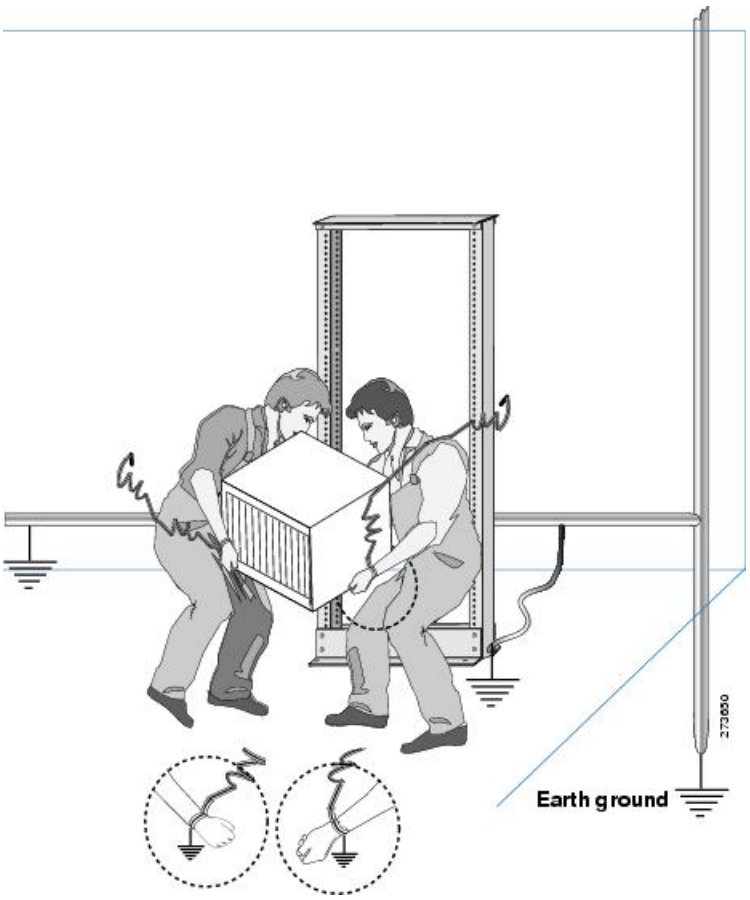


Figure 8: Handling the Chassis



Prepare Rack for Chassis Installation

Install the NCS 5500 Series chassis into a standard 19-inch, four-post Electronic Industries Alliance (EIA) cabinet or rack with mounting rails that conform to English universal hole spacing per section 1 of the ANSI/EIA-310-D-1992 standard.

The spacing between the posts of the rack must be wide enough to accommodate the width of the chassis.

Figure 9: Rack Specification EIA (19 inches and 23 inches)

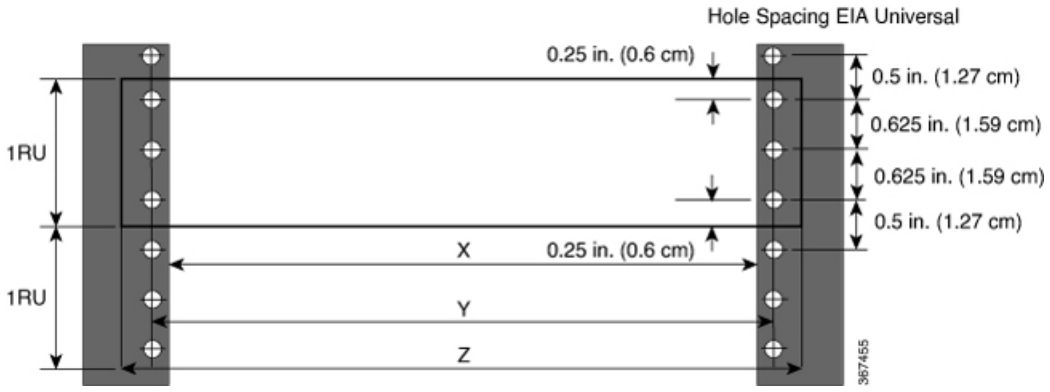


Table 7: Rack specification EIA (19 inches and 23 inches)

Post Type	Rack Type	Rack Front Opening (X)	Rack Mounting Hole Center-Center (Y)	Mounting Flange Dimension (Z)
4 Post	19 inches (48.3 centimeters)	450.8mm (17.75”)	465mm (18.312”)	482.6mm (19”)
2 Post				
4 Post	23 inches (58.4 centimeters)	552.45mm (21.75”)	566.7mm (22.312”)	584.2mm (23”)
2 Post				

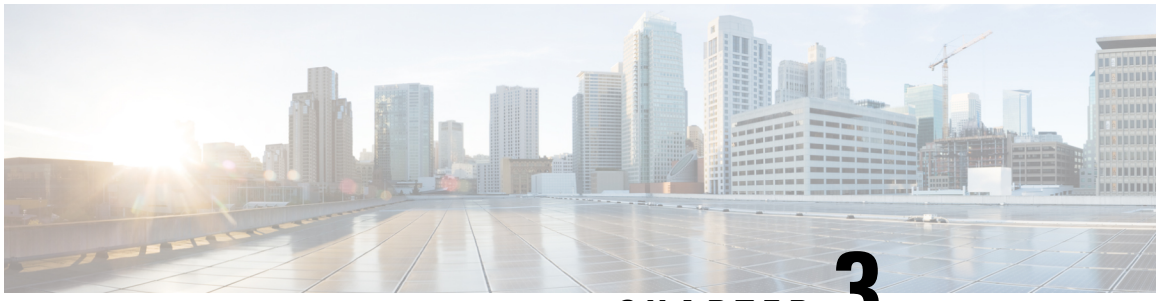
Before you move the chassis or mount the chassis into the rack, we recommend that you do the following:

Procedure

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 25.

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 bolting 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.



CHAPTER 3

Install the Chassis

Note The images in this chapter are only for representation purposes, unless specified otherwise. The chassis' actual appearance and size may vary.

- Rack Mount the Chassis, on page 31
- Install the Air Filter , on page 55
- Installing the Air Filter to the Chassis on a 4-Post Rack, on page 56
- Installing the Air Filter to the Chassis on a 2-Post Rack (Port Side Inlet), on page 58
- Ground the Chassis, on page 60
- Connect AC Power to the Chassis, on page 63
- Connect DC Power to the Chassis, on page 64

Rack Mount the Chassis

The chassis can be mounted on a 4-post or a 2-post rack based on the type of the chassis and the rack requirement.

- **4-Post Rack**-The following sections explain the mounting of the chassis on a 4-post rack:
  - Rack-Mount the Chassis in a 4-Post Rack — Procedure 1, on page 32- Contains the procedures for mounting the Cisco NCS-55A1-24H, Cisco NCS 5501, Cisco NCS 5501-SE, Cisco NCS-55A1-48Q6H, Cisco NCS-55A1-24Q6H-S, Cisco NCS-55A1-24Q6H-SS, Cisco NCS 55A1-36H-S, Cisco NCS 55A1-36H-SE-S, Cisco NCS 5502, and Cisco NCS 5502-SE chassis.

    To mount the Cisco NCS 55A2-MOD-S, Cisco 55A2-MOD-HD-S, Cisco NCS 55A2-MOD-SE-S, Cisco NCS-55A2-MOD-HX-S, and Cisco NC55A2-MOD-SE-H-S chassis on the front post of the 4-post rack, follow the steps in Rack Mount the Chassis in a 2 Post Rack — Procedure 2, on page 53.

  - Rack Mount the Chassis in a 4-Post Rack — Procedure 2, on page 40- Contains the procedures for mounting the Cisco NCS-55A2-MOD-HD-S, Cisco NCS-55A2-MOD-HX-S and Cisco NC55A2-MOD-SE-H-S chassis.

- **2-Post Rack**-The following sections explain the mounting of the chassis on a 2-post rack:

- Rack-Mount the Chassis in a 2-Post Rack — Procedure 1, on page 50- Contains procedures for mounting the Cisco NCS-55A1-24H, Cisco NCS 5501, Cisco NCS 5501-SE, Cisco NCS-55A1-24Q6H-S, and Cisco NCS-55A1-24Q6H-SS,
- Rack Mount the Chassis in a 2 Post Rack — Procedure 2, on page 53- Contains procedures for mounting the Cisco NCS-55A2-MOD-S, Cisco NCS-55A2-MOD-HD-S, Cisco NCS-55A2-MOD-SE-S, Cisco NCS-55A2-MOD-HX-S, and Cisco NC55A2-MOD-SE-H-S

Rack-Mount the Chassis in a 4-Post Rack — Procedure 1

This section describes how to use the rack-mount kit that is provided with the router to install the router in a 4-post rack.

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

Note To mount the Cisco NCS 55A2-MOD-S, Cisco 55A2-MOD-HD-S, Cisco NCS 55A2-MOD-SE-S, Cisco NCS-55A2-MOD-HX-S, and Cisco NC55A2-MOD-SE-H-S chassis on the front post of the 4-post rack, follow the steps in Rack Mount the Chassis in a 2 Post Rack — Procedure 2, on page 53.

The following table lists the items that are contained in the rack-mount kit.

Table 8: Cisco NCS-55A1-24H, Cisco NCS 5501, Cisco NCS 5501-SE, Cisco NCS-55A1-48Q6H, Cisco NCS-55A1-24Q6H-S, Cisco NCS-55A1-24Q6H-SS Router Rack-Mount Kit

Quantity	Part Description
2	Rack-mount brackets
12	M4 x 6-mm Phillips flat-head screws
2	M5 x 12mm Phillips pan-head screws
2	Rack-mount guides
2	Rack-mount slider rails
1	Grounding lug

Table 9: Cisco NCS 55A1-36H-S and Cisco NCS 55A1-36H-SE-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

Quantity	Part Description
2	Rack-mount guides
2	Rack-mount slider rails
1	Grounding cover plate
1	Grounding lug

Table 10: 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

Procedure

Step 1 Install the 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 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 fan and power supply modules are in the cold aisle.

Note
The Cisco NCS-55A1-24Q6H-SS module supports only port-side intake configuration.

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

Note
Cisco NCS 55A1-36H-S, Cisco NCS 55A1-36H-SE-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 brackets.

Note
You can align four of the holes in the rack-mount bracket to four of the screw holes on the front side of 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.

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, Cisco NCS-55A1-48Q6H, Cisco NCS-55A1-24Q6H-S, Cisco NCS-55A1-24Q6H-SS, and Cisco NCS 55A1-24H. However, Cisco NCS-55A1-48Q6H and Cisco NCS-55A1-24Q6H-S /Cisco NCS-55A1-24Q6H-SSdo not have a separate top plate; it is in-built in the system.

Figure 10: Rack-Mount Brackets on Cisco NCS 5501—Port-Side Intake

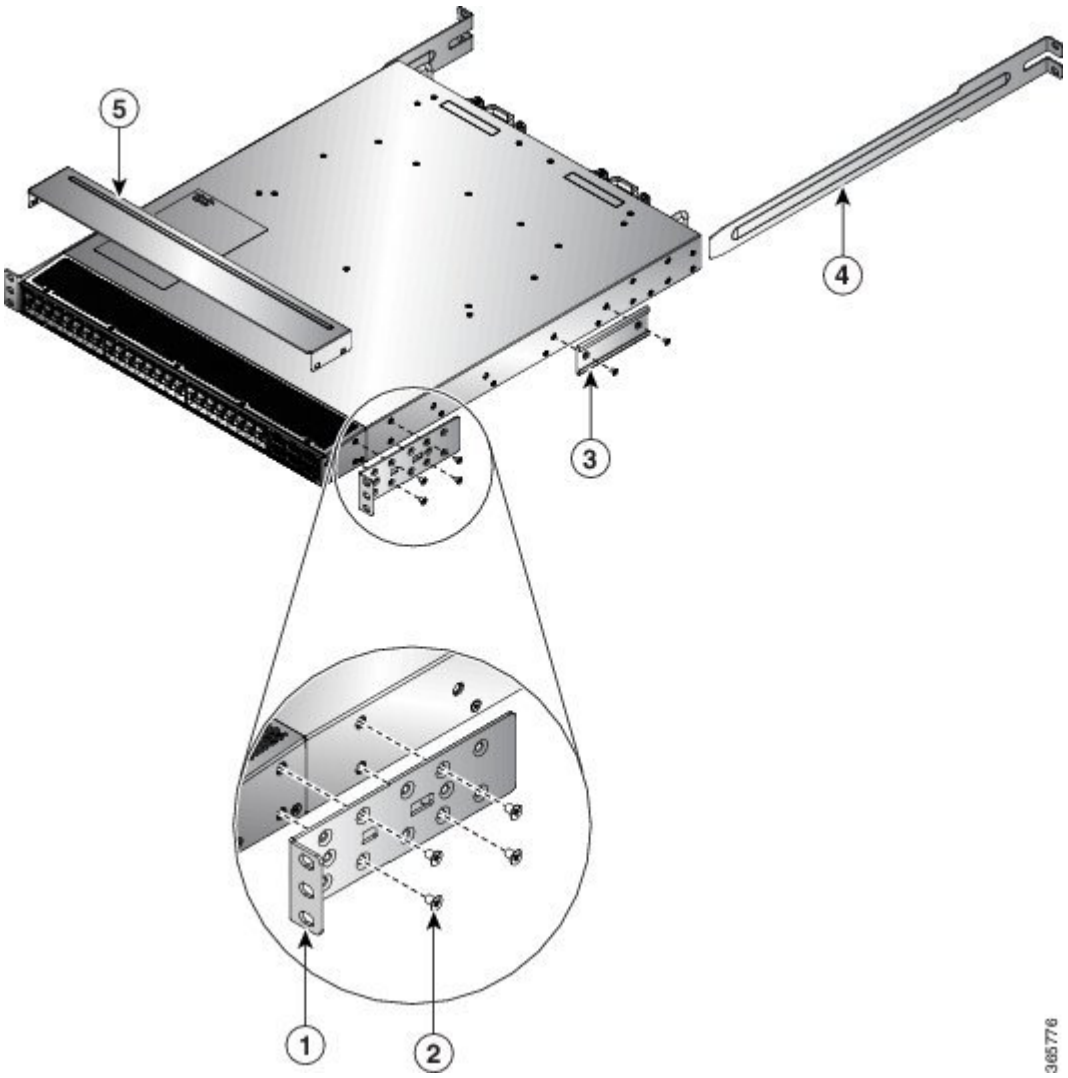
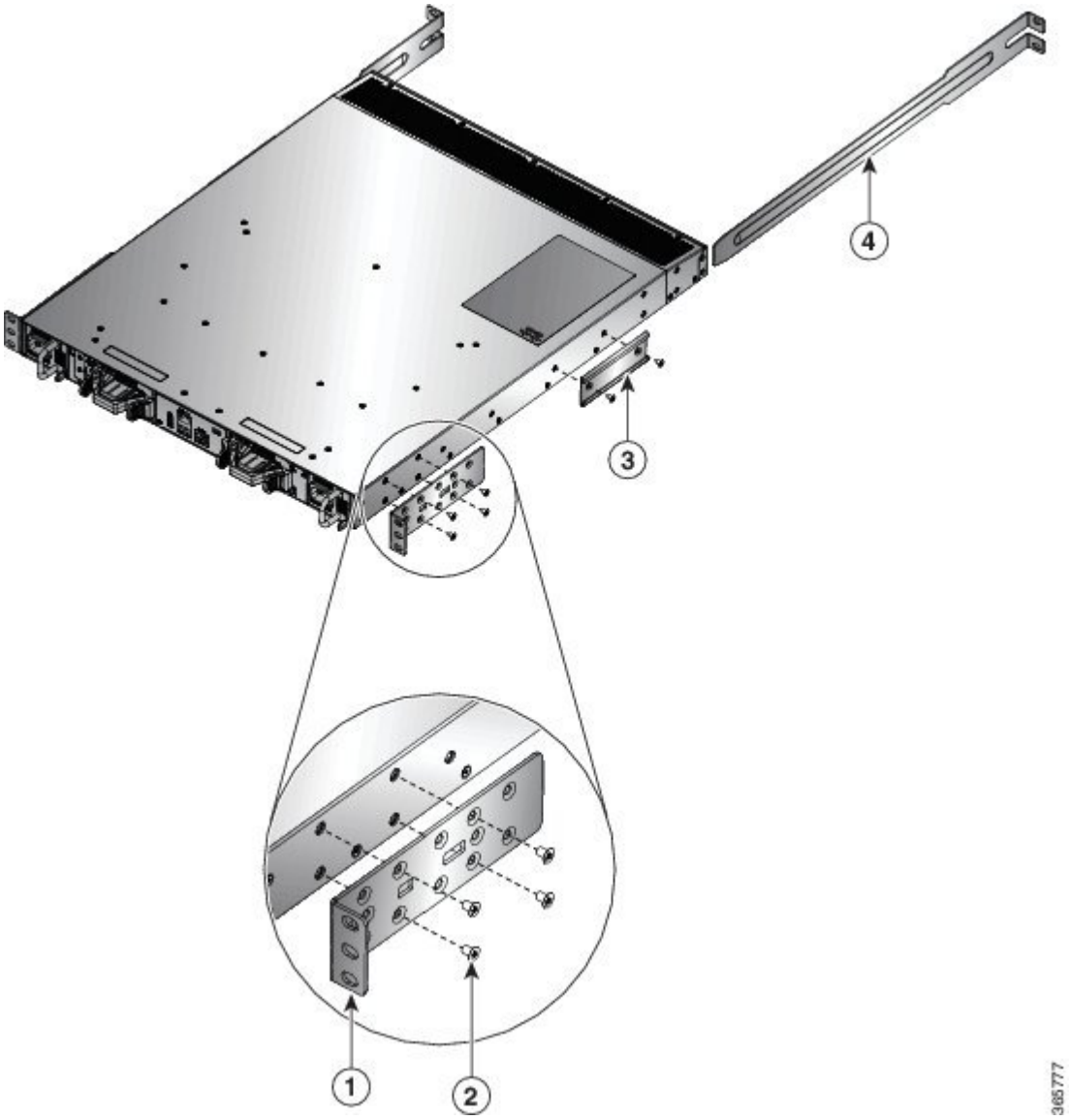


Figure 11: Rack-Mount Brackets on Cisco NCS 5501—Port-Side Exhaust



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

Figure 12: Rack-Mount Brackets on Cisco NCS 55A1-36H-S and Cisco NCS 55A1-36H-SE-S—Port-Side Intake

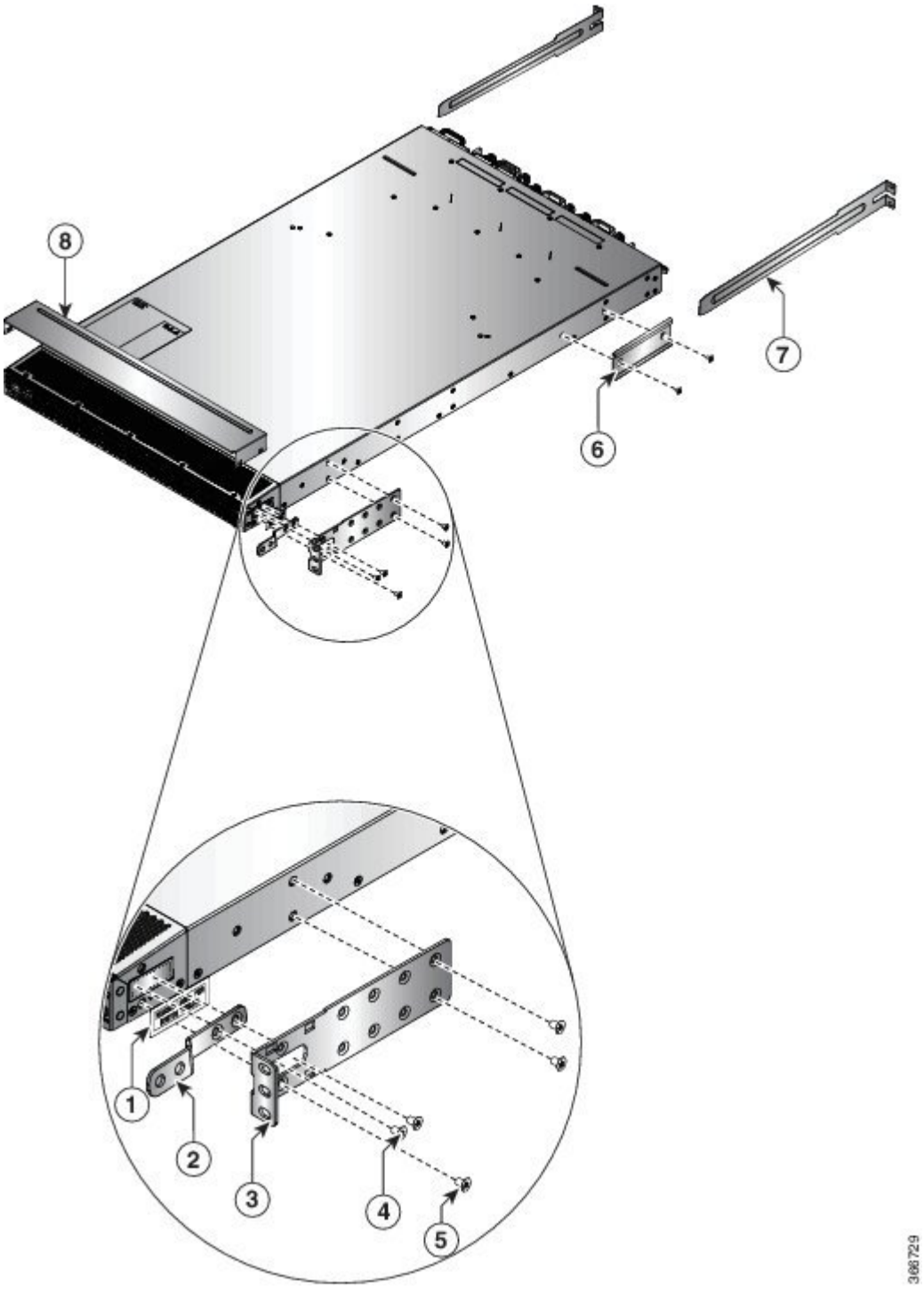
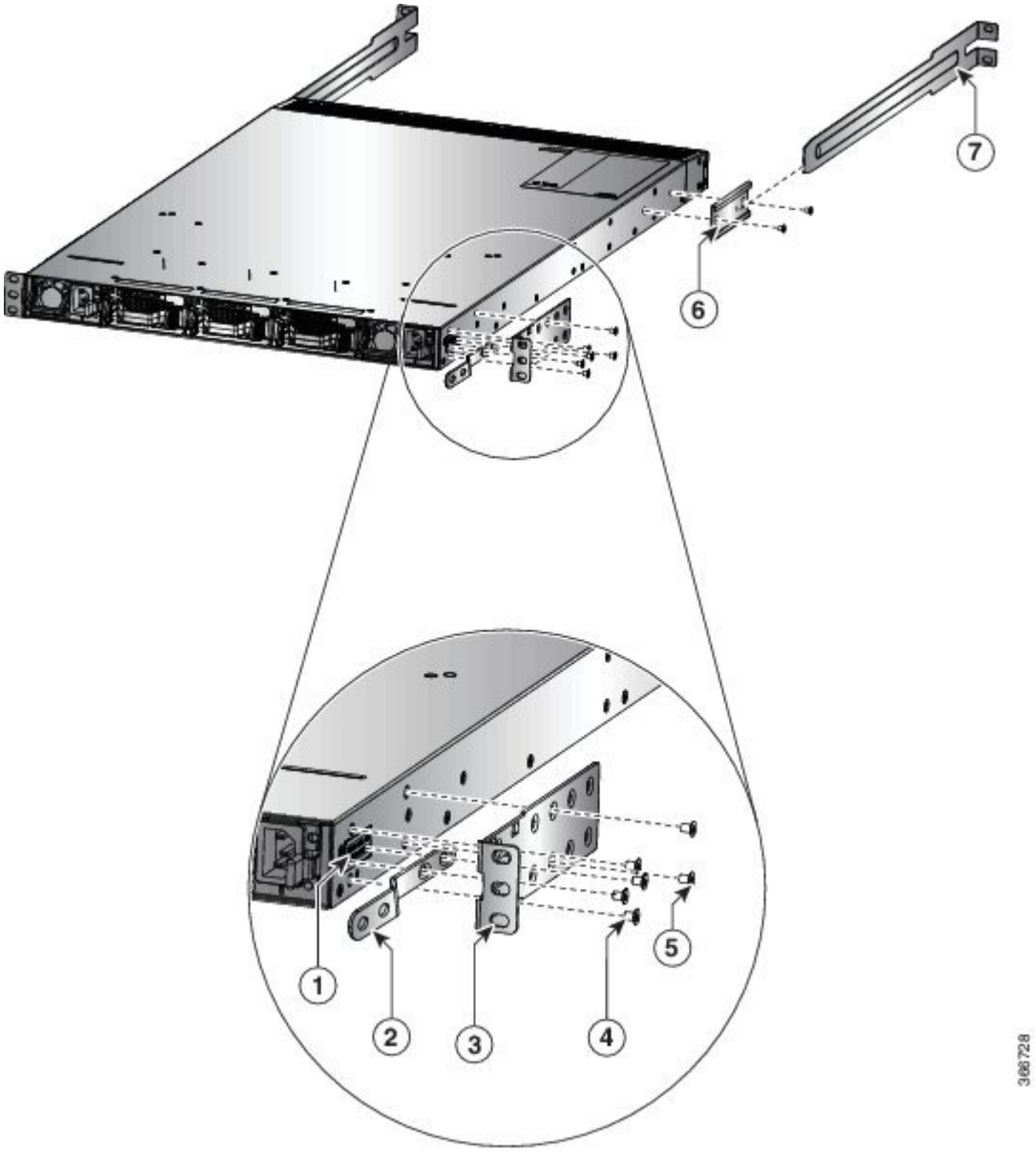


Figure 13: Rack-Mount Brackets on Cisco NCS 55A1-36H-S and Cisco NCS 55A1-36H-SE-S—Port-Side Exhaust



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

Figure 14: Rack-Mount Brackets on Cisco NCS 5502 and NCS 5502 SE—Port-Side Intake

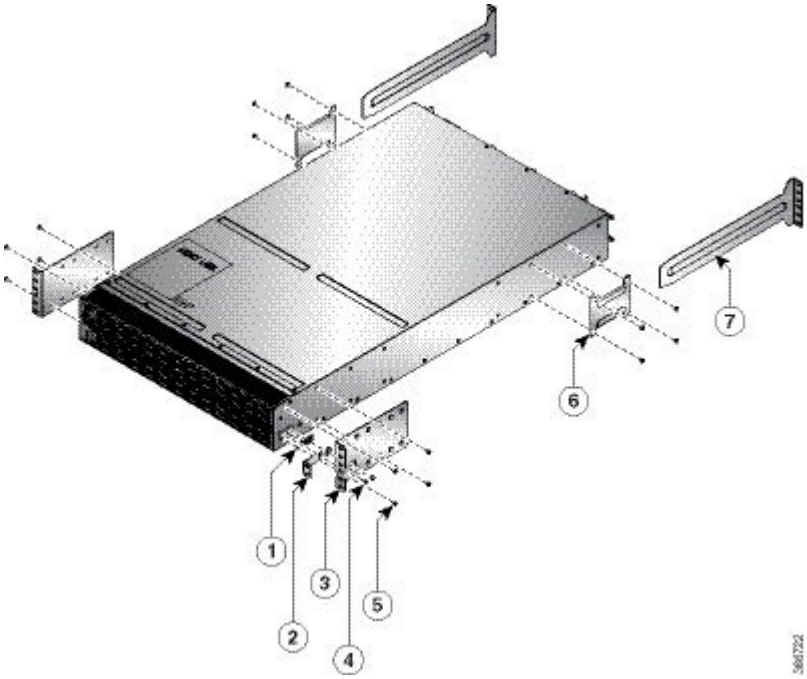
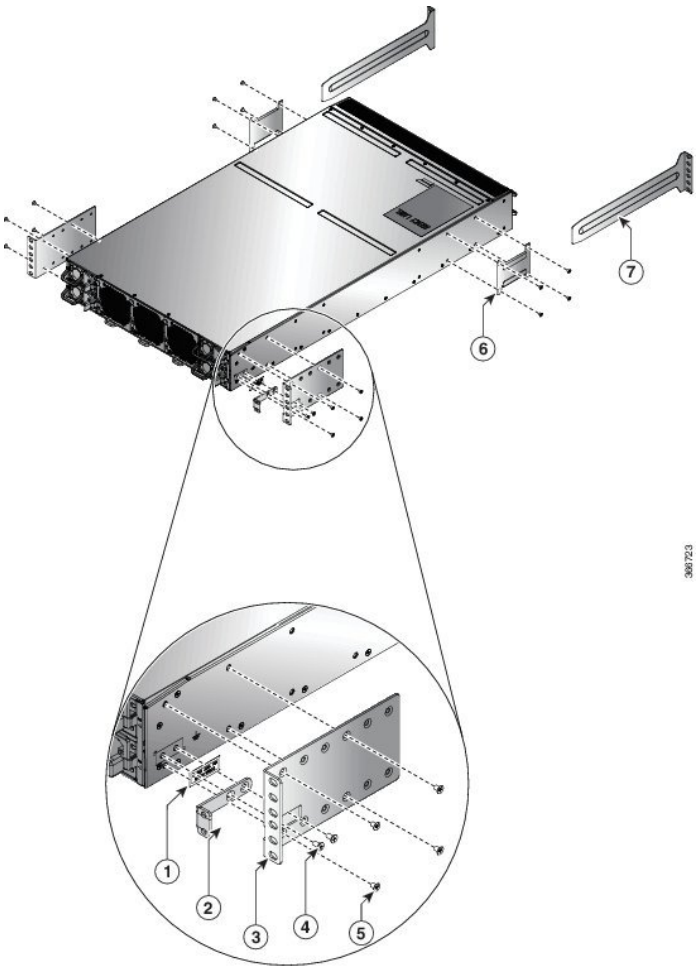


Figure 15: Rack-Mount Brackets on Cisco NCS 5502 and NCS 5502 SE—Port-Side Exhaust



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, Cisco NCS 55A1-36H-SE-S, NCS 5501, and NCS 5501-SE**: The top plate is required for NEBS compliance when the router is installed with the ports in the cold aisle (port-side air intake). Install the top plate by pressing the ends of the plate on to the rack-mount brackets.

- If you are installing multiple routers with space between each router, install a top plate on each router.
- If you are installing multiple routers that are stacked, install the top plate only on the top router.

Note
The top plate is part of the orderable NEBS kit.

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 on the side of the chassis, and then use two M4 screws to attach the guides to the chassis.

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 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 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 each of 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 in a 4-Post Rack — Procedure 2

This section describes how to install the Cisco NCS-55A2-MOD-HD-S, Cisco NCS-55A2-MOD-HX-S and Cisco NC55A2-MOD-SE-H-S chassis on the 4-post rack, using sliders.

Sliders

The sliders are used to install the Cisco NCS-55A2-MOD-HX-S and Cisco NC55A2-MOD-SE-H-S chassis on a 4-post outdoor rack. Sliders are used to access the fan trays in the chassis easily during maintenance.

The sliders are designed such that the air filters (NCS-55A2-FLTR-FW) can also be accomodated in the chassis installation. There are two types of sliders:

- NC55-2RU-ACC-SL1: Designed for custom made cabinets that are 476 mm wide (min. 650 x650 mm), or for cabinets with equivalent specifications.

  Rack Requirements to Install NC55-2RU-ACC-SL1:

  - 4-post rack
  - 476 cm wide center to center rail mounting.
  - The width between the front rack-mounting rails must be at least 17.75 inches (45.0 cm)
  - 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 4.7 inches (12.0 cm).

- The minimum spacing between the front-mounting rails of the cabinet to the inner surface of the front door shall be min. 5.8 inches (14.7 cm). Depend on cabinet ambient thermal set-point this distance can change.
- The distance between the outside face of the front mounting rail and the outside face of the back-mounting rail should be 16.0 to 19.9 inches (40.7to 50.5 cm) to allow for rear-bracket installation.

- NC55-2RU-ACC-SL2: Designed for 19-inch (min. 650 x650 mm) EIA cabinet standard 4-post rack.

  Rack Requirements to Install NC55-2RU-ACC-SL2:

  - Standard 19-inch (48.3 cm) (four-post EIA cabinet, with mounting rails that conform to English universal hole spacing per section 1 of ANSI/EIA-310-D-1992.)
  - The width between the front rack-mounting rails must be at least 17.75 inches (45.0 cm.)
  - The minimum spacing between the front-mounting rails of the cabinet to the inner surface of the front door shall be min. 5.8 inches (14.7 cm). Depending on the cabinet ambient thermal set-point this minimum distance can change.
  - 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 4.7 inches (12.0 cm).
  - The distance between the outside face of the front mounting rail and the outside face of the back-mounting rail should be 16.5 to 19 inches (41.9 to 48.26 cm) to allow for rear-bracket installation.

The slider assembly consists of three parts:

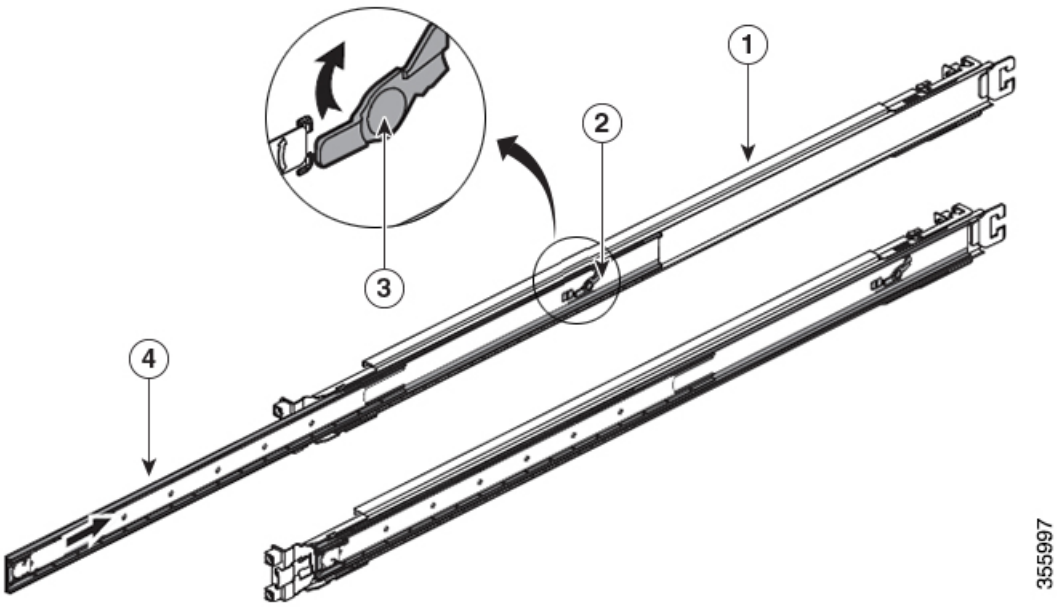
- Inner Slider Member
- Middle Slider Member
- Outer Slider Member



Note The front end of the outer slider member may vary between **NC55-2RU-ACC-SL1** and **NC55-2RU-ACC-SL2**.

The outer slider member of NC55-2RU-ACC-SL2 is mounted to the front post with 2 screws, whereas, the outer slider member of NC55-2RU-ACC-SL1 is passed through the rack holes of the front post and latched to the rack.

Figure 16: Slider Assembly



1	Outer Slider Member	2	Middle Slider Member
3	Unlock Feature on the Middle Slider Member	4	Inner Slider Member

The following table lists the items that are contained in the Cisco NCS-55A2-MOD-HD-S, Cisco NCS-55A2-MOD-HX-S and Cisco NC55A2-MOD-SE-H-S Router rack-mount kit.

Table 11: Cisco NCS-55A2-MOD-HD-S, Cisco NCS-55A2-MOD-HX-S and Cisco NC55A2-MOD-SE-H-S Router Rack-Mount Kit

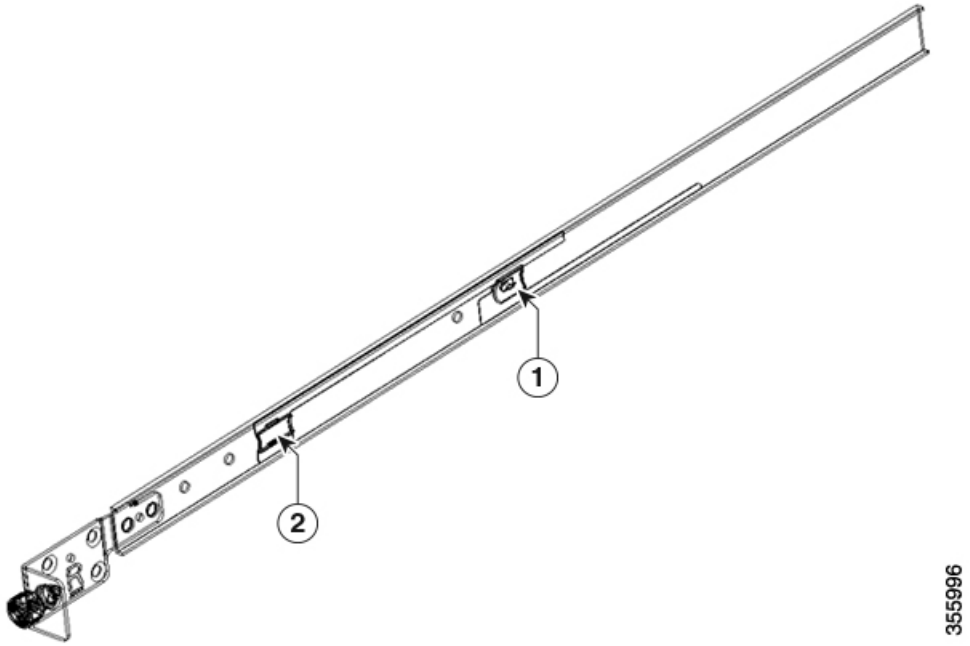
Quantity	Part Description
2	Rack-mount brackets
2	Rack-mount slider rails
8	M4 x 8-mm Phillips counter sink screws
2	M4 x 8-mm Phillips pan-head screws
1	Grounding lug
6	(Only NC55-2RU-ACC-SL1) M4 x 10-mm Phillips pan-head screws
6	(Only NC55-2RU-ACC-SL2) M4 x 8-mm Phillips flat-head screws
4	(Only NC55-2RU-ACC-SL2) washers
4	(Only NC55-2RU-ACC-SL2) 10-32 counter sink screws
4	(Only NC55-2RU-ACC-SL2) 9.1 mm rack mount pins

Quantity	Part Description
4	(Only NC55-2RU-ACC-SL2) 8.8 mm rack mount pins

Procedure

Step 1 Remove the inner slider member from the slider assembly, by depressing the white tab present at the front of the slider assembly (on the outer slider member).

Figure 17: Remove the Inner Slider Member from the Slider Assembly



1	White Tab	2	Blue Tab

Step 2 Push the unlock feature of the middle slider member and slide the middle slider member back to the slider assembly.

Step 3 Attach the inner slider member to the sides of the chassis:

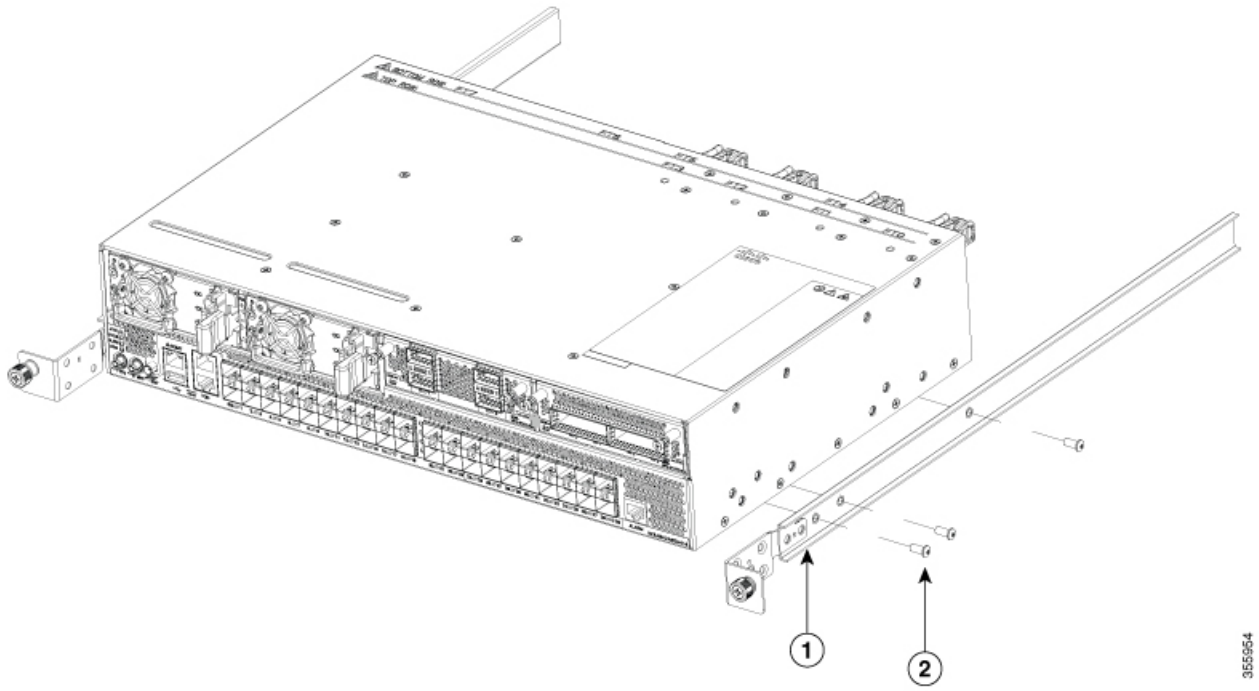
a. Align the inner slider member with one side of the chassis and use three M4 screws and tighten the screws to 12 in-lbs (1.4 N-m).

Note
For NC55-2RU-ACC-SL1, use M4 x 10-mm pan head screws.

For NC55-2RU-ACC-SL2, use M4 x 8-mm flat head screws.

b. Repeat 3a to install the inner slider member to the other side of the chassis.

Figure 18: Install the Inner Slider Member to the Chassis



1	Inner slider member	2	M4 x 10-mm Phillips pan head or M4 x 8-mm Phillips f head screws, based on the slider.

Step 4 Install the outer slider member to the rack:

a. Align the rack mount pins of the outer slider to the rear post rack holes.

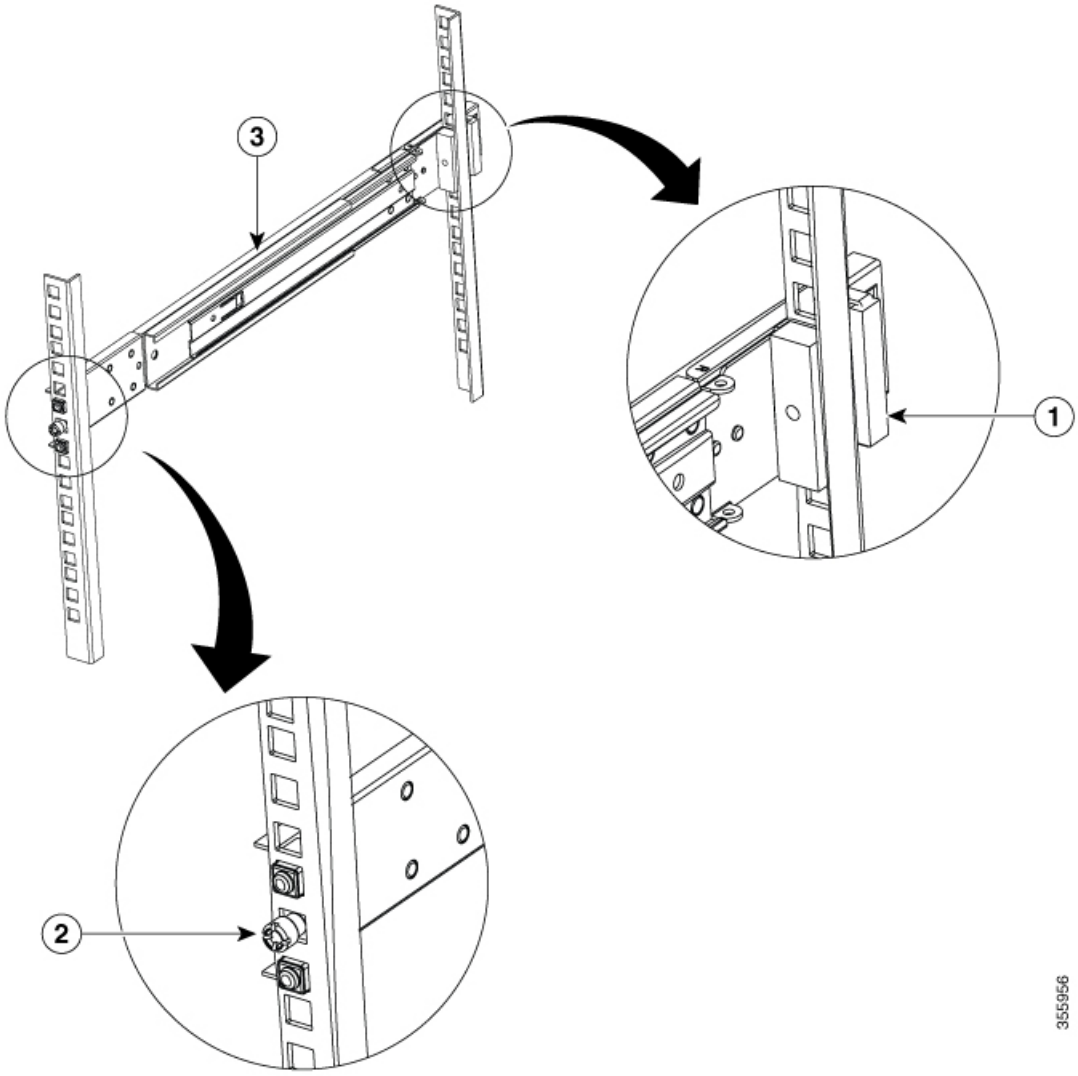
Note
If the rack mount pins of the outer slider member do not fit the rack hole dimensions, use the pins that are provided in the package.

b. (NC55-2RU-ACC-SL1) The front end of the outer slider member passes through the screw holes of the rack and latches to the rack. See the "Rear and Front End (NC55-2RU-ACC-SL1) of the Outer Slider Member" figure.

(NC55-2RU-ACC-SL2) Adjust the slider (push and pull) to place and fix the slider behind the front post. Attach the slider to the front post with 2 counter sink screws (10-32) and washers. See the "Rear and Front End (NC55-2RU-ACC-SL2) of the Outer Slider Member" figure.

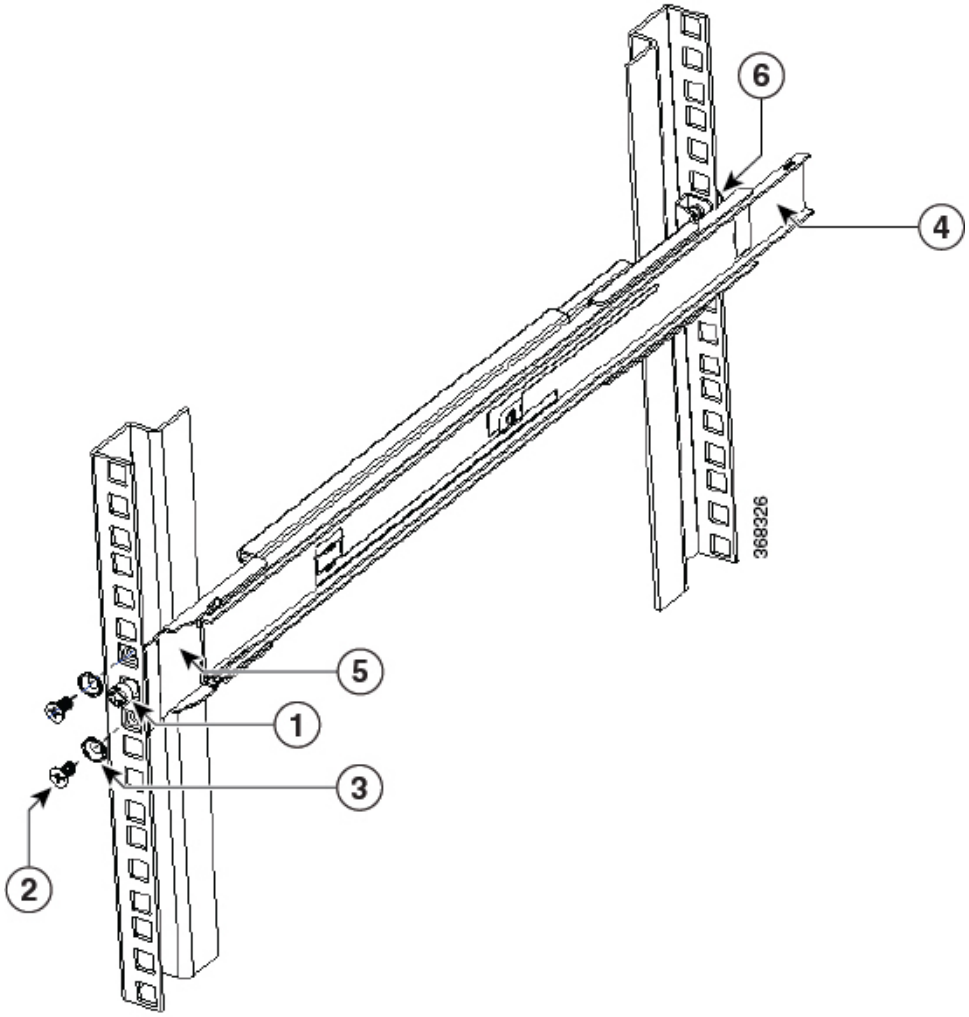
Note
Remove the screw thread adapter present at the front end of the outer slider member if you are unable to pass the slider through the rack holes. Tighten the screws later after passing the slider through the rack holes.

Figure 19: Rear and Front End (NC55-2RU-ACC-SL1) of the Outer Slider Member



1	Rear End- Outer slider member	2	Screw thread adapter at the Front End- Outer slic
3	Outer slider member		

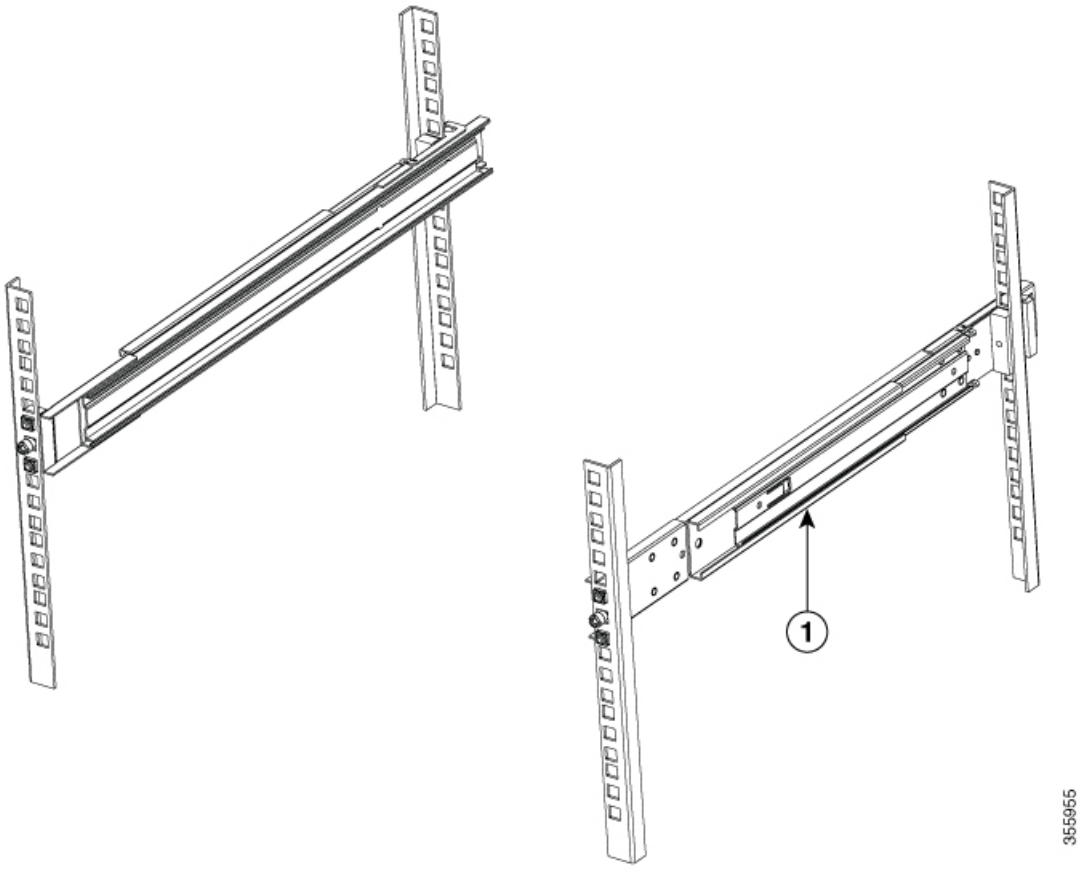
Figure 20: Rear and Front End (NC55-2RU-ACC-SL2) of the Outer Slider Member



1	Screw thread adapter at the Front End- Outer slider member	2	Counter sink screws
3	Washer	4	Rear end - Outer slider member
5	Front end - Outer slider member	6	Rear end - Rack mount pin

c. Repeat 4a through 4b to install the outer slider member to the other side of the chassis.

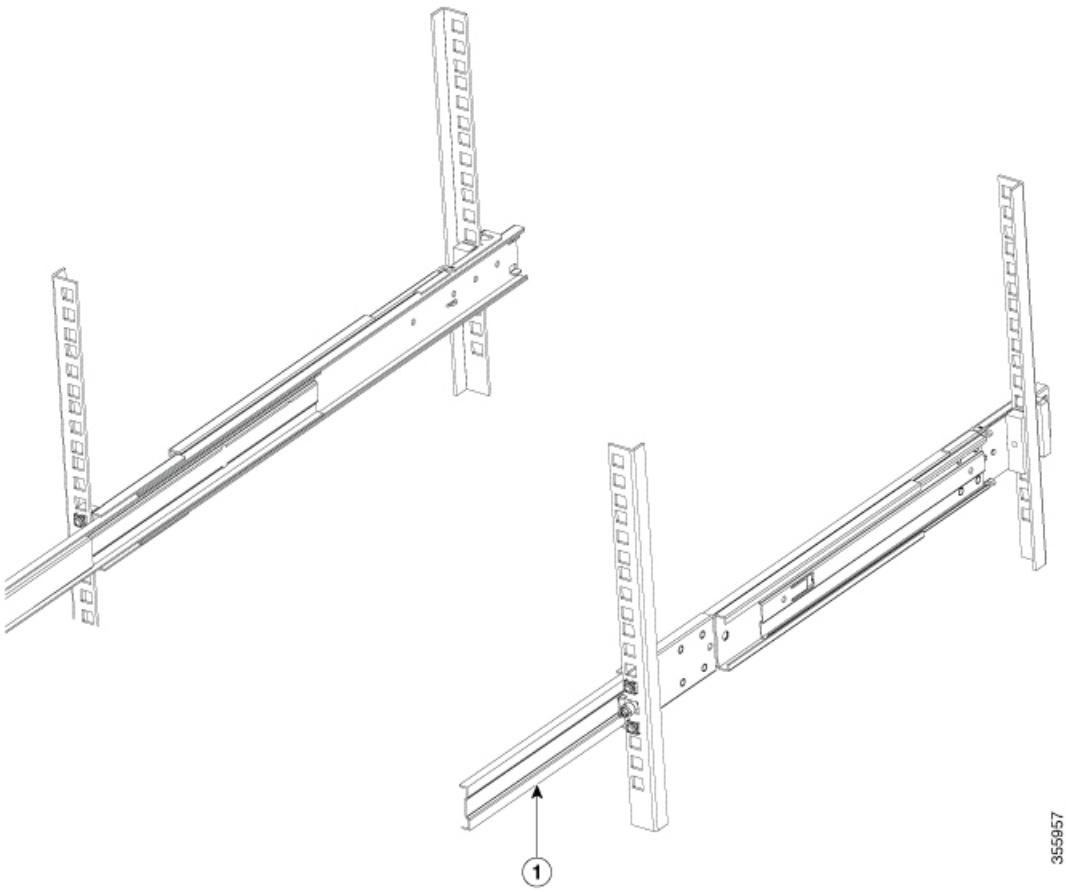
Figure 21: Install the Outer Slider Member to the Rack



1	Outer slider member		

Step 5 Pull the middle slider member from the slider assembly to an extended position.

Figure 22: Extend the Middle Slider Member

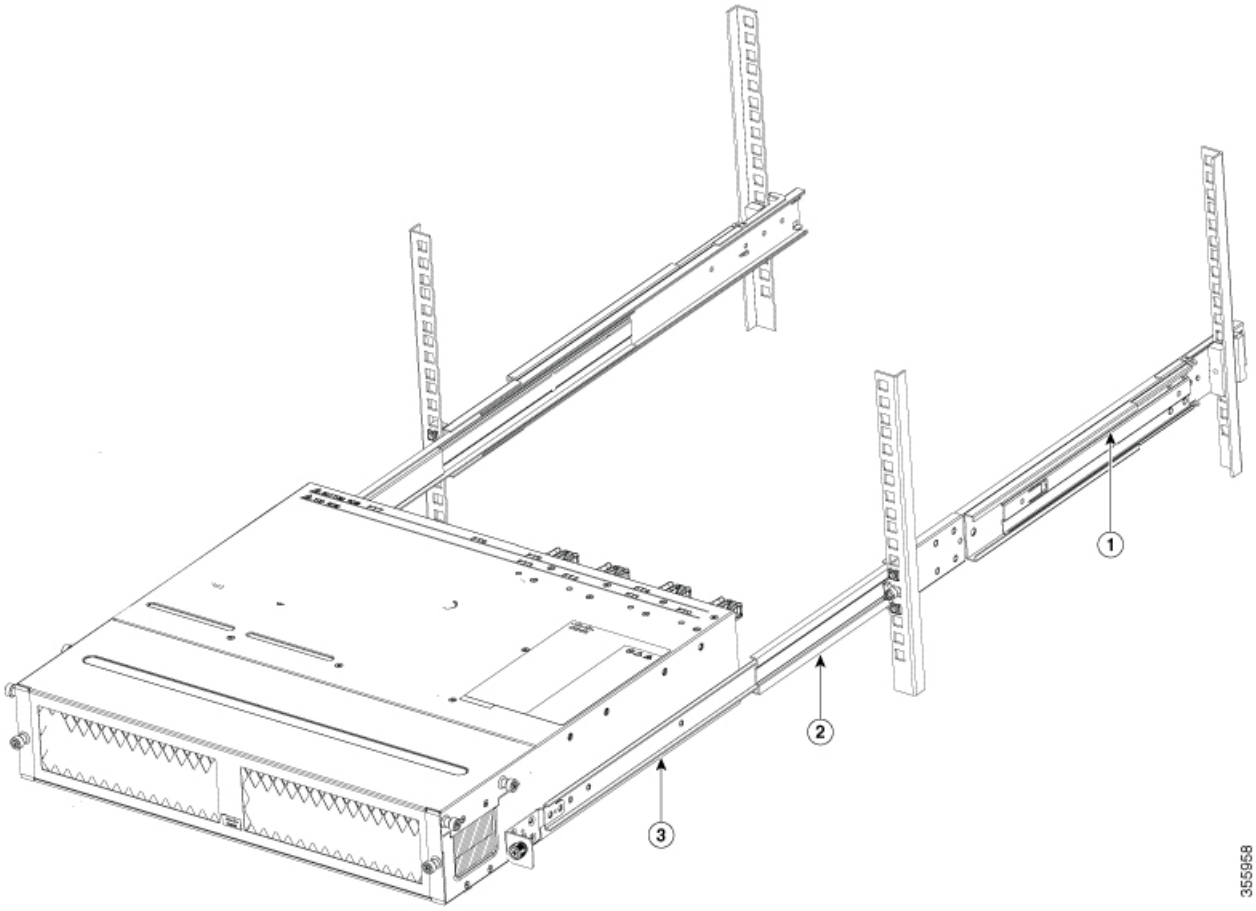


1	Middle slider member		

Step 6 Insert the chassis that already has the inner slider members attached, to the middle slider member on the rack.

Step 7 Slide the chassis into middle slider member until it cannot be pushed further.

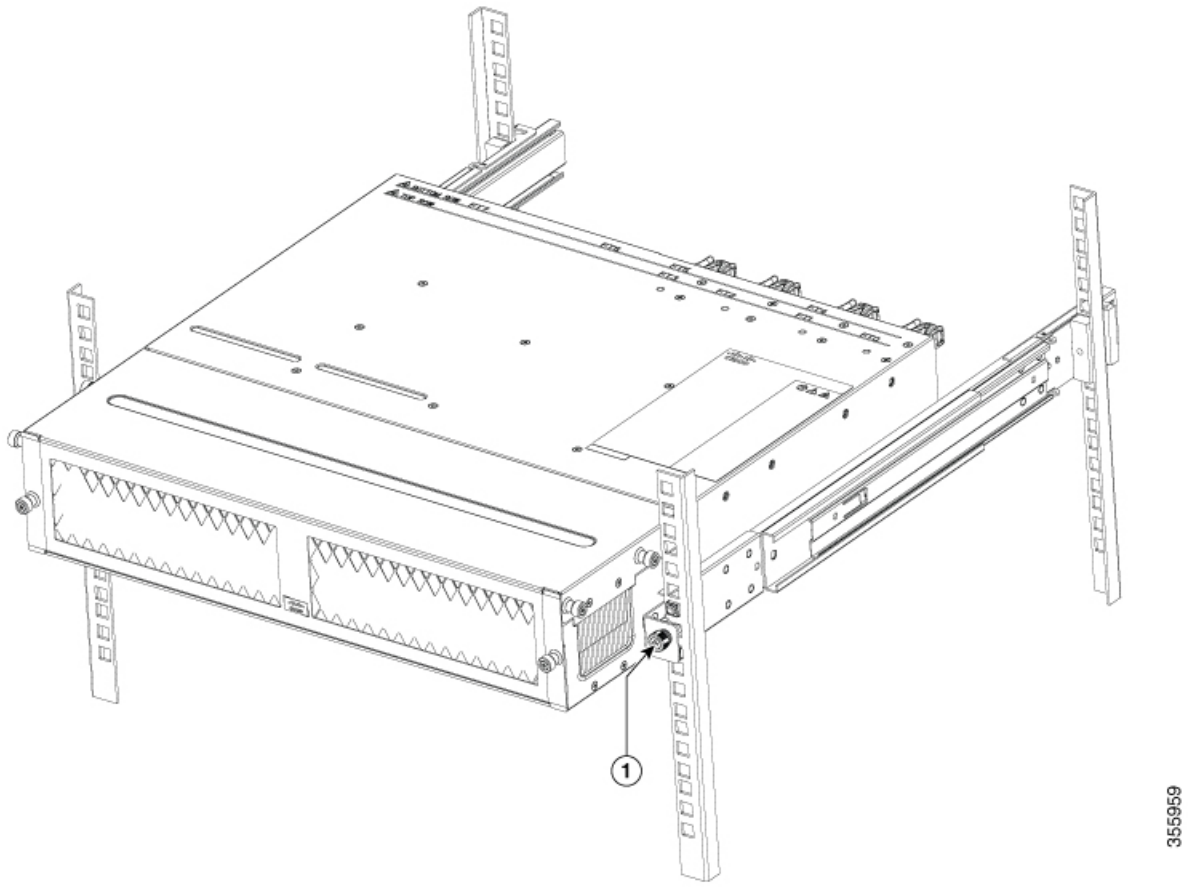
Figure 23: Install the Chassis to the Rack



1	Outer slider member	2	Middle slider member
3	Inner slider member		

Step 8 Pull the blue release tab on the inner slider member on both sides simultaneously to release the lock position. Continue to push the chassis to the rack.

Figure 24: Install the Chassis to the Rack



Step 9 Tighten the thumbscrews on either side of the chassis, that is aligned with the screw thread adapter of the outer slider member through the rack holes.

What to do next

Installing the Air Filter to the Chassis on a 4-Post Rack, on page 56

Rack-Mount the Chassis in a 2-Post Rack — Procedure 1

This section describes how to use the rack-mount kit provided with the router to install the following routers into a cabinet or 2-post rack:

- Cisco NCS-55A1-24H
- Cisco NCS 5501
- Cisco NCS 5501-SE
- Cisco NCS-55A1-24Q6H-S

- Cisco NCS-55A1-24Q6H-SS

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 12: Cisco NCS-55A1-24H, Cisco NCS 5501, Cisco NCS 5501-SE, and Cisco NCS-55A1-24Q6H-S Router Rack-Mount Kit

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

Procedure

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 its 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 its fan and power supply modules will be in the cold aisle.

b) Do the following:

Cisco NCS-55A1-24H, Cisco NCS 5501, Cisco NCS 5501-SE, Cisco NCS-55A1-24Q6H-S , and Cisco NCS-55A1-24Q6H-SS router—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 with 12 in-lbs (1.4 N-m) 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. 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 and Cisco NCS 55A1-24H.

Figure 25: Rack-mount brackets on Cisco NCS 5501

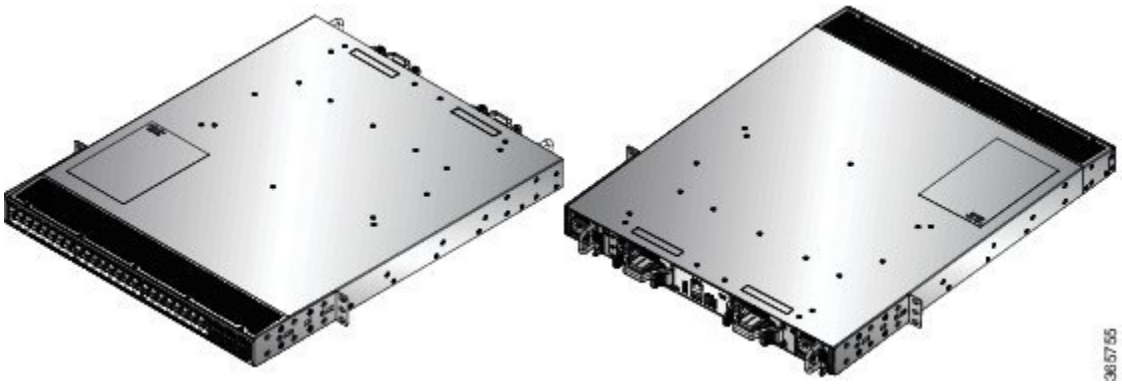
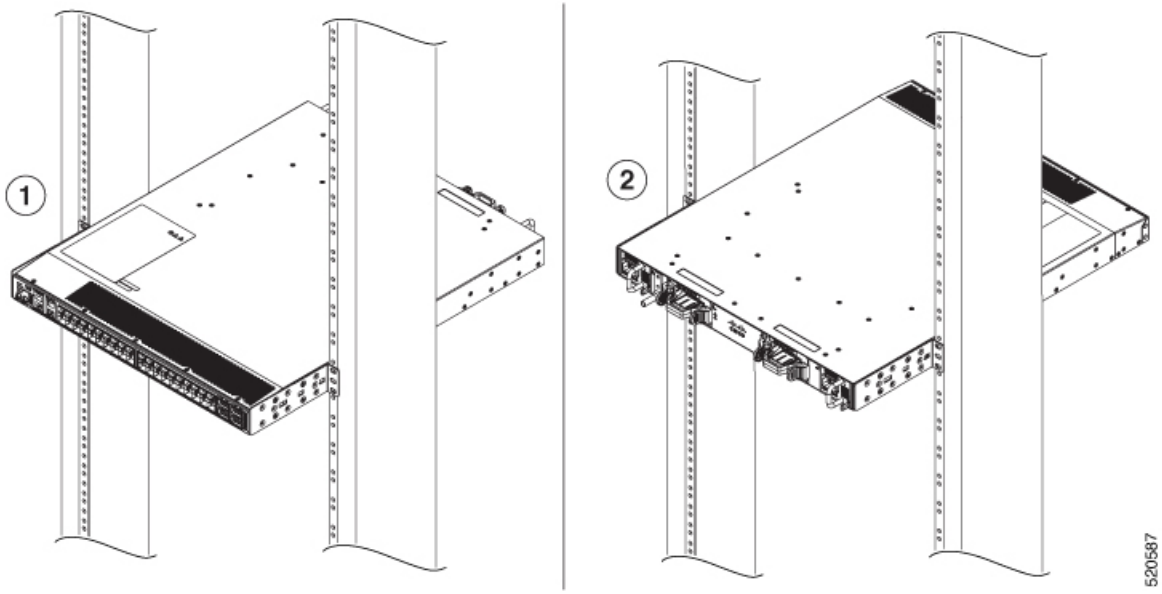


Figure 26: Rack-mount brackets on Cisco NCS 5501



1	Port Side Intake Installation	2	Port Side Exhaust Installation

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 type) in 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).

Rack Mount the Chassis in a 2 Post Rack — Procedure 2

This section describes how to use the rack-mount kit provided with the chassis, to install the following chassis into a cabinet or a 2-post rack:

- Cisco NCS-55A2-MOD-S
- Cisco NCS-55A2-MOD-HD-S
- Cisco NCS-55A2-MOD-SE-S
- Cisco NCS-55A2-MOD-HX-S
- Cisco NC55A2-MOD-SE-H-S

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 13: Cisco NCS 55A2-MOD-SE-S , Cisco NCS-55A2-MOD-HX-S, Cisco NC55A2-MOD-SE-H-S Router Rack-Mount Kit

Quantity	Part Description
2	Rack-mount brackets
8	M4 x 8-mm Phillips counter sink screws

Depending on the type of the rack, the following rack mount brackets can be used:

- 19-inch Rack: NC55A2-RCKMNT-19 brackets
- 23-inch Rack: NC55A2-RCKMNT-23 brackets
- ETSI Rack: N55A2-RCKMNT-ETSI brackets

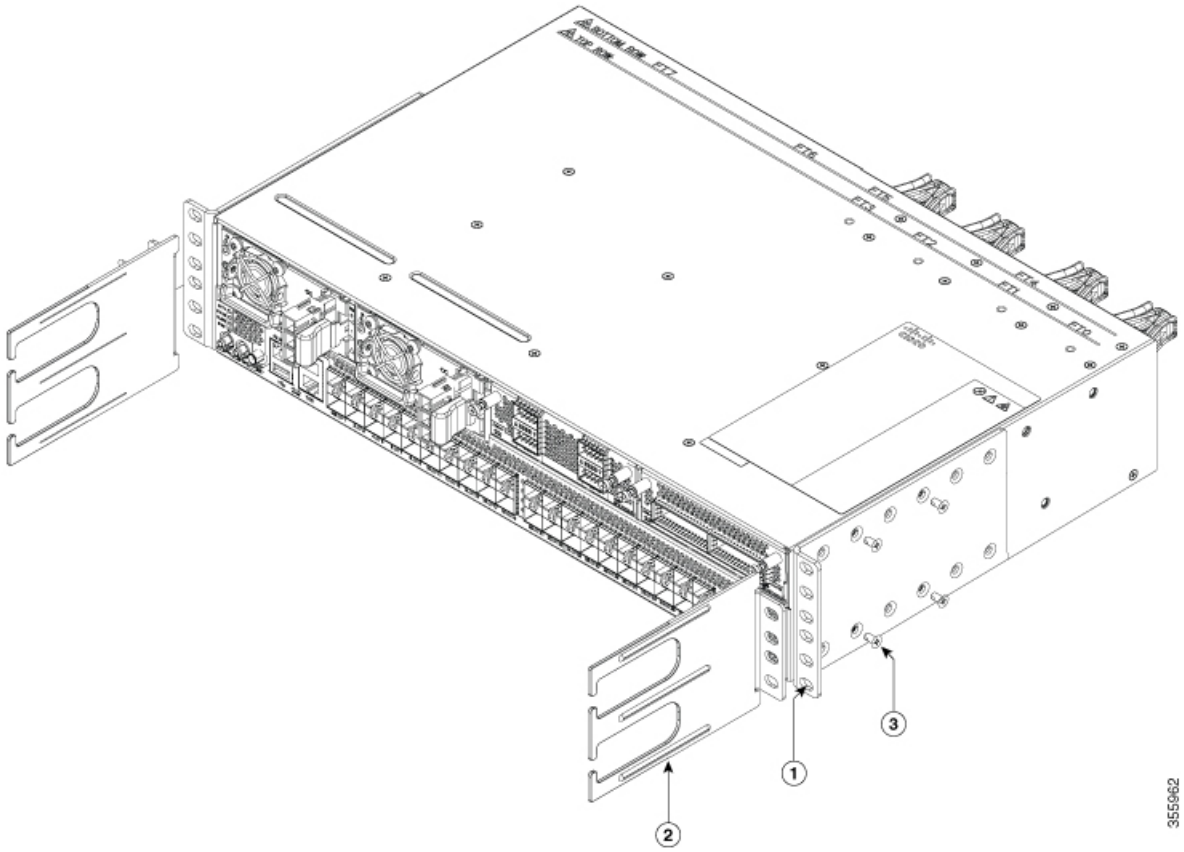
Note In addition, use the cable guide bracket (NCS-55A2-CAB-MGMT) for managing the cables in Cisco NCS 55A2-MOD-SE-S, Cisco NCS-55A2-MOD-HX-S and Cisco NC55A2-MOD-SE-H-S. The cable guide bracket is optional and is obtained in the accessory kit (NC55-2RU-ACCX-KIT).

Procedure

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

a) Position the router so that its ports will be in the cold aisle.
b) With the bracket ears aligned to the front of the chassis, position a 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 with 12 in-lbs (1.4 N-m) 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.

Figure 27: Rack-Mount Brackets on Cisco NCS 55A2-MOD-S , Cisco NCS 55A2-MOD-HD-S , Cisco NCS 55A2-MOD-SE-S, Cisco NCS-55A2-MOD-HX-S and Cisco NC55A2-MOD-SE-H-S



1	Rack-mount brackets	2	Cable guide
3	M4 x 8 Phillips counter sink screws		

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 type) in 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).

What to do next

Installing the Air Filter to the Chassis on a 2-Post Rack (Port Side Inlet), on page 58

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 only.

Note In general, we recommend that you inspect the air filter every three months and replace, if necessary, every 6 months. Air filters are consumable items and must be ordered separately by customers. Customers may contact TAC for assistance in identifying the correct air filter PID to order. We recommend having spare air filters in stock.

Install the Air Filter on the Port Side Inlet

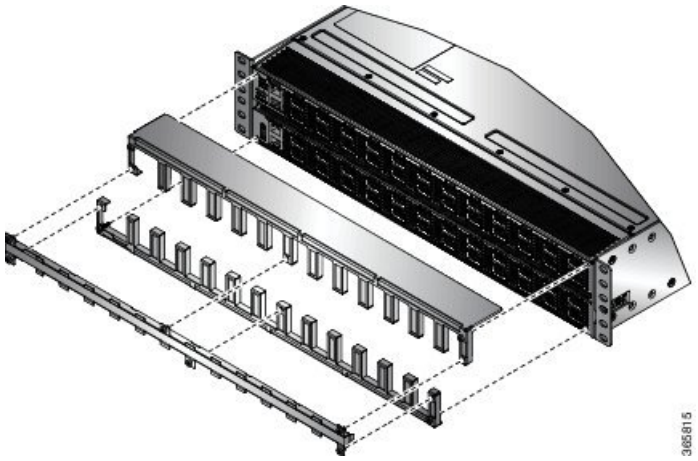
If the air filter on the port-side inlet needs replacement, follow this procedure.

Note To fix the top and bottom filters (NCS-5502-FLTR-FW) use a manual screwdriver to gently turn the screws. Ensure that you turn the screws only three to four times, and that you do not overtighten the screws.

Procedure

Step 1 Place the top air filter section on the top port-side of the chassis and secure it with the two screws at the upper left and right.

Figure 28: Port-side Inlet Air Filter



Step 2 Place the bottom air filter section along the bottom port-side of the chassis and secure it with the two screws at the lower left and right.

Step 3 Insert the air filter between the top and bottom air filter sections and tighten the six screws (two on each side, and two in the middle).

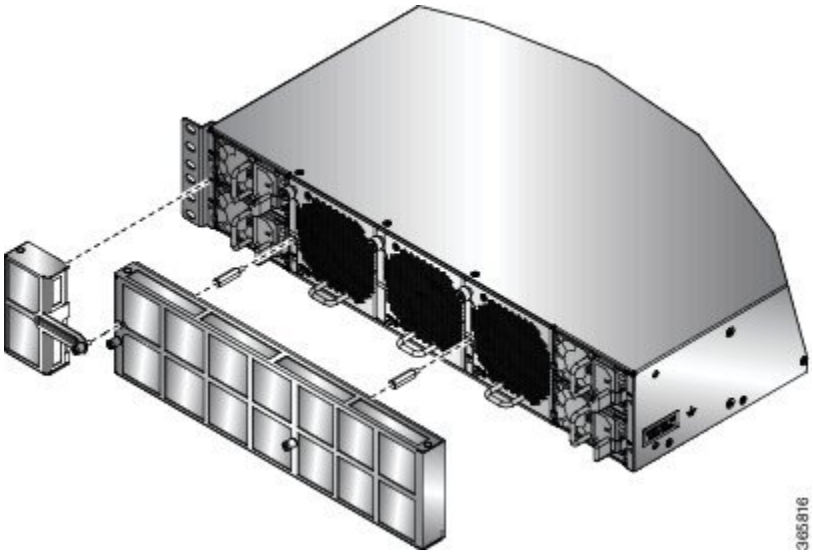
Install the Air Filter on the Port Side Exhaust

If the air filter on the port-side exhaust needs replacement, follow this procedure.

Procedure

Step 1 Install the two standoffs to the chassis.

Figure 29: Port Side Exhaust Air Filter



Step 2 Install the main air filter by aligning it to the standoffs and tightening the two thumb screws.

Step 3 Install the side filter extension and tighten the 2 screws (1 to the chassis and 1 to the main air filter).

Installing the Air Filter to the Chassis on a 4-Post Rack

This section describes about installing the air filter to the Cisco NCS-55A2-MOD-HD-S, Cisco NCS-55A2-MOD-HX-S and Cisco NC55A2-MOD-SE-H-S chassis on a 4-post rack.

Note Sliders can be extended from the rack by atleast 2 inches.

Before you begin

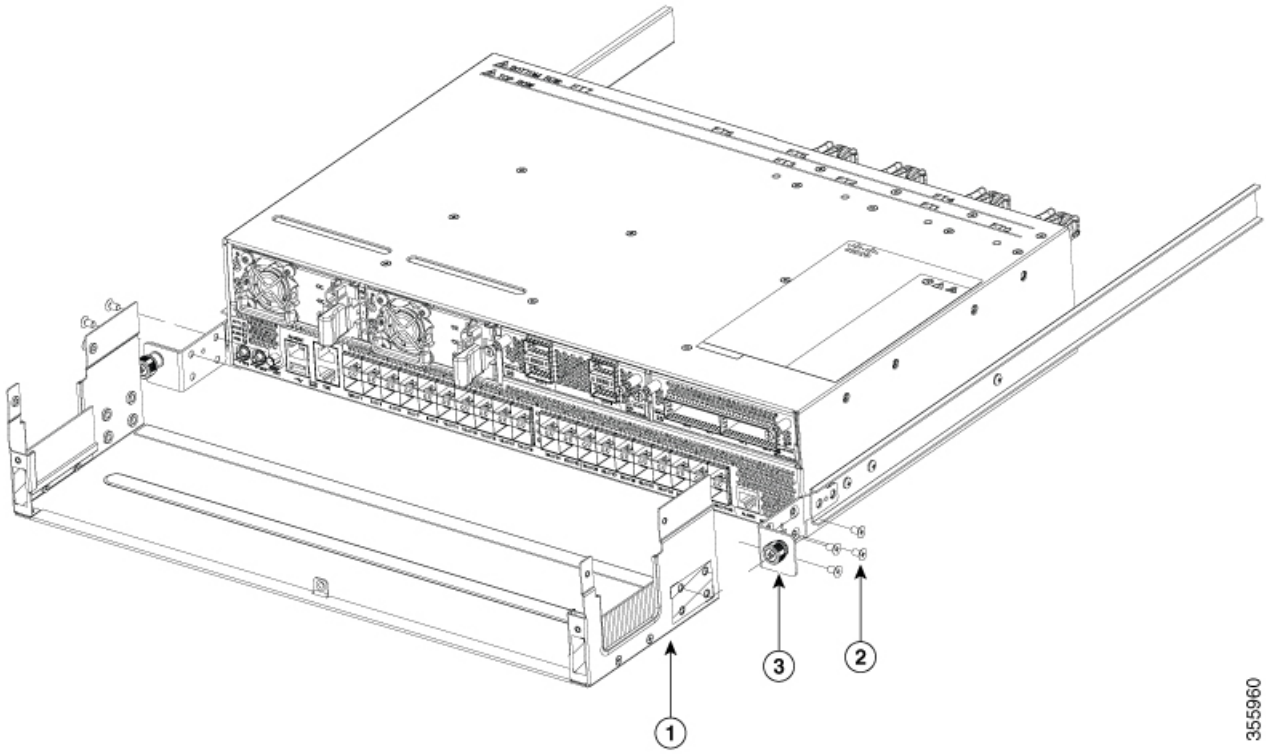
Complete the "Rack Mount the Chassis in a 4-Post Rack — Procedure 2, on page 40" procedure.

Procedure

Step 1 Install the tray of the air filter box to the inner slider member

a. Align the tray of the air filter box to the inner slider member, as shown in the following figure.

Figure 30: Install the Tray of the Air Filter Box



1	Air Filter Box - Tray	2	M4 x 8 Phillips couter sink screws
3	Inner slider member		

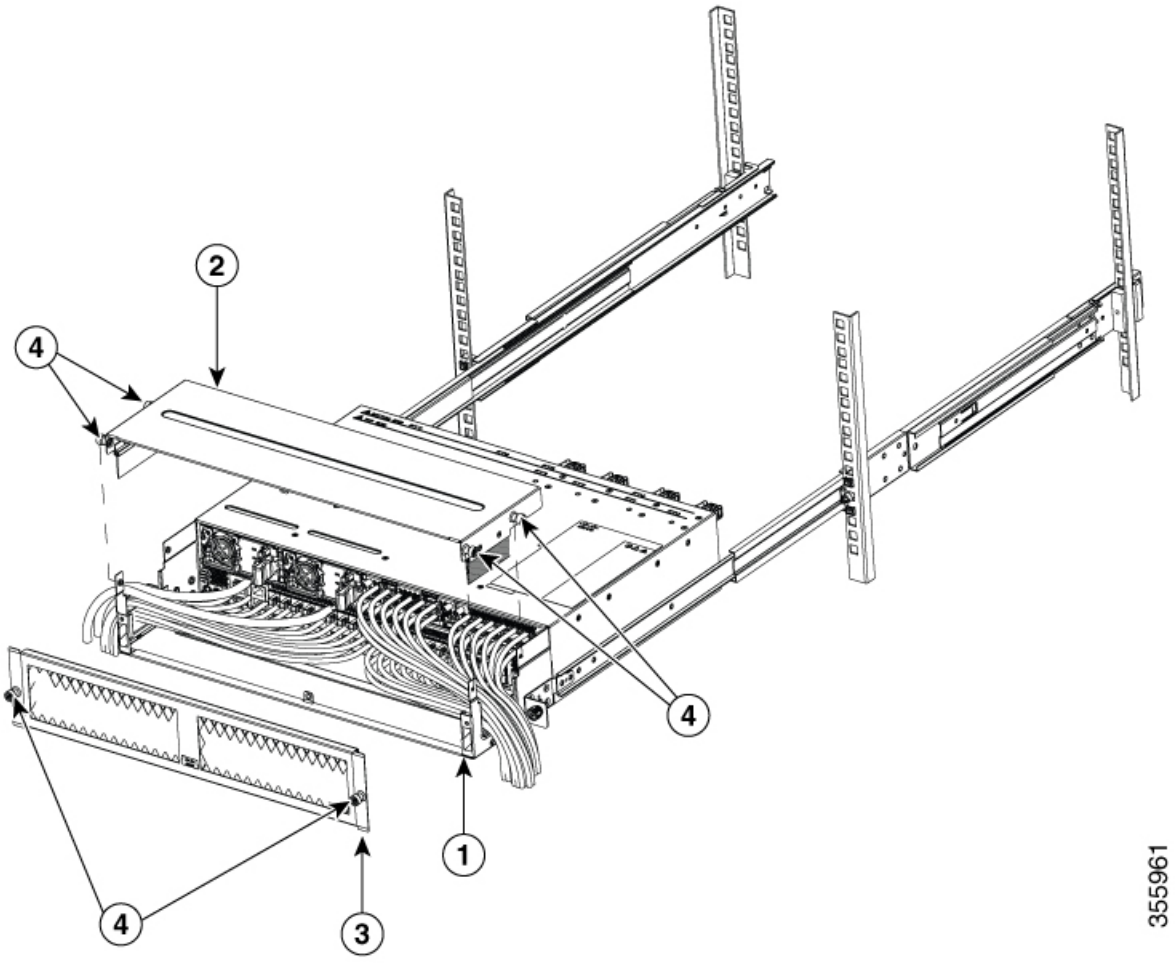
b. Tighten four M4 x 8 screws to 12 in-lbs (1.4 N-m) to secure the tray of the air filter box to the inner slider member.

c. Repeat 1a through 1b on the other inner slider member.

Step 2 Configure the system, modules, cables, and so on.

Step 3 Place and align the top cover of the air filter box, with the tray. Use the thumbscrews on either sides of the top cover to tighten. See the following figure:

Figure 31: Install the Top Cover of the Air Filter Box



1	Air Filter Box - Tray	2	Top Cover
3	Front Filter	4	Thumbscrews

Step 4 Align the front filter faceplate with the air filter assembly. To ensure correct orientation, verify if the Cisco logo is present at the bottom center of the front filter faceplate. Tighten the thumbscrews on either sides of the front filter.

Step 5 Tighten the chassis with thumbscrews to the rack.

Installing the Air Filter to the Chassis on a 2-Post Rack (Port Side Inlet)

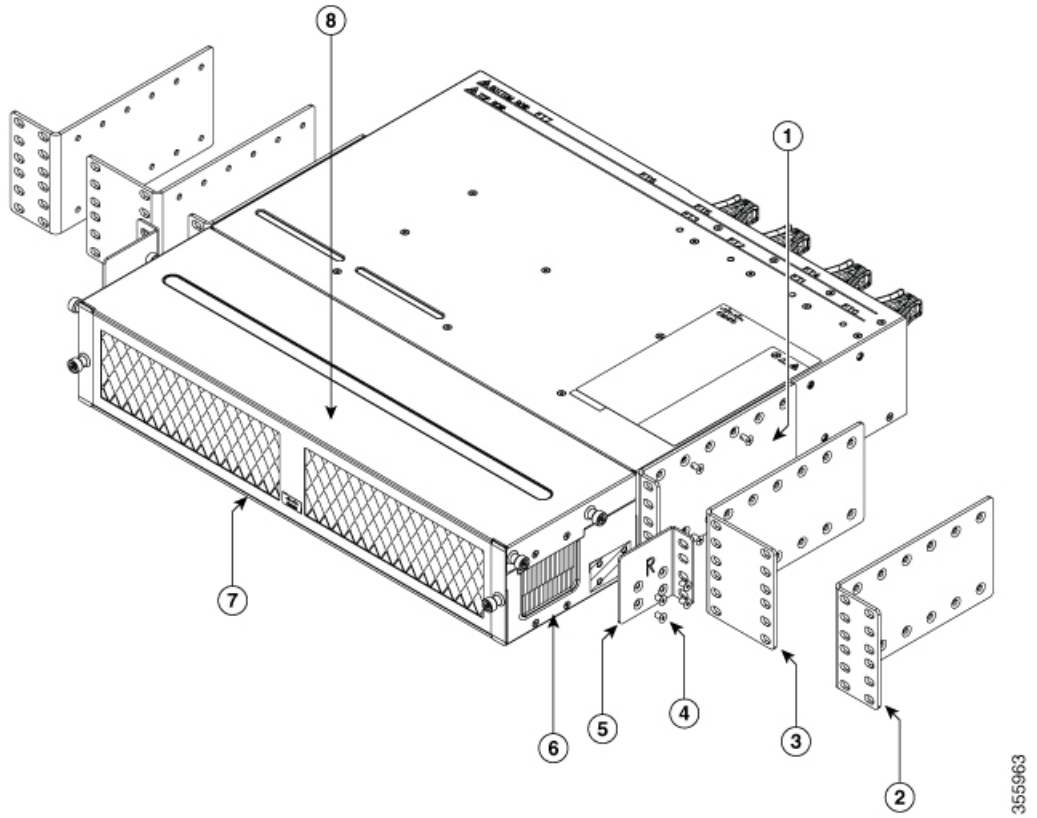
This procedure installs the air filter to the Cisco NCS-55A2-MOD-HD-S, Cisco NCS-55A2-MOD-HX-S and Cisco NC55A2-MOD-SE-H-S chassis on a 2-post rack (port side inlet)

Procedure

Step 1 Place the chassis on a flat surface and mount the brackets (19-inch, 23-inch, or ETSI) on either sides of the chassis. Use four counter sink M4 screws with 12 in-lbs (1.4 N-m), to secure the brackets to the chassis.

Step 2 Place the air filter box in front of the chassis and attach the left and right hand side adapter bracket to secure the air filter box to the chassis. Use four counter sink M4 screws with 12 in-lbs (1.4 N-m), on each side to secure the air filter box to the chassis.

Figure 32: Installing the Air Filter to the Chassis on a 2-Post Rack



1	Rack-mount brackets- 19 inch	2	Rack-mount brackets- ETSI
3	Rack-mount brackets- 23 inch	4	M4 Phillips counter sink screws
5	Adapter bracket	6	Air Filter Box- Tray
7	Front filter	8	Top cover

Step 3 Lift the unit assembly (chassis along with the air filter box) and mount it to the appropriate rack size.

Note

The top cover of the air filter box and the front filter faceplate can be removed for cable management.

Ground the Chassis

Warning **Statement 1024—**Ground Conductor

This equipment must be grounded. To reduce the risk of electric shock, 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—**Installing or Replacing the Unit

To reduce risk of electric shock, when installing or replacing the unit, the ground connection must always be made first and disconnected last.

If your unit has modules, secure them with the provided screws.

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 ground 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.

Procedure

Step 1 Use a wire-stripping tool to remove approximately 0.75 inches (19 mm) of the covering from the end of the #6 AWG grounding cable.

Step 2 Insert the stripped end of the grounding cable into the open end of the grounding lug.

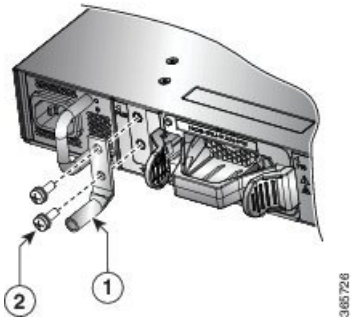
Step 3 Use the crimping tool to secure the grounding cable in the grounding lug.

Step 4 Attach the ground cable:

- **Cisco NCS-55A1-24H, Cisco NCS 5501, Cisco NCS 5501-SE, Cisco NCS-55A1-48Q6H, Cisco NCS-55A1-24Q6H-S, Cisco NCS-55A1-24Q6H-SS, Cisco NCS-55A2-MOD-S, Cisco NCS 55A2-MOD-SE-S , Cisco NCS-55A2-MOD-HX-S, Cisco NC55A2-MOD-SE-H-S , Cisco NCS-55A2-MOD-HD-S**: Remove the

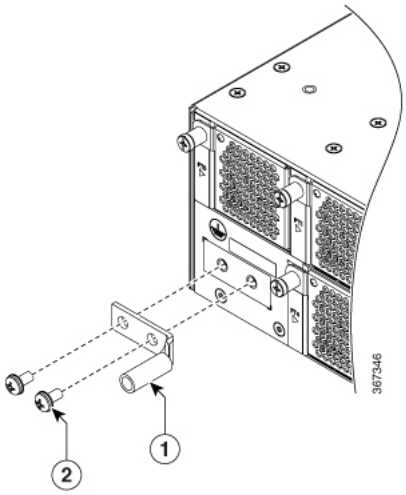
adhesive label from the grounding pad on the chassis. Place the grounding lug against the grounding pad so that there is solid metal-to-metal contact, and insert the two M4 or M5 screws with washers through the holes in the grounding lug and into the grounding pad.

Figure 33: Cisco NCS-55A1-24H, Cisco NCS 5501, Cisco NCS 5501-SE, Cisco NCS-55A1-48Q6H, Cisco NCS-55A1-24Q6H-S and Cisco NCS 55A2-MOD-SE-SGround Lug



1	Grounding lug	2	M5 x 12mm pan-head screws

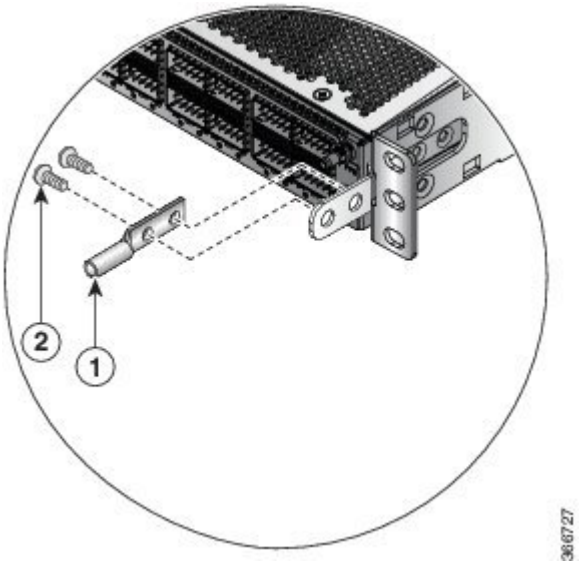
Figure 34: Cisco NCS-55A2-MOD-S , Cisco NCS 55A2-MOD-SE-S, Cisco NCS-55A2-MOD-HX-S, Cisco NC55A2-MOD-SE-H-S and Cisco NCS-55A2-MOD-HD-S Ground Lug



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

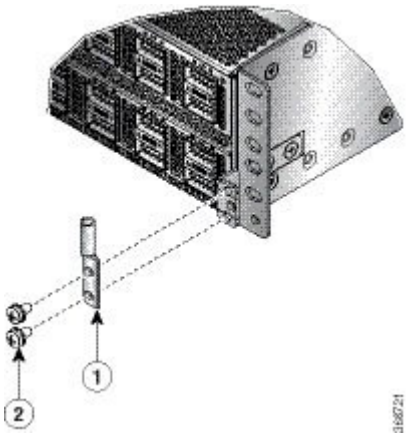
- **Cisco NCS 55A1-36H-S, Cisco NCS 55A1-36H-SE-S, NCS 5502 and NCS 5502-SE**: Attach one end of the shelf ground cable (#6 AWG cable) to the grounding cover plate using the specified dual-hole lug connector.

Figure 35: NCS 55A1-36H-S, Cisco NCS 55A1-36H-SE-S Ground Lug



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

Figure 36: NCS 5502 Ground Lug



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

Step 5 Tighten the pan-head screws to torque value of 11.5 in-lbs (1.3 N-m).

Step 6 Ensure that the lug and cable do not interfere with other equipment.

Step 7 Prepare the other end of the grounding cable and connect it to an appropriate grounding point in your site to ensure adequate earth ground.

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, Cisco NCS-55A1-48Q6H, Cisco NCS-55A1-24Q6H-S, Cisco NCS-55A1-24Q6H-SS**—To provide full output power of 1100 W, the nominal voltage rating value ranges between 100 V to 240 V, depending on the standards in various countries.

Cisco NCS 55A2-MOD-S, Cisco NCS 55A2-MOD-SE-S, Cisco NCS-55A2-MOD-HX-S, Cisco NC55A2-MOD-SE-H-S—To provide full output power of 1200 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 55A1-36H-SE-S, Cisco NCS 5502, Cisco NCS 5502-SE—To provide full output power of 2000 W, the nominal voltage rating value ranges between 200V to 240V, depending on the standards in various countries.

Note A dual pole breaker is needed for the installation. The rating of the dual pole breaker for 110 V is 20 A and for 220 V is 16 A. The minimum cable size is 14 AWG for 110 V and 16 AWG for 220 V.

Procedure

Step 1 Verify that the AC cable is installed in the correct AC source panel.

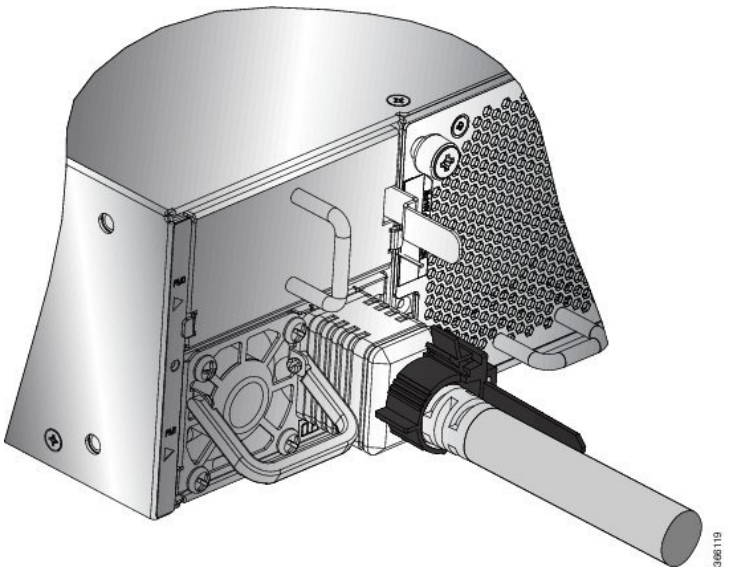
Step 2 Attach the AC power cable to the cable connector in the AC power module.

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.

Figure 37: Cable Clamp: Example



Connect DC Power to the Chassis

Warning **Statement 1003—**DC Power Disconnection

To reduce risk of electric shock or personal injury, disconnect DC power before removing or replacing components or performing upgrades.

Warning **Statement 1022—**Disconnect Device

To reduce the risk of electric shock and fire, a readily accessible disconnect device must be incorporated in the fixed wiring.

Warning **Statement 1046—**Installing or Replacing the Unit

To reduce risk of electric shock, when installing or replacing the unit, the ground connection must always be made first and disconnected last.

If your unit has modules, secure them with the provided screws.

Warning **Statement 1074—**Comply with Local and National Electrical Codes

To reduce risk of electric shock or fire, 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. 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 is 40 A.

Graceful Shutdown of DC PSU

If the DC input power to the DC PSU falls below 40V, graceful shutdown of the power supply is initiated, and the chassis is shutdown. To power up the chassis again, shut off the DC circuit at the circuit breaker, then turn on the DC circuit. The chassis will power up if the DC input power is above 43.5V.

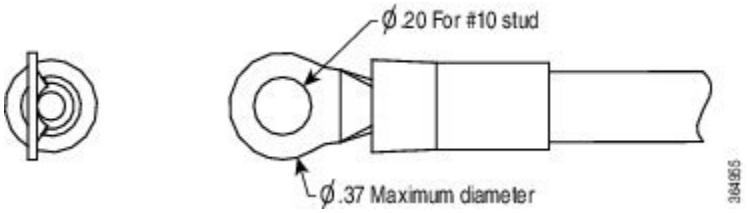
Note You can disable the graceful shutdown of the DC PSU using the **environment graceful-shutdown disable** command in Admin Configuration mode. When graceful shutdown is disabled, the chassis will shut down if the DC input power falls below 38.5V +/- 1V. The chassis will recover (power on again) if the DC input power to the DC PSU is above 43.5V. In this mode, the long-term reliability of the router can be impacted if the DC input power continues to fluctuate between 38.5V and 43.5V (resulting in continuous power-on and power-off cycles).

Connect DC Power to the Chassis - NCS-950W-DCFW-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 38: 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.

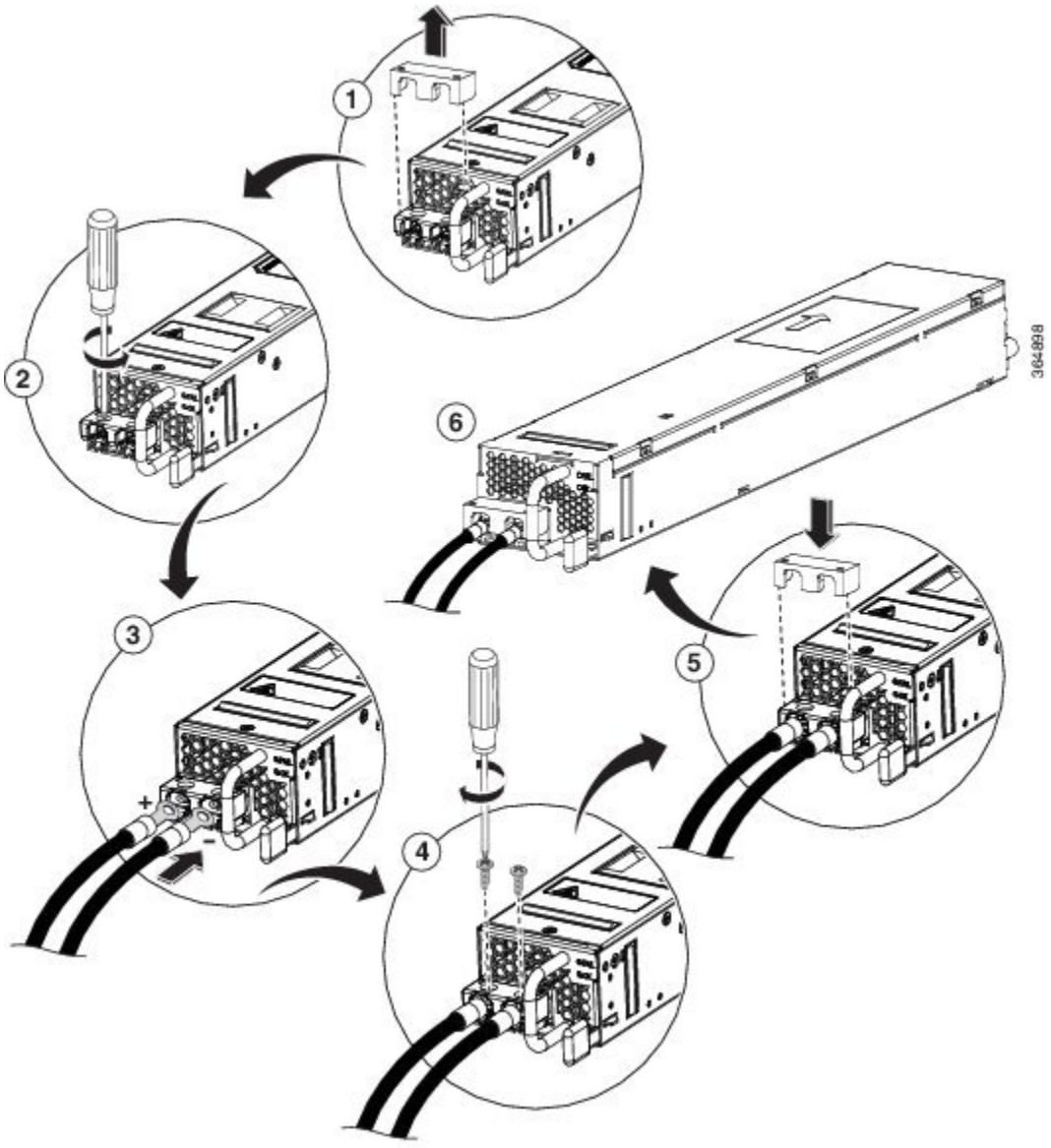
DC power connector is included in the DC power supply's accessory kit.

Procedure

Step 1 Turn off the circuit breaker from the power source.

Step 2 Remove the plastic cover from the terminal block.

Figure 39: Connecting DC Power – NCS-950W-DCFW-A



Step 3 Remove the set screws from the connector.

Step 4 Insert the black (DC negative) wire into the right aperture on the connector and insert the red (DC positive) wire into the left aperture on the connector.

Step 5 Reinstall the connection set screws and tighten them to a torque value of 0.65 Nm.

Note
Do not tighten over 0.7 Nm.

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

Step 7 Turn on the circuit breaker at the power source.

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

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 DC power connector is included in the DC power supply's accessory kit.

Procedure

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.

Note
Use 10 to 12 AWG wire.

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 Remove the DC power connector block from the power supply by doing the following:

a) Use a small flat-blade screw driver to loosen the panel mounting screws on the sides of the connector.
b) Pull the connector block out of the power supply.

Step 6 Do one of the following:

- Strip 0.4 inches (10 mm) of insulation off the DC wires.
- Install wire ferrules ($4mm^2$ to $6mm^2$) on the power cables following manufacturer instructions.

Note
Using wire ferrules creates a more secure connection between the wire and connector.

Step 7 Insert the black (DC negative) wire into the right aperture on the connector and insert the red (DC positive) wire into the left aperture on the connector.

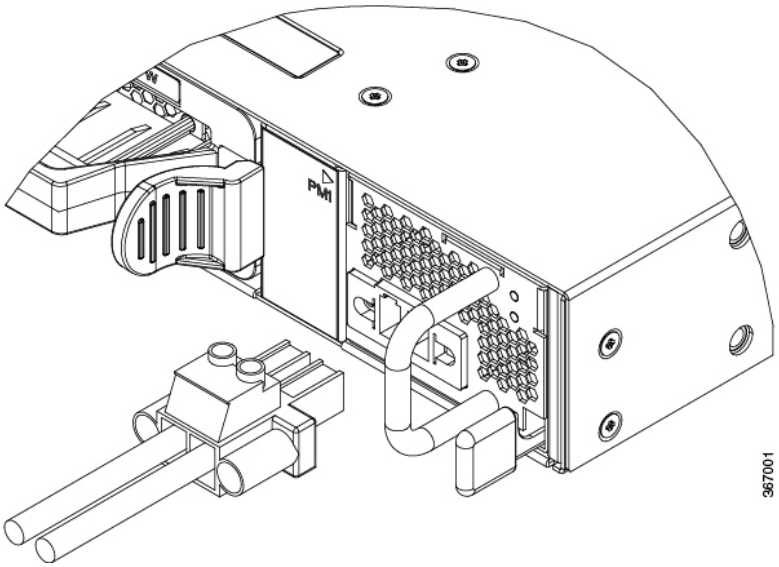
Step 8 Use a small flat-blade screw driver to secure the spring-loaded wire retainers on the top of the DC input connectors using the following torque values:

- Bare wire $\leq 4\ mm^2$: 0.5 Nm to 0.6 Nm

- Bare wire > 4 mm^2: 0.7 Nm to 0.8 Nm
- Wire ferrules: 0.7 Nm

Step 9 Insert the DC connector into the DC receptacle on the power supply.

Figure 40: Connecting DC Power – NCS-950W-DCFW



Step 10 Use a small flat-blade screw driver to tighten the panel mounting screws to a torque value of 0.5 to 0.8 Nm.

Step 11 Turn on the circuit breaker at the power source.

Connect DC Power to the Chassis – NC55-930W-DCFW, NC55-900W-DCFW-HD, 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.

Procedure

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.

Note
Use 10 to 12 AWG wire.

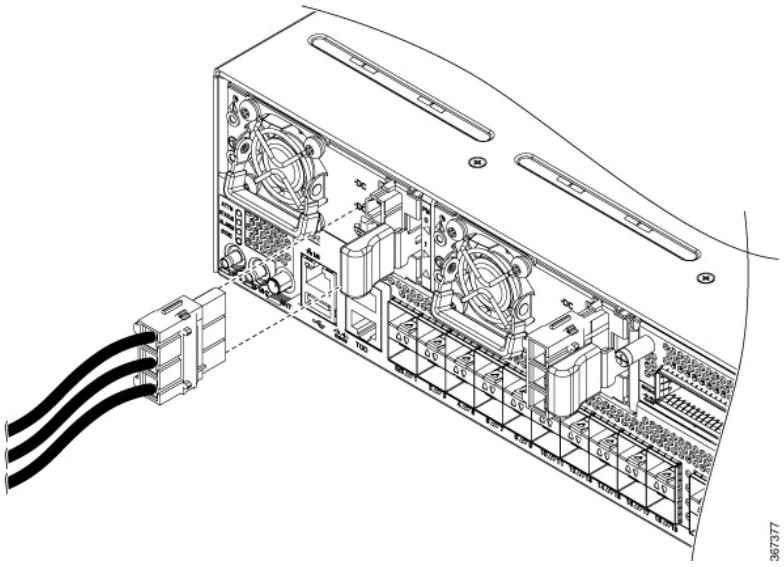
Step 3 Dress the power according to local practice.

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:

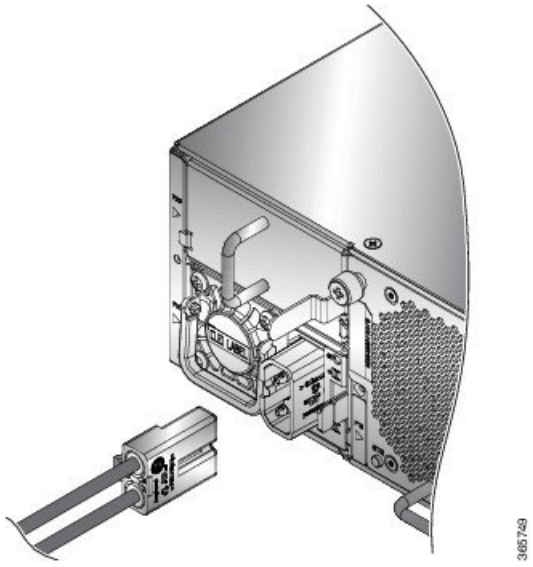
Note
For NC55-930W-DCFW and NC55-900W-DCFW-HD power supply units, please order the CAB-48DC-40A-8AWG power cord. For the NC55-2KW-DC power supply unit, please order the PWR-2KW-DC-CBL power cord.

- ***Figure 41: Connecting DC Power – NC55-930W-DCFW and NC55-900W-DCFW-HD***

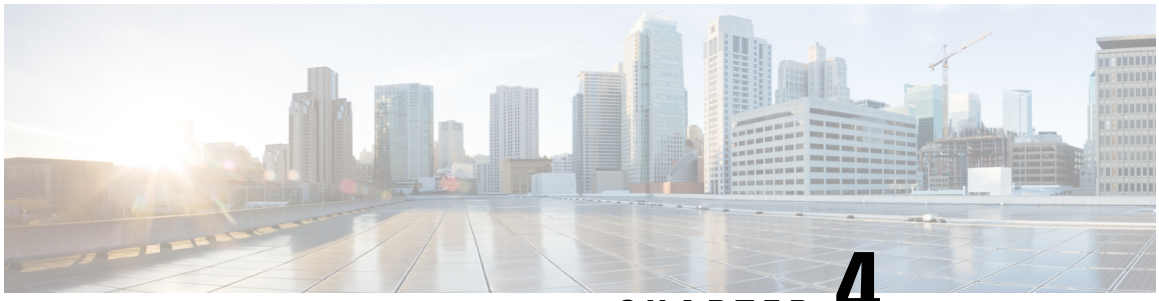


Ensure that the locking mechanism has engaged to secure the cable.

- ***Figure 42: Connecting DC Power – NC55-2KW-DC***



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



CHAPTER 4

Connect Router to the Network

- Port Connection Guidelines , on page 71
- Connect to the Console Port, on page 72
- Create the Initial Router Configuration, on page 75
- Connect to the Management Ethernet Port, on page 77
- Installing and Removing Modular Port Adapters, on page 78
- Installing Dust Caps, on page 81
- Install and Remove Transceiver Modules, on page 82
- Connect Interface Ports, on page 93
- Connecting a Cable to the GNSS Antenna Interface , on page 93
- Maintain Transceivers and Optical Cables, on page 95

Port Connection Guidelines

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

To prevent damage to the fiber-optic cables when installing a transceiver in the line card, we recommend that you disconnect the transceiver from its fiber-optic cables. Before removing the transceiver from the router, remove the cable from the transceiver. You can change or remove the cable without removing 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. 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 and should be kept below 0.35 dB.
    - Clean these parts before installation to prevent dust from scratching the fiber-optic cable ends.
    - Clean the connectors regularly; the required frequency of cleaning depends upon the environment. In addition, clean connectors when 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.

- 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 under 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 for 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.

Figure 43: NCS 55A1

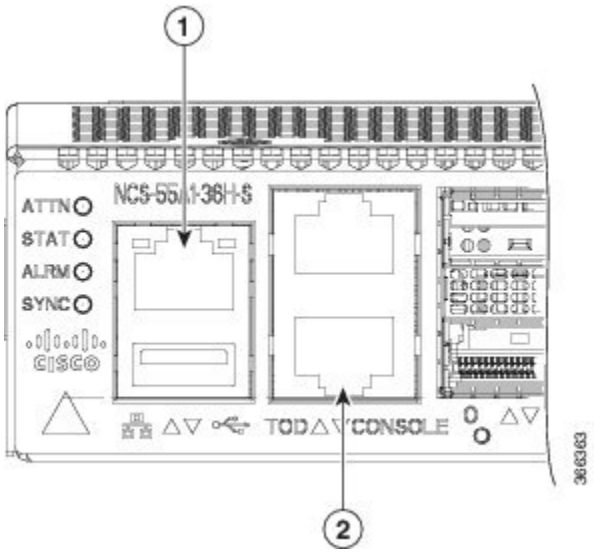


Figure 44: NCS 55A2

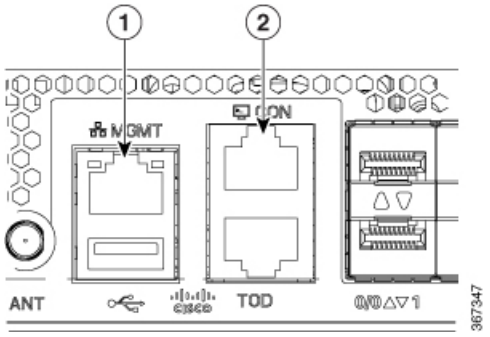
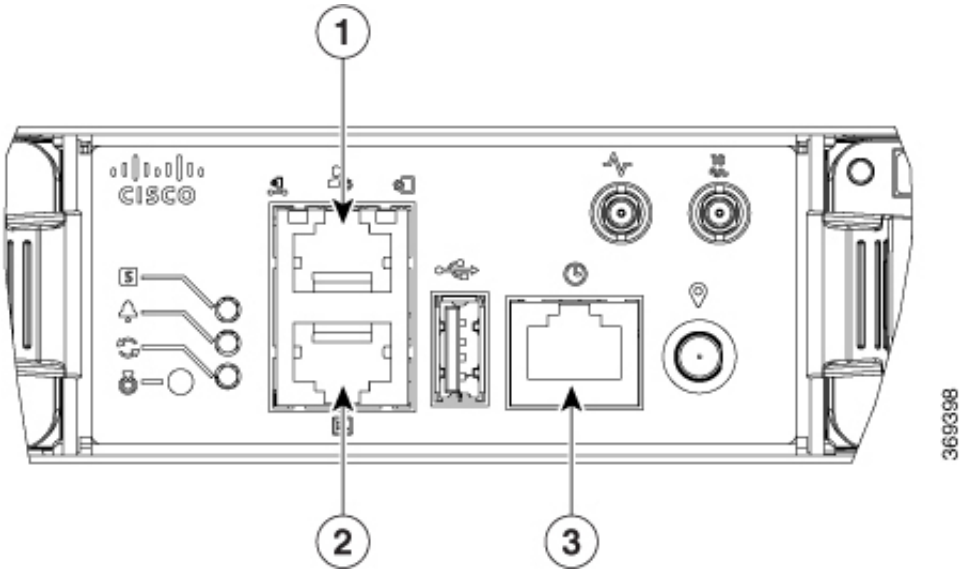


Figure 45: NCS-55A1-48Q6H and NCS-55A1-24Q6H-S/ NCS-55A1-24Q6H-SS



1	Management Ethernet port	2	Console port
3	Time of Day (ToD) 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 accessory kit.
  - Network cabling should already be routed to the location of the installed router.

Procedure

Step 1 Set your terminal to these operational values: 115200 bps, 8 data bits, no parity, 1 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 14: RJ-45 Straight-through Cable Pin-outs

RJ-45 Pin	Signal
1	—

RJ-45 Pin	Signal
2	—
3	Tx
4	Ground (GND)
5	GND
6	Rx
7	—
8	—

Create 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 a series of questions to help configure the router. To enable you to connect the router to the network, you can use the default choices for each configuration except for the IP address, which you must provide.



Note Be aware of the router's unique name to identify it among the other 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: `MgmtEth0/RP0/CPU0/0` and `MgmtEth0/RP1/CPU0/0`:

Procedure

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, and the 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 ---


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 it 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 "aaa")
- Does not contain recognizable words from the dictionary
- Does not contain proper names
- Contains both uppercase and lowercase characters
- Contains both numbers and 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 rejects the password configuration. Be sure to configure a strong password as described by the guidelines in this step. Passwords are case sensitive.

If you enter a strong password, the software asks you to confirm the password.

Step 4 Reenter the password.

When 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 whether you want to edit the configuration. Enter **no** to not edit the configuration.

Step 8 The software asks whether you want to save the configuration. Enter **yes** to save the configuration.

Connect to the Management Ethernet Port

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

Figure 46: NCS 55A1

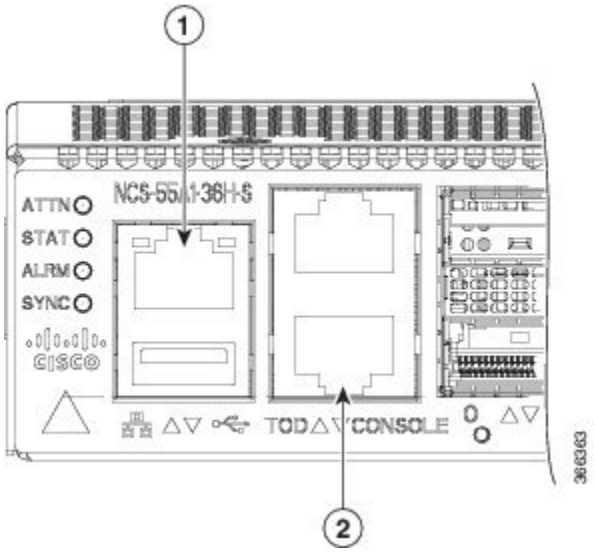


Figure 47: NCS 55A2

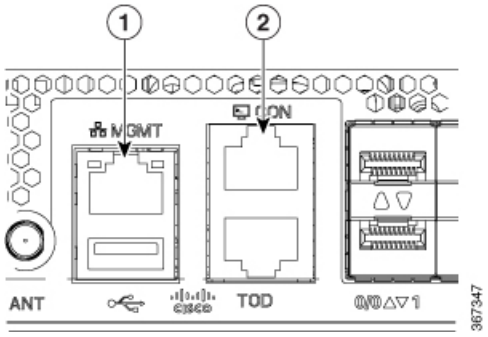
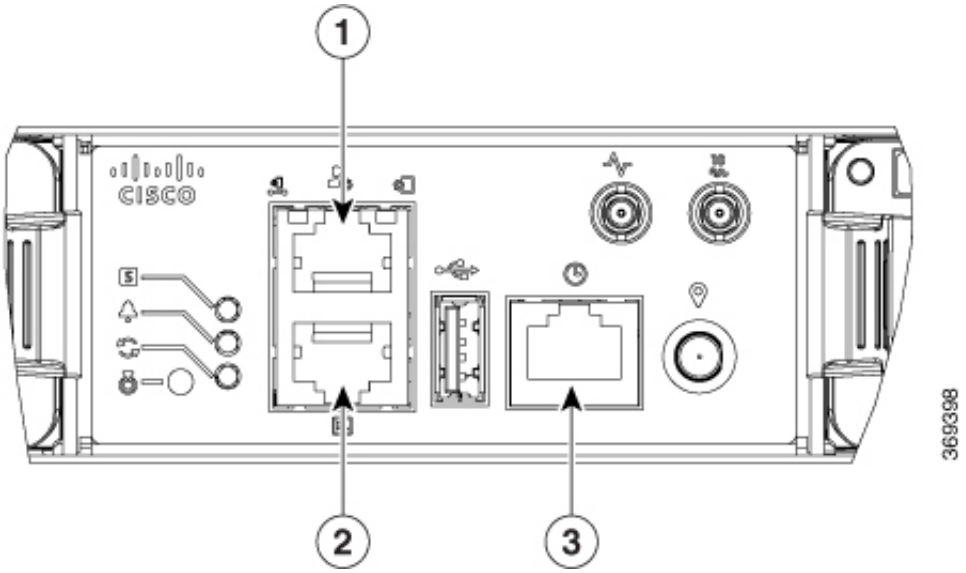


Figure 48: NCS-55A1-48Q6H and NCS-55A1-24Q6H-S/ NCS-55A1-24Q6H-SS



1	Management Ethernet port	2	Console port

Note To comply with GR-1089-CORE, Railway EN 50121, Smartgrid IEC 61850, and IEEE 1613, 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.

Procedure

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.

Installing and Removing Modular Port Adapters

The following sections describe how to install or remove MPA:

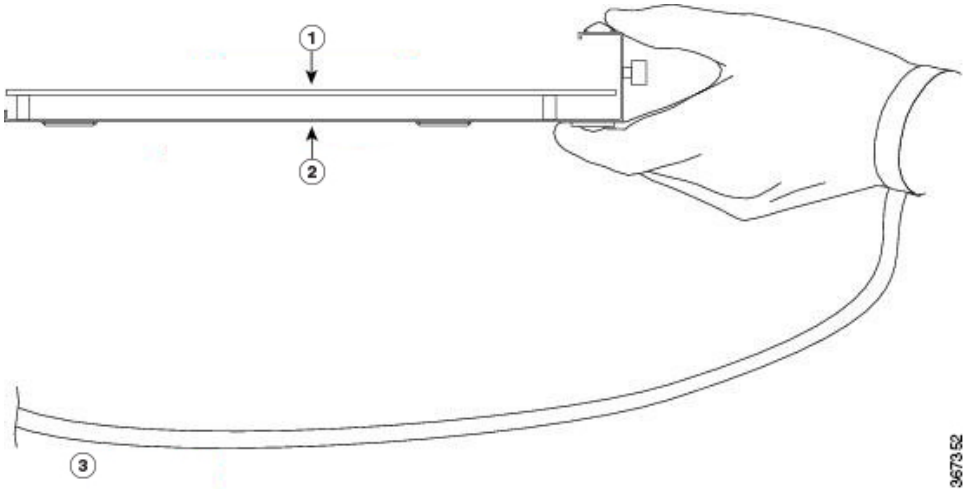
Handling Modular Port Adapters

Each modular port adapter (MPA) circuit board is mounted to a metal carrier and is sensitive to electrostatic discharge (ESD) damage.

Caution Always handle the MPA by the carrier edges and handle; never touch the MPA components or connector pins (See the figure below).

When a bay is not in use, a blank MPA Slot Filler must fill the empty bay to allow the router or switch to conform to electromagnetic interference (EMI) emissions requirements and to allow proper airflow across the installed modules. If you plan to install a MPA in a bay that is not in use, you must first remove the blank.

Figure 49: Handling a Modular Port Adapter



1	Printed Circuit Board	2	Metal Carrier
3	Grounding Strap		

Online Insertion and Removal

Caution Cisco IOS XR Software 6.6.1 and later releases support online insertion and removal (OIR) of Cisco NCS 5500 series modular port adapters (MPAs). To replace an MPA in systems running earlier releases, you must power down the chassis, replace the MPA, then power up the chassis.

Cisco NCS 5500 series modular port adapters (MPAs) support online insertion and removal (OIR).

Modular port adapters (MPAs) support the following types of OIR:

- Soft OIR

  Soft OIR uses the IOS XR **hw-module subslot** *rack/slot/subslot* **reload**, **hw-module subslot** *rack/slot/subslot* **shutdown**, and **no hw-module subslot** *rack/slot/subslot* **shutdown** commands to complete online insertion and removal.

- Managed OIR

A managed online insertion and removal of Modular port adapters (MPAs) is comprised of the following steps:

- Shut down the MPA with the **hw-module subslot** *rack/slot/subslot* **shutdown** command.
- Confirm that the LEDs have gone from green to off.
- Execute the **do show platform** command to verify that the MPA to be removed is in the disabled state.
- Physically remove the MPA to be replaced.
- Physically insert the replacement MPA. After inserting the MPA in the slot, tighten the MPA screw located on the right side within 10 seconds. Ensure that you first tighten the right screw and then the left.

Note Tighten the captive screws on the MPA within 10 seconds. Otherwise, the MPA shuts down and moves to **Disabled** state. To recover the MPA, tighten both the captive screws and then execute the **hw-module subslot** *rack/slot/subslot* **reload** command.

- Return the MPA to the up state with the **no hw-module subslot** *rack/slot/subslot* **shutdown** command.

Modular Port Adapter Installation and Removal

This section provides step-by-step instructions for removing and installing a modular port adapter (MPA) in a Cisco NCS 55A2-MOD-S, Cisco NCS 55A2-MOD-SE-S or Cisco NCS 55A2-MOD-HD-S router.

Note After you remove the MPA from the slot, wait for 60 seconds before you reinsert the MPA. From Cisco IOS XR Software Release 26.3.1 onward, the MPA can be replaced immediately without any delay.

Note After you unscrew both ejector screws, wait for 15 seconds before removing MPA from the slot.

To remove and install a MPA, do the following:

1. To insert the MPA, locate the guide rails inside the chassis that hold the MPA in place. They are at the bottom left and bottom right of the MPA slot and are recessed about an inch.
2. Carefully slide the MPA all the way in the chassis until the MPA is firmly seated in the MPA interface connector. When fully seated, the MPA might be slightly behind the faceplate.

Note The MPA will slide easily into the slot if it is properly aligned on the tracks. If the MPA does not slide easily, do NOT force it. Remove the MPA and reposition it, paying close attention to engaging it on the tracks. Push the MPA inside the slot until you hear a click. Continue to push the MPA further until you hear a second click. The MPA is fully seated only after the second click is heard.

3. After the MPA is properly seated, use a number 2 Phillips screwdriver to tighten the captive screws on the MPA. Ensure that you first tighten the right screw and then the left.

Note Tighten the captive screws on the MPA within 10 seconds. Otherwise, the MPA shuts down and moves to **Disabled** state. To recover the MPA, tighten both the captive screws and then execute the **hw-module subslot** *rack/slot/subslot* **reload** command.

Note Avoid over torquing the MPA captive screws when installing the MPA. Tighten the captive screws on the MPA to a torque of 6 +/-0.5 inch-pound.

4. To remove the MPA from the chassis, use a number 2 Phillips screwdriver to loosen the captive screws on the MPA. Ensure that you first loosen the right screw and then the left.
5. Grasp the MPA and pull the MPA from the chassis. (You have already disconnected the cables from the MPA.)

Installing Dust Caps

Install dust caps to protect unused or unconnected optical ports.

Caution Protect the transceiver ports by inserting clean dust caps into any ports not in use and do not have optical modules plugged in. If optical modules are plugged in but not in use, the dust caps that were supplied with the optical modules, should be used to protect the TX and RX surfaces of the optical module. Be sure to clean the optic surfaces of the fiber cables before you plug them back into the optical ports of another module. The dust caps protect the ports from possible EMI interference and also avoid contamination due to dust collection. To meet the EMI interference requirements, you must use the metal dust caps when the ports are not in use by optical modules.

The following list provides the product IDs (PIDs) for the dust caps that are available for each port type:

PID	Description
NC55-SFP-DCAP(=)	Cisco NCS5500 Series Dust cover for SFP/ZSFP (Qty: 1 per Kit)
NC55-QSFP-DCAP(=)	Cisco NCS5500 Series Dust cover for QSFP/ZQSFP (Qty: 1 per Kit)

PID	Description
NC55-CFP2-DCAP(=)	Cisco NCS5500 Series Dust cover for CFP2 (Qty: 1 per Kit)

Note Dust caps are orderable separately from Cisco and are available for a variety of input/output connectors.

Figure 50: SFP Dust Cap

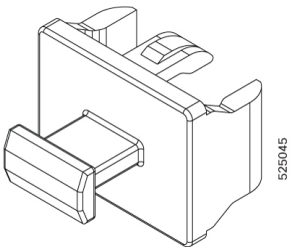


Figure 51: QSFP Dust Cap

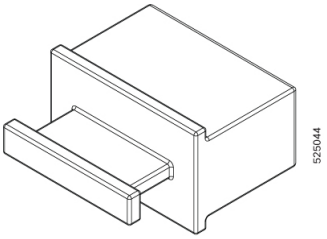
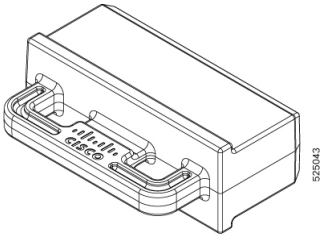


Figure 52: CFP2 Dust Cap



To install the dust cap:

1. Hold the dust cap by its handle.
2. Insert the dust cap in to the appropriate unused ports (SFP, QSFP, CFP2).

Install and Remove Transceiver Modules

Install and Remove SFP Modules

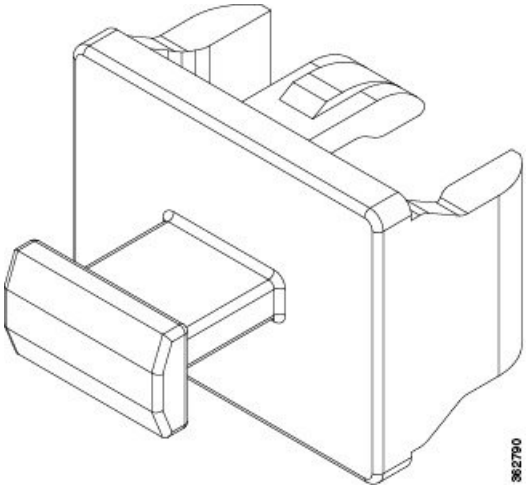
Before you remove or install an SFP or SFP+ module, read the installation information in this section.

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.

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 53: 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 by dust.

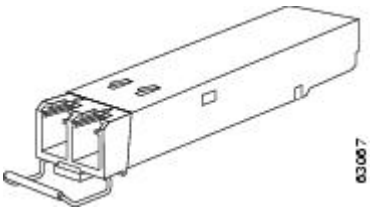
Caution We strongly recommended that you do not install or remove the SFP or SFP+ module with fiber-optic cables attached to it because of the potential of damaging the cable, the cable connector, or the optical interfaces in the module. Disconnect all cables before removing or installing an SFP or SFP+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

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. The click indicates that the module is correctly seated and secured in the receptacle. Verify that the modules are completely seated and secured in their assigned receptacles 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 54: Bale Clasp SFP or SFP+ Module



Install a Bale Clasp SFP or SFP+ Module

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

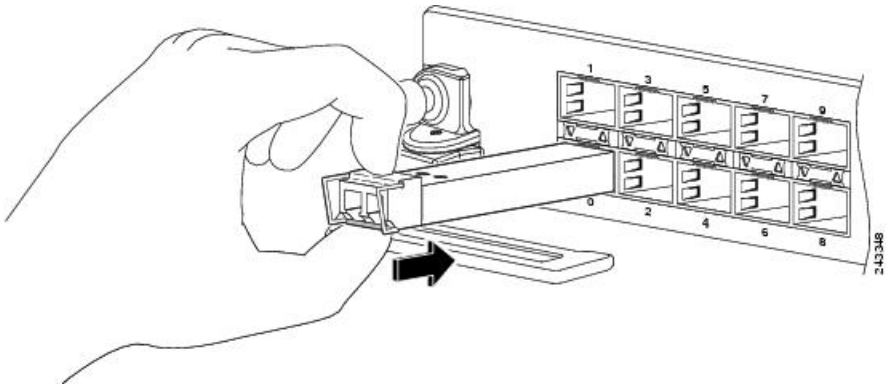
Procedure

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 55: 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 SFP module snaps into the hole in the receptacle. This click indicates 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.

Remove a Bale Clasp SFP or SFP+ Module

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

Procedure

Step 1 Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.

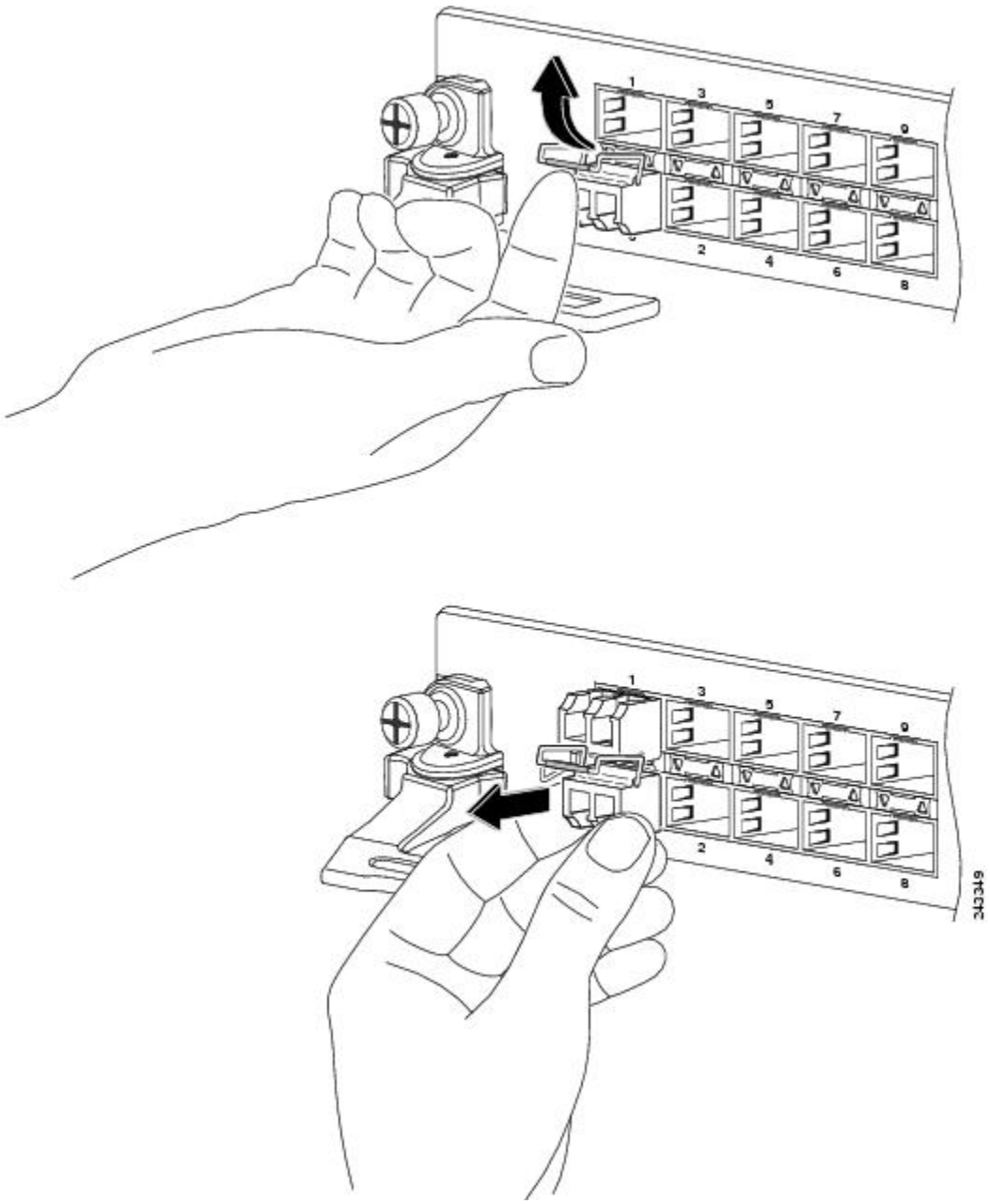
Step 2 Disconnect and remove all interface cables from the ports; note the current connections of the cables to the ports on the line card.

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.

Note
This action must be performed during your first instance. After all the ports are populated, this may not be possible.

Figure 56: 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 a clean SFP module cage covers into the optical module cage when there is no SFP module installed.

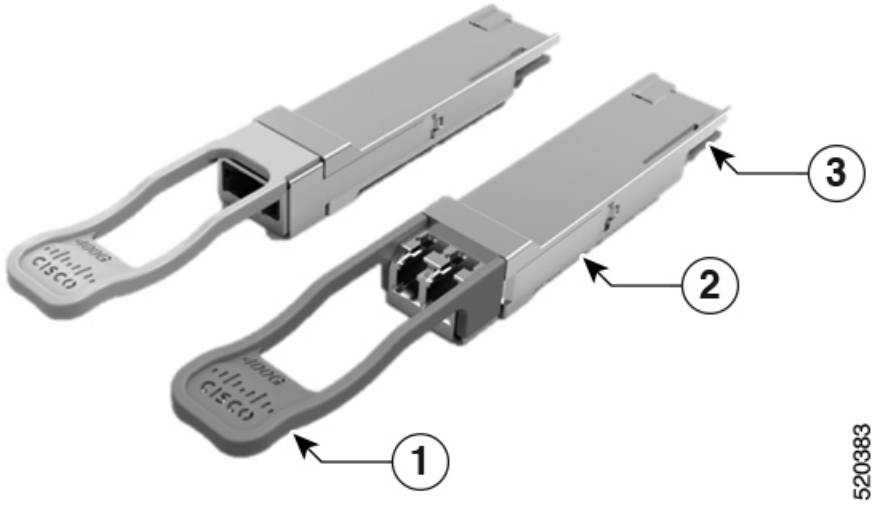
Install and Remove QSFP Transceiver Modules

Note In this section, QSFP refers to QSFP+, QSFP28, and QSFP-DD. Refer to the *Cisco Optical Transceiver Handling Guide* for additional details on optical transceivers.

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

The following figure shows the 400-Gigabit QSFP-DD transceiver module.

Figure 57: 400-Gigabit QSFP-DD Transceiver Module



1	Pull-tab	2	QSFP-DD transceiver body
3	Electrical connection to the module circuitry		

Warning **Statement 1079**—Hot Surface

This icon is a hot surface warning. To avoid personal injury, do not touch without proper protection.



Required Tools and Equipment

You need these tools to install the transceiver modules:

- 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 Maintaining Transceivers and Optical Cables.

Installing the QSFP Transceiver Module

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

The QSFP transceiver module has a pull-tab latch. To install a QSFP transceiver module, follow these steps:

Procedure

Step 1 Attach an ESD wrist strap to yourself and a properly grounded point on the chassis or the rack.

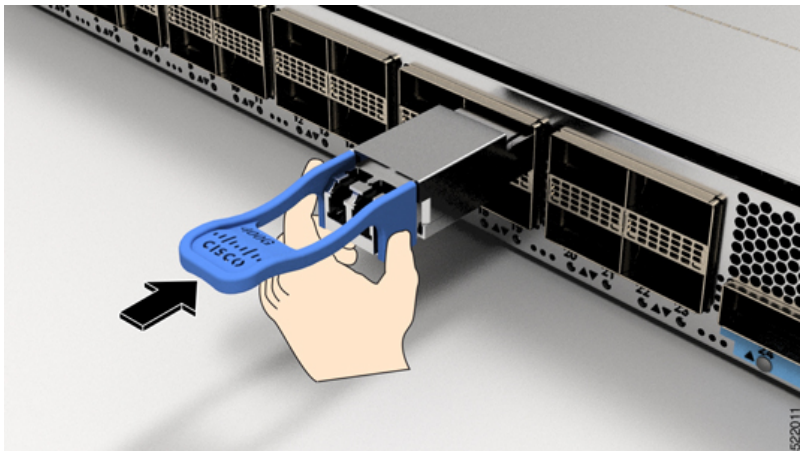
Step 2 Remove the transceiver module from its protective packaging.

Step 3 Check the label on the transceiver module body to verify that you have the correct model for your network. Do not remove the dust plug until you're ready to attach the network interface cable. Dust plug is not shown in the images.

Step 4 Hold the transceiver by the pull-tab so that the identifier label is on the top.

Step 5 Align the transceiver module in front of the module's transceiver socket opening and carefully slide the transceiver into the socket until the transceiver makes contact with the socket electrical connector (see the figure below).

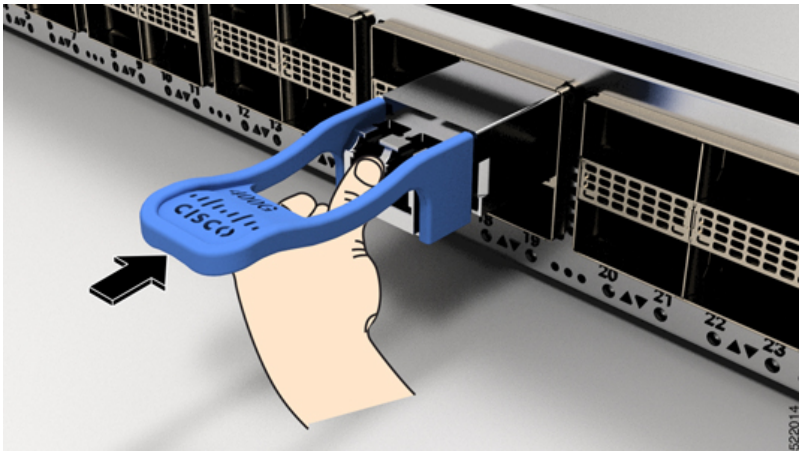
Figure 58: Installing the QSFP Transceiver Module



Step 6 Press firmly on the front of the transceiver module with your thumb to fully seat the transceiver in the module's transceiver socket (see the below figure).

Caution
If the latch is not fully engaged, you might accidentally disconnect the transceiver module.

Figure 59: Seating the QSFP Transceiver Module



Attach the Optical Network Cable

Before you begin

Before you remove the dust plugs and make any optical connections, follow these guidelines:

- Keep the protective dust plugs installed in the unplugged fiber-optic cable connectors and in the transceiver optical bores until you are ready to make a connection.
- Inspect and clean the MPO connector end faces just before you make any connections. For complete information on inspecting and cleaning fiber-optic connections, see the *Inspection and Cleaning Procedures for Fiber-Optic Connections* document.
- Grasp the MPO connector only by the housing to plug or unplug a fiber-optic cable.

Note QSFP transceiver modules are keyed to prevent incorrect insertion.

Note The multiple-fiber push-on (MPO) connectors on the optical QSFP 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 transceivers do not support network interface cables with an angle-polished contact (APC) face type.

Procedure

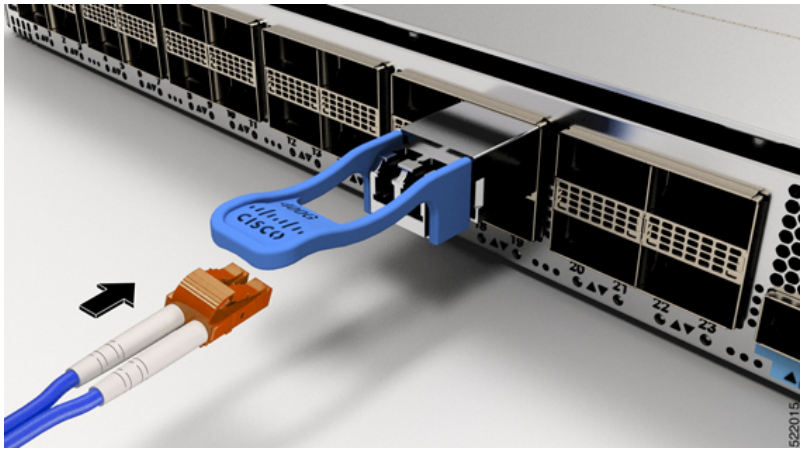
Step 1 Remove the dust plugs from the optical network interface cable MPO connectors. Save the dust plugs for future use.

Step 2 Inspect and clean the MPO connector's fiber-optic end faces.

Step 3 Remove the dust plugs from the transceiver module optical bores.

Step 4 Immediately attach the network interface cable MPO connectors to the transceiver module (see the figure below).

Figure 60: Cabling a Transceiver Module



Removing the QSFP Transceiver Module

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

To remove a QSFP transceiver module, follow these steps:

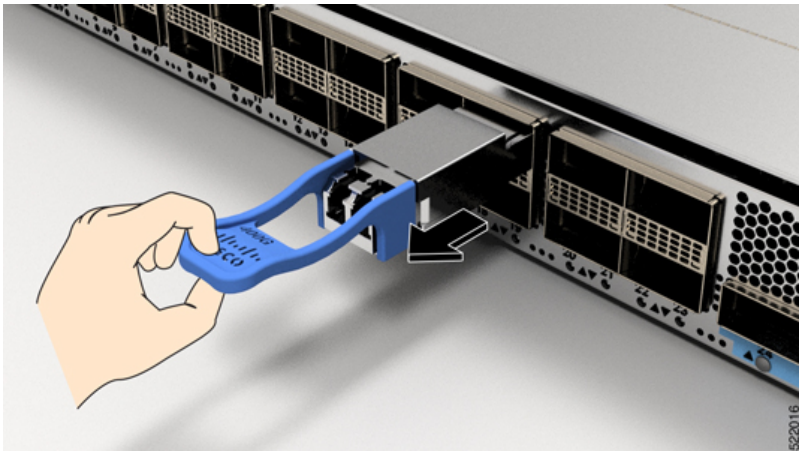
Procedure

Step 1 Disconnect the network interface cable from the transceiver connector.

Step 2 Install the dust plug immediately into the transceiver's optical bore

Step 3 Grasp the pull-tab and gently pull to release the transceiver from the socket.

Figure 61: Removing the QSFP Transceiver Module



Step 4 Slide the transceiver out of the socket.

Step 5 Place the transceiver module into an antistatic bag.

Installing and Removing CFP2 Modules

Before you remove or install a CFP2 module, read the installation information in this section.

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.

Caution The CFP2 module is a static-sensitive device. Always use an ESD wrist strap or similar individual grounding device when handling the CFP2 modules or coming into contact with the modules.

Installing a CFP2 Module

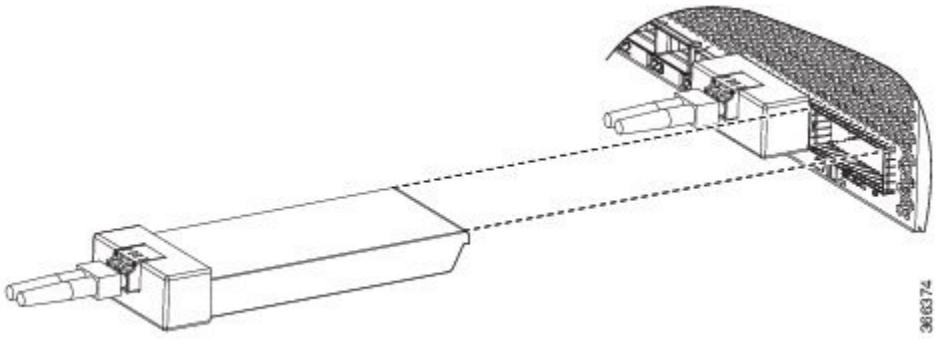
To install a CFP2 module, follow these steps:

Procedure

Step 1 Attach an ESD-preventive wrist or ankle strap and follow its instructions for use.

Step 2 Align the CFP2 module into the transceiver port socket of the line card.

Figure 62: Aligning a CFP2 Module into a Port Socket

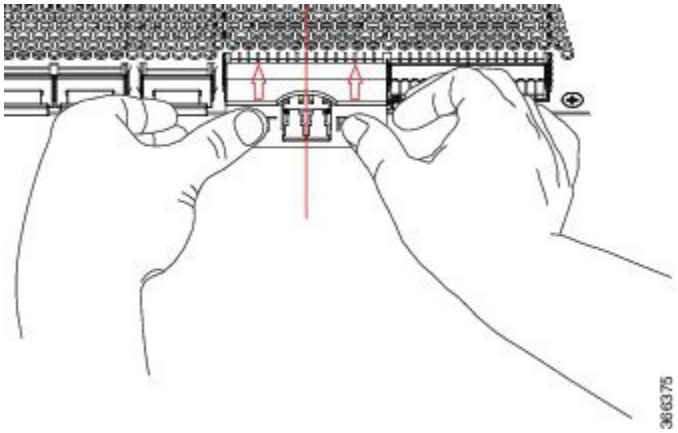


Step 3 Slide the CPT2 module in until the EMI gasket flange makes contact with the line card faceplate.

Step 4 Press firmly on the front of the CFP2 module with your thumbs to fully seat it in the transceiver socket.

The CFP2 module is properly seated in the slot by applying symmetrical force of at least 80N on its front surface, along the centerline. The latching mechanisms on both the sides of the pluggable should be fully engaged, and the electrical connectors should be completely mated.

Figure 63: Installing a CFP2 Module into a Port Socket



Step 5 When you are ready to attach the network cable interface, remove the dust plugs and inspect and clean fiber connector end faces, and then immediately attach the network interface cable connectors into the CFP2 module optical bores.

Removing a CFP2 Module

To remove a CFP2 module, follow these steps:

Procedure

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 ports on the line card.

Step 3 Open the bail latch on the CFP2 module with your index finger. If the bail latch 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 bail latch.

Step 4 Grasp the CFP2 module between your thumb and index finger and carefully remove it from the port.

Step 5 Place the removed CFP2 module on an antistatic mat, or immediately place it in a static shielding bag if you plan to return it to the factory.

Connect Interface Ports

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

Connect 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 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 SFP transceivers for 1-Gigabit optical ports or install SFP+ transceivers for 10-Gigabit optical ports or QSFP+ 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 than it is absolutely necessary. We recommended that you disconnect cables before installing or removing transceivers to prevent damage to the cable or transceiver.

Disconnect Optical Ports from the Network

When you need to remove fiber-optic transceivers, you must first remove the fiber-optic cables from the transceiver before you remove the transceiver from the port.

Connecting a Cable to the GNSS Antenna Interface

The GNSS LED is located on the rear side of the NCS-55A2-MOD-SL, NCS-55A2-MOD-HD-S, NCS-55A2-MOD-HX-S, NCS-55A2-MOD-SE-S, NCS-55A1-48Q6H, and NCS-55A1-24Q6H-S/NCS-55A1-24Q6H-SS chassis.

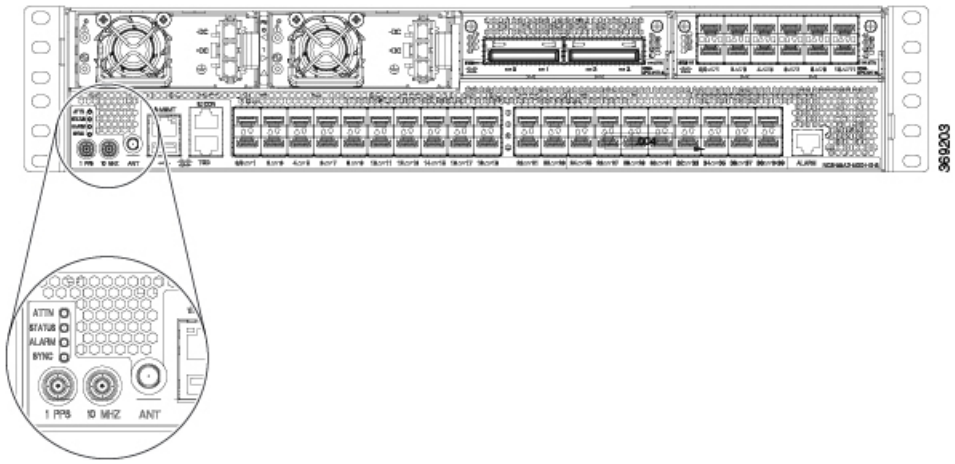
Procedure

Step 1 Connect one end of a shielded coaxial cable to the GNSS RF IN port.

Step 2 Connect the other end of the shielded coaxial cable to the GNSS antenna after the primary protector.

Note
The GNSS RF In port should have a primary protector installed to meet the Local Safety guidelines.

Figure 64: GNSS Port - NCS 55A2



The GNSS RF In coaxial cable shield must be connected to the Facility Equipment Ground through the chassis. The chassis must have the ground wire connected to the Facility Equipment Ground.

GPS Port Pinouts

The platform is capable of receiving or sourcing GPS signals of 1 PPS & 10 MHz. These interfaces are provided by two mini-coax 50-Ohm, 1.0/2.3 DIN series connector on the front panel. Similarly there are two mini-coax 50-Ohm connectors provided in the front panel to output this 1PPS and 10MHz.

The table below summarizes the GPS port pinouts.

Table 15: GPS Port Pinouts

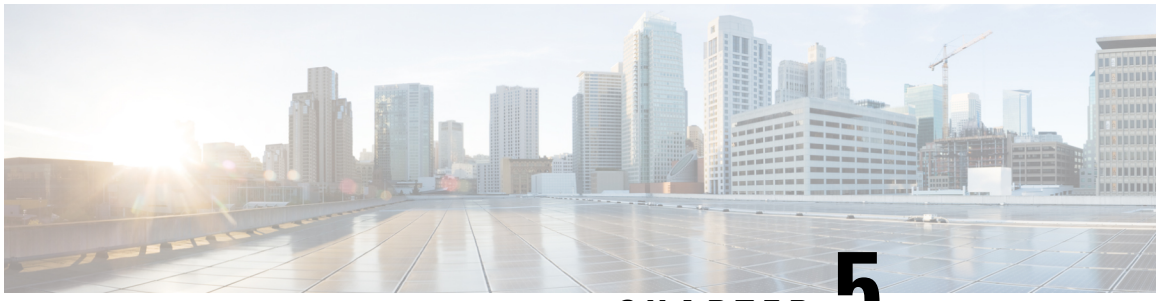
	10 MHz (Input and Output)	**1PPS (Input and Output)**
Waveform	Input—Sine wave Output—Square wave	Input—Rectangular pulse Output—Rectangular pulse
Amplitude	Input— > 1.7 volt p-p(+8 to +10 dBm) Output— > 2.4 volts TTL compatible	Input— > 2.4 volts TTL compatible Output— > 2.4 volts TTL compatible
Impedance	50 ohms	50 ohms
Pulse Width	50% duty cycle	26 microseconds
Rise Time	Input—AC coupled Output—5 nanoseconds	40 nanoseconds

Maintain Transceivers and Optical Cables

To maintain high signal accuracy and to prevent damage to the connectors, transceivers and fiber-optic cables must be kept clean and free of dust. 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 that is connected to the grounded chassis.
- Do not remove and insert a transceiver more than it is necessary. Repeated removals and insertions can shorten its useful life.
- Keep all optical connections covered when not in use. Clean them before use to prevent dust from scratching the fiber-optic cable ends.
- Do not touch the ends of connectors. Touching the ends would 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 have been 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. Clean and then inspect fiber ends under a microscope to determine whether any damage has occurred.



CHAPTER 5

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 configurations.

Procedure

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 IDs.

Note
To know the fan tray serial number in case of NCS 5500 series fixed-port routers, you must check the label on the fan tray.

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 three thresholds:

- Minor temperature threshold-When a minor threshold is exceeded, a minor alarm occurs and the following actions 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 actions occur:
  - For sensors 1, 2, 3, and 4 (outlet, inlet, 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.
    - 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.

- Critical temperature threshold-When a critical threshold is exceeded, a critical alarm occurs and 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, only that route processor card is shut down and the standby route processor card takes over.

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
```

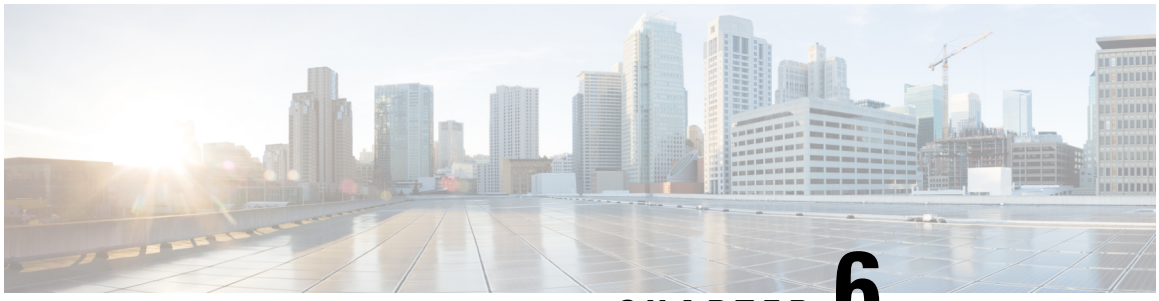
Displays the status of the fan trays.

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

Example:

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

Powers up or shuts down a card gracefully.



CHAPTER 6

Replace Chassis Components

Note The images in this chapter are only for representation purposes, unless specified otherwise. The chassis' actual appearance and size may vary.

- Replace Fan Modules, on page 101
- Replacing the Air Filter Frame, on page 106
- Replace Power Supply, on page 107
- Installing and Removing Modular Port Adapters, on page 109

Replace Fan Modules

Note To know the fan tray serial number in case of NCS 5500 series fixed-port routers, you must check the label on the fan tray.

Replace NCS 55A1-24H, NCS 55A1-36H-S, NCS 55A1-36H-SE-S, NCS 5501,NCS 5501-SE, NCS-55A1-48Q6H, NCS-55A1-24Q6H-S and NCS-55A1-24Q6H-SS Fan Modules

The fan module is designed to be removed and replaced while the system is operating without presenting 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 and NCS 55A1-36H-SE-S routers support NC55-A1-FAN-FW (port-side intake airflow) and NC55-A1-FAN-RV (port-side exhaust airflow) fan modules.

The NCS-55A1-48Q6H routers support NC55-A1-FAN-FW (port-side intake airflow) and NC55-A1-FAN-RV (port-side exhaust airflow) fan modules.

The NCS-55A1-24Q6H-S routers support NCS-1RU-FAN-FW (port-side intake airflow) and NCS-1RU-FAN-RV (port-side exhaust airflow) fan modules.

The NCS-55A1-24Q6H-SS routers support NCS-1RU-FAN-FW (port-side intake airflow) fan module.

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

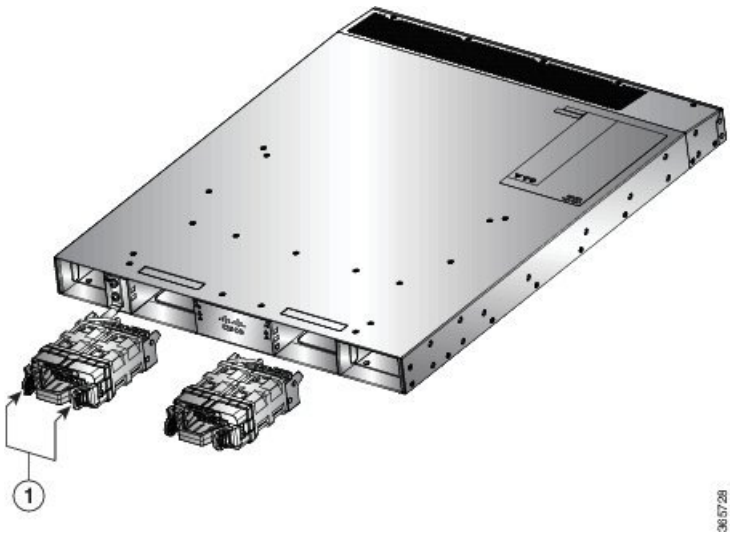
Procedure

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, NCS-55A1-48Q6H, NCS-55A1-24Q6H-S/NCS-55A1-24Q6H-SS and NCS 55A1 routers.

Figure 65: 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.

Installing or Replacing the Latched Fan Module



Note The Cisco NCS-55A2-MOD-HD-S, Cisco NCS-55A2-MOD-HX-S and Cisco NC55A2-MOD-SE-H-S routers support NC55-A2-FAN-L-FW (port-side intake airflow) fan modules.

This procedure replaces the NC55-A2-FAN-L-FW latched fan module in Cisco NCS-55A2-MOD-HD-S, Cisco NCS-55A2-MOD-HX-S and Cisco NC55A2-MOD-SE-H-S.

Procedure

Step 1 To insert the fan module (NC55-A2-FAN-L-FW) , do the following:

a) Hold the fan module with the LED and PID label at the top.

b) Align the fan module in the right orientation to the open fan tray slot in 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 chassis and in the correct orientation.

c) Push the module all the way into the slot until the latches click and lock into the chassis.

d) 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.

e) 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.

Step 2 To remove the fan module, do the following:

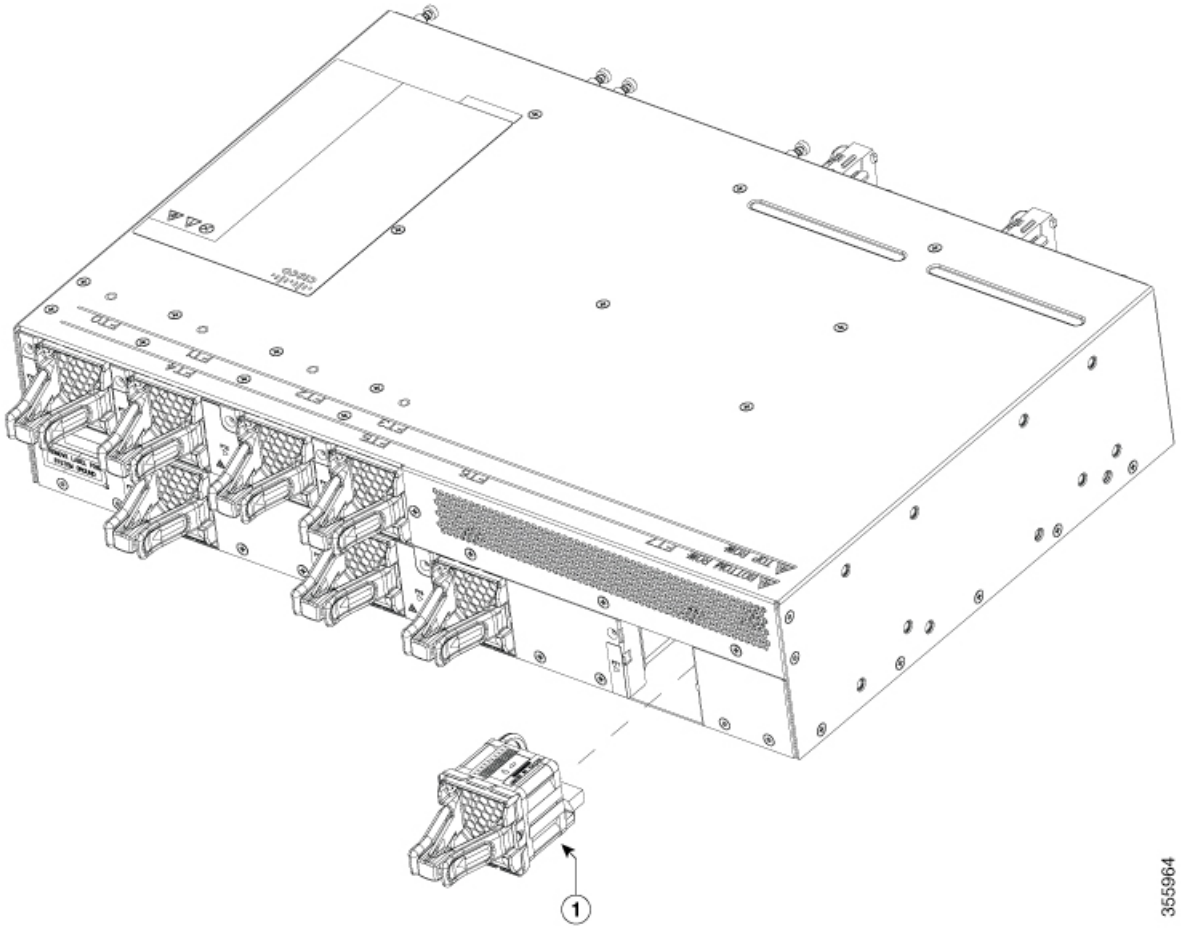
a) Press both the latches on the fan module to disengage the fan module connection from the chassis.

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

c) Pull the fan module clear of the chassis.

Note
The fan module port assignment label is present at the rear-top surface of the chassis.

Figure 66: Replace the Latched Fan Module



1	Fan Module		

Replace NCS 55A2-MOD-S, NCS 55A2-MOD-SE-S, NCS-55A2-MOD-HX-S, NC55A2-MOD-SE-H-S, NCS 55A2-MOD-HD-S, NCS 5502, NCS 5502 SE Fan Modules

Cisco NCS 55A2-MOD-S, NCS 55A2-MOD-SE-S, NCS-55A2-MOD-HX-S,NC55A2-MOD-SE-H-S,NCS 55A2-MOD-HD-S, NCS 5502 and NCS 5502 SE routers have 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 3 minutes.

Note The NCS 55A2-MOD-S, NCS 55A2-MOD-SE-S, NCS-55A2-MOD-HX-S, NC55A2-MOD-SE-H-S and NCS 55A2-MOD-HD-S routers have 8 fans: 4 fans for the MPAs (top) and 4 fans for the chassis baseboard (bottom). The top and bottom levels can operate with a minimum of 3 fans each.

Procedure

Step 1 Unscrew the thumbscrew on the fan.

Figure 67: Remove NCS 55A2-MOD-S , NCS 55A2-MOD-SE-S, NCS-55A2-MOD-HX-S, NC55A2-MOD-SE-H-S and NCS 55A2-MOD-HD-S Fan Modules

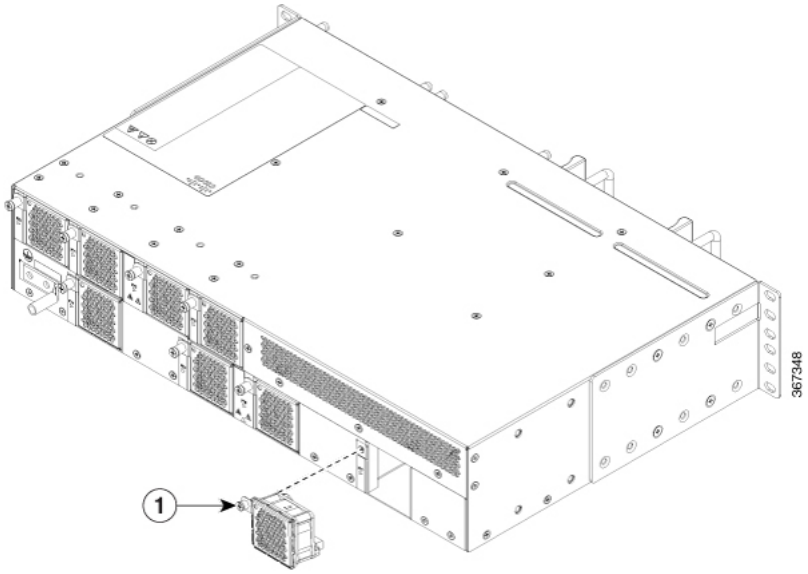
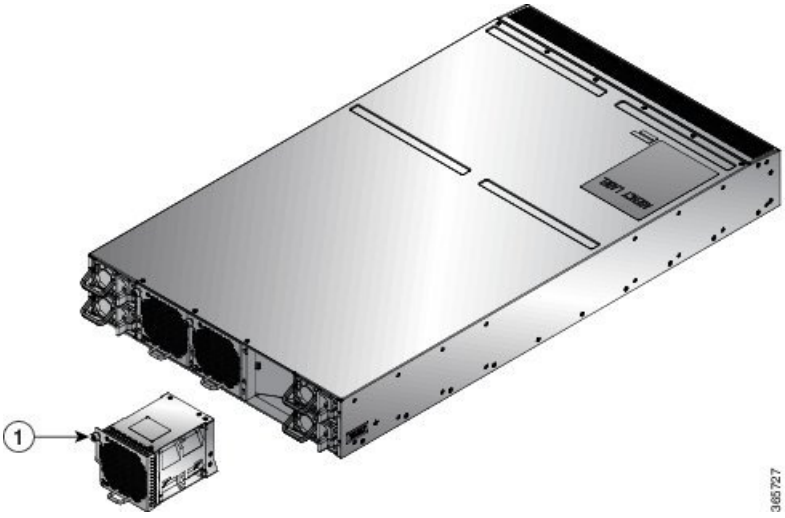


Figure 68: Remove NCS 5502 and NCS 5502 SE Fan Modules



1	Fan module thumbscrew

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 slot in the chassis and press the module all the way into the slot until the front of the fan module touches the chassis.

Make sure that the thumbscrew on the fan module is aligned with the screw hole in the chassis.

Step 5 Tighten the thumbscrew to secure the fan module in the chassis.

Step 6 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.

Step 7 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.

Replacing the Air Filter Frame

This procedure replaces the air filter frame (NCS-55A2-FLTR=) in Cisco NCS-55A2-MOD-HD-S, Cisco NCS-55A2-MOD-HX-S and Cisco NC55A2-MOD-SE-H-S.

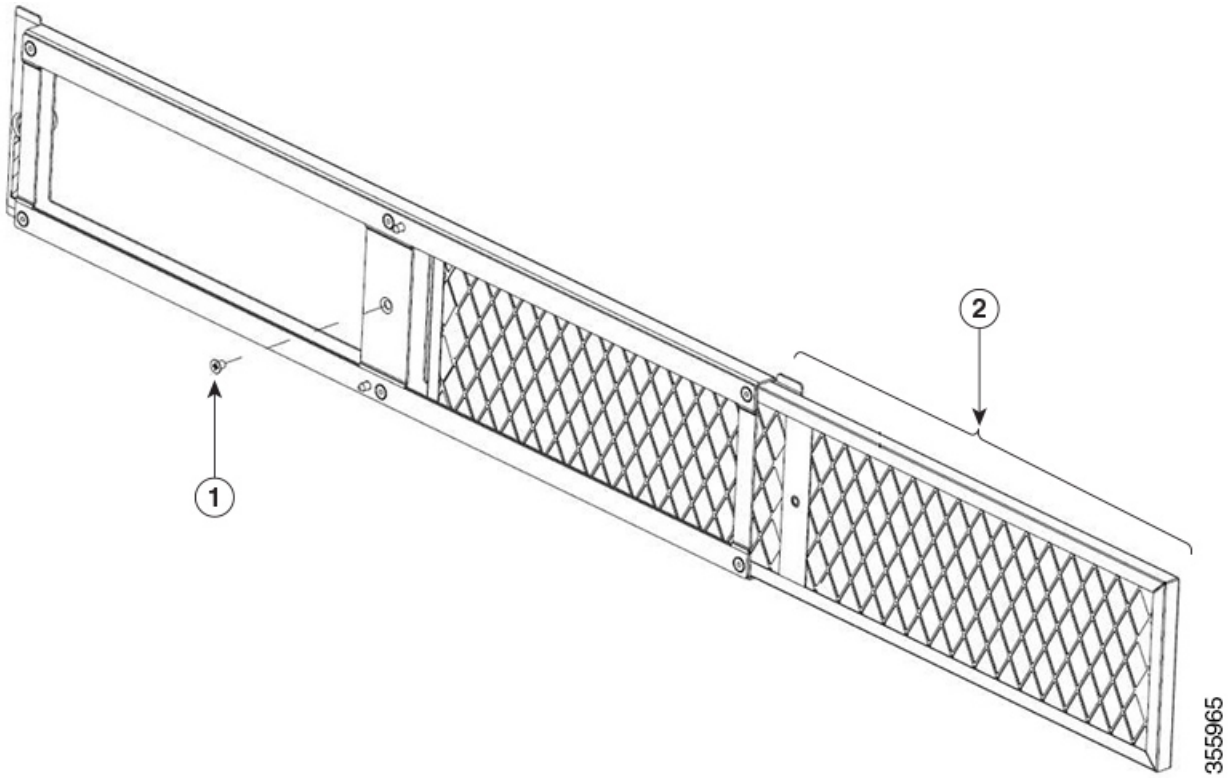
Note A periodic health check of the filter, every three months based on the level of dust in the environment, helps in avoiding over clogging of the filters and provide a better life. This product's filter is used as a single-use component. If the product is installed in a controlled environment, check and replace the filter every three months, otherwise replace the filter every month.

Procedure

Step 1 Remove the counter sink M3 screw on the filter faceplate with a torque value of 5 in-lbs (.56 N-m).

Step 2 Remove the filter frame from the right side as shown in the following figure.

Figure 69: Replace the Air Filter Frame



1	Screw	2	Air Filter Frame

Step 3 Slide the new filter frame in the reverse direction and tighten the counter sink M3 screw with a torque value of 5 in-lbs (.56 N-m).

Replace Power Supply

Use this procedure to replace the AC or DC power supply units.

Procedure

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 To install the new PSU, press the tab inward and then insert the 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, NCS-55A1-48Q6H, NCS-55A1-24Q6H-S/NCS-55A1-24Q6H-SS, and NCS 55A1-24H router.

Figure 70: Remove NCS 5501 Power Supply

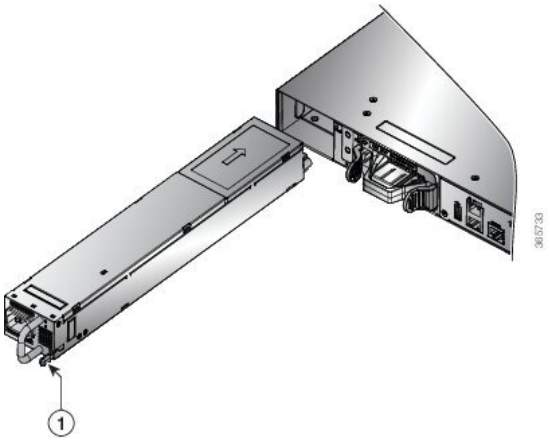


Figure 71: Remove NCS 55A1-36H-S and NCS 55A1-36H-SE-S Power Supply

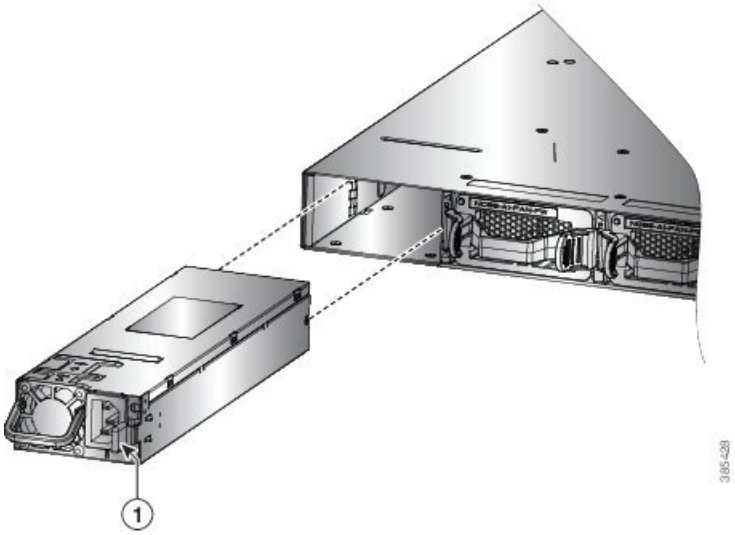


Figure 72: Remove NCS 5502 and NCS 5502 SE Power Supply

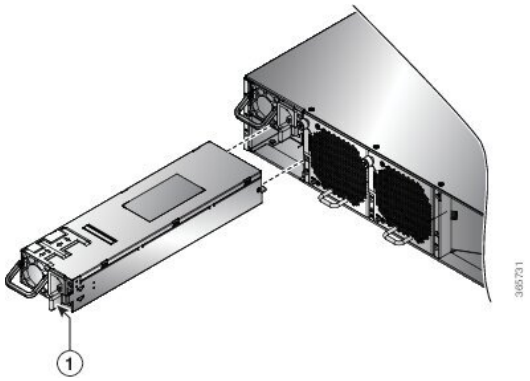
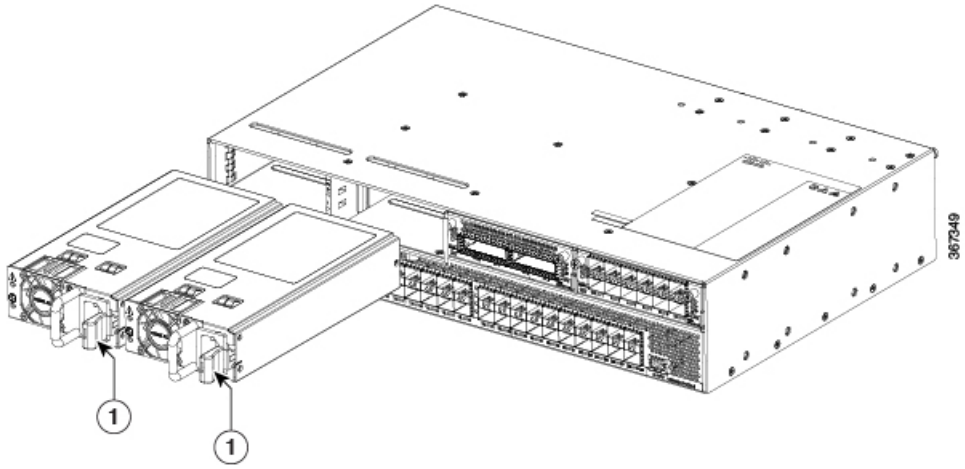


Figure 73: Remove NCS 55A2-MOD-S, NCS 55A2-MOD-SE-S , NCS-55A2-MOD-HX-S,NC55A2-MOD-SE-H-S,and NCS 55A2-MOD-HD-S Power Supply



1	Tab

Installing and Removing Modular Port Adapters

The following sections describe how to install or remove MPA:

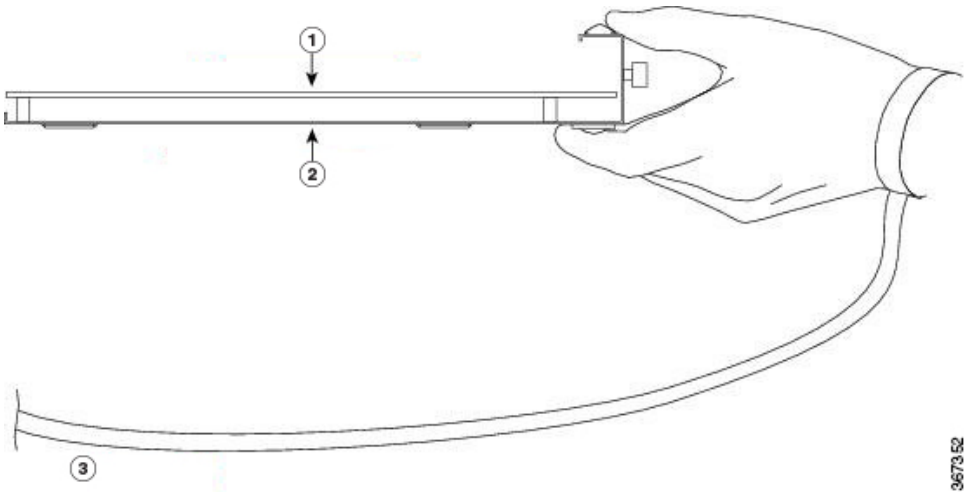
Handling Modular Port Adapters

Each modular port adapter (MPA) circuit board is mounted to a metal carrier and is sensitive to electrostatic discharge (ESD) damage.

Caution Always handle the MPA by the carrier edges and handle; never touch the MPA components or connector pins (See the figure below).

When a bay is not in use, a blank MPA Slot Filler must fill the empty bay to allow the router or switch to conform to electromagnetic interference (EMI) emissions requirements and to allow proper airflow across the installed modules. If you plan to install a MPA in a bay that is not in use, you must first remove the blank.

Figure 74: Handling a Modular Port Adapter



1	Printed Circuit Board	2	Metal Carrier
3	Grounding Strap		

Online Insertion and Removal

Caution Cisco IOS XR Software 6.6.1 and later releases support online insertion and removal (OIR) of Cisco NCS 5500 series modular port adapters (MPAs). To replace an MPA in systems running earlier releases, you must power down the chassis, replace the MPA, then power up the chassis.

Cisco NCS 5500 series modular port adapters (MPAs) support online insertion and removal (OIR).

Modular port adapters (MPAs) support the following types of OIR:

- Soft OIR

  Soft OIR uses the IOS XR **hw-module subslot** *rack/slot/subslot* **reload**, **hw-module subslot** *rack/slot/subslot* **shutdown**, and **no hw-module subslot** *rack/slot/subslot* **shutdown** commands to complete online insertion and removal.

- Managed OIR

  A managed online insertion and removal of Modular port adapters (MPAs) is comprised of the following steps:

  - Shut down the MPA with the **hw-module subslot** *rack/slot/subslot* **shutdown** command.
  - Confirm that the LEDs have gone from green to off.

- Execute the **do show platform** command to verify that the MPA to be removed is in the disabled state.
- Physically remove the MPA to be replaced.
- Physically insert the replacement MPA. After inserting the MPA in the slot, tighten the MPA screw located on the right side within 10 seconds. Ensure that you first tighten the right screw and then the left.

Note Tighten the captive screws on the MPA within 10 seconds. Otherwise, the MPA shuts down and moves to **Disabled** state. To recover the MPA, tighten both the captive screws and then execute the **hw-module subslot** *rack/slot/subslot* **reload** command.

- Return the MPA to the up state with the **no hw-module subslot** *rack/slot/subslot* **shutdown** command.

Modular Port Adapter Installation and Removal

This section provides step-by-step instructions for removing and installing a modular port adapter (MPA) in a Cisco NCS 55A2-MOD-S, Cisco NCS 55A2-MOD-SE-S or Cisco NCS 55A2-MOD-HD-S router.

Note After you remove the MPA from the slot, wait for 60 seconds before you reinsert the MPA. From Cisco IOS XR Software Release 26.3.1 onward, the MPA can be replaced immediately without any delay.

Note After you unscrew both ejector screws, wait for 15 seconds before removing MPA from the slot.

To remove and install a MPA, do the following:

1. To insert the MPA, locate the guide rails inside the chassis that hold the MPA in place. They are at the bottom left and bottom right of the MPA slot and are recessed about an inch.
2. Carefully slide the MPA all the way in the chassis until the MPA is firmly seated in the MPA interface connector. When fully seated, the MPA might be slightly behind the faceplate.

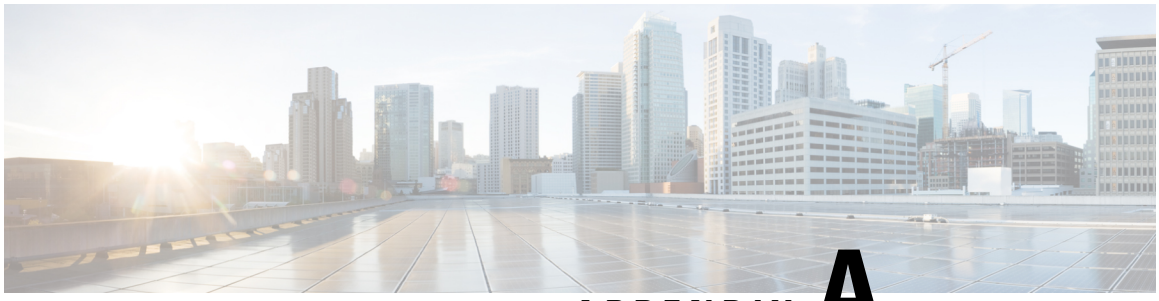
Note The MPA will slide easily into the slot if it is properly aligned on the tracks. If the MPA does not slide easily, do NOT force it. Remove the MPA and reposition it, paying close attention to engaging it on the tracks. Push the MPA inside the slot until you hear a click. Continue to push the MPA further until you hear a second click. The MPA is fully seated only after the second click is heard.

3. After the MPA is properly seated, use a number 2 Phillips screwdriver to tighten the captive screws on the MPA. Ensure that you first tighten the right screw and then the left.

Note Tighten the captive screws on the MPA within 10 seconds. Otherwise, the MPA shuts down and moves to **Disabled** state. To recover the MPA, tighten both the captive screws and then execute the **hw-module subslot** *rack/slot/subslot* **reload** command.

Note Avoid over torquing the MPA captive screws when installing the MPA. Tighten the captive screws on the MPA to a torque of 6 +/-0.5 inch-pound.

4. To remove the MPA from the chassis, use a number 2 Phillips screwdriver to loosen the captive screws on the MPA. Ensure that you first loosen the right screw and then the left.
5. Grasp the MPA and pull the MPA from the chassis. (You have already disconnected the cables from the MPA.)



APPENDIX A

System Specifications

- Environmental and Physical Specifications, on page 113
- Transceivers, Connectors, and Cables, on page 113

Environmental and Physical Specifications

For information on chassis specification, software feature support, environment properties, regulatory standards compliance, and ordering information, refer to these data sheets :

- Cisco Network Convergence System 5500 Series: Fixed Chassis Data Sheet
- Cisco Network Convergence System 5500 Series: 55A1 Fixed Chassis Data Sheet
- Cisco Network Convergence System 5500 Series: 55A2 Chassis Data Sheet

Transceivers, Connectors, and Cables

Transceiver and Cable Specifications

To determine which transceivers and cables are supported by this router, refer to the Transceiver Module Group (TMG) Compatibility Matrix Tool:

https://tmgmatrix.cisco.com

To see the transceiver specifications and installation information, see Cisco Transceiver Modules Install and Upgrade Guides.

Thermal Limitations

The optics listed below have different temperature specifications, as described below:

Table 16: Thermal Limitations

Optical Module	Platform	Ports Supported	Supported Temperature
QSFP-100G-ZR4-S	NCS-5502	48 Fixed ports	50℃
	NCS-5502-SE	48 Fixed ports	50℃
	NCS-55A1-48Q6H	6 Fixed ports	50℃
	NCS-55A1-24Q6H-S	6 Fixed ports	50℃
	NC55-MPA-1TH2H-S	2 Fixed ports	50℃
CFP2-DCO Coherent Optical Module	NCS-55A2 fixed ports, with NC55-MPA-2TH-S and NC55-MPA-1T2H-S	• MPA1 - 2 Ports • MPA2 - 2 Ports	50℃
400G Digital Coherent QSFP-DD Optical Module	NCS-55A2 fixed ports, with NC57-MPA-2D4H-S	• MPA1 - 1 Ports • MPA2 - 1 Ports	45℃

RJ-45 Connectors

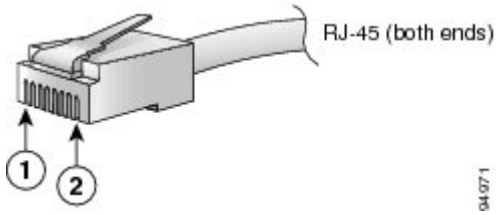
The RJ-45 connector connects Category 3, Category 5, Category 5e, Category 6, or Category 6A foil twisted-pair or unshielded twisted-pair cable from the external network to the following module interface connectors:

- Router chassis
  - CONSOLE port
  - MGMT ETH port

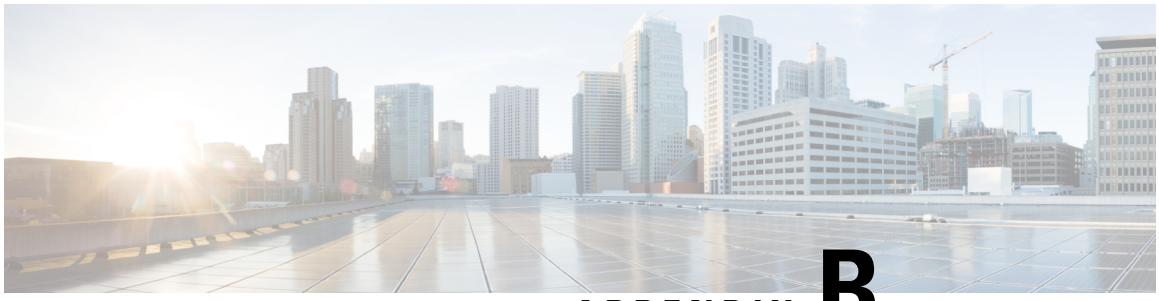
Caution To comply with GR-1089 intrabuilding, lightning immunity requirements, you must use a foil twisted-pair (FTP) cable that is properly grounded at both ends.

The following figure shows the RJ-45 connector.

Figure 75: RJ-45 Connector



1	Pin 1	2	Pin 8



APPENDIX B

LEDs

- Chassis LEDs, on page 115
- MPA LEDs, on page 117
- Fan Tray LED, on page 118
- Power Supply LEDs, on page 119
- Port Status LEDs, on page 122
- GNSS LED, on page 122

Chassis LEDs

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

NCS-55A1-48Q6H and NCS-55A1-24Q6H-S/NCS-55A1-24Q6H-SS: Attention (ATTN), STATUS, and ALARM LEDs are located on the bottom left front of the chassis and also on the rear-side of the chassis.

NCS 5501 SE, NCS 55A1-24H, NCS 55A2-MOD-S, NCS 55A2-MOD-SE-S, NCS-55A2-MOD-HX-S,NC55A2-MOD-SE-H-S, NCS 55A2-MOD-HD-S: Attention (ATTN), STATUS, ALARM, and SYNC LEDs are located along the left front of the chassis.

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

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

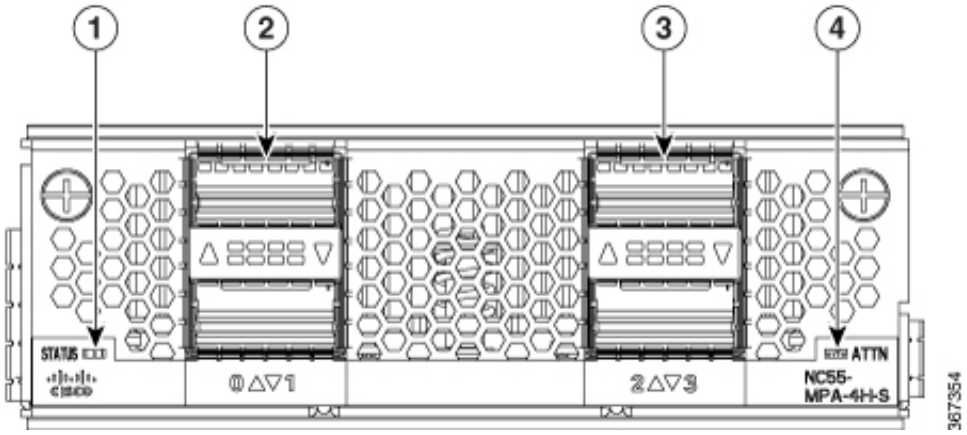
Table 17: Fixed-Port Chassis LED Descriptions

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

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 being 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: • Less than 2 PSUs • Power cord not plugged in • PSU not inserted properly • Input power not good
	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 IEEE1588.
	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.

MPA LEDs

The STATUS LED is located on the front left of the MPA, the attention (ATTN) is located on the front right of the MPA, and the Link LED for each port is located between the two rows of ports (each of these LEDs is a triangle pointing to the port above or below the LED).



LED	Color	Status
ATTN	Flashing blue	The operator has activated this LED to identify this MPA in the chassis.
	Off	This LED is not being used.
STATUS	Green	This MPA is operational.
	Amber	Either of the following conditions: • The MPA has detected a slot ID parity error and will not power on or boot up. • The MPA is not fully inserted.
	Flashing amber	The MPA is booting up or shutting down.
	Off	The MPA is powered-off and can now be safely removed.
Link (for each port)	Green	The port is active.
	Orange	The port is disabled by the operator or is not initializing.
	Flashing orange	The port is faulty and disabled.
	Off	The port is not active or the link is not connected.

Fan Tray LED

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

Figure 76: NCS-55A1-24H, NCS 55A1-36H-S, NCS 55A1-36H-SE-S, NCS 5501, NCS-55A1-48Q6H, NCS-55A1-24Q6H-S, and NCS 5501 SE Fan Tray LED



Figure 77: NCS 5502 Fan Tray LED

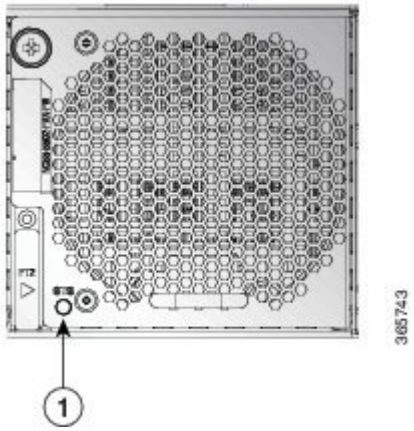
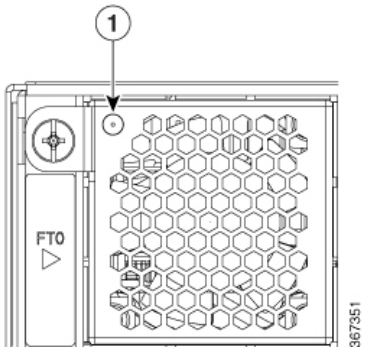


Figure 78: NCS 55A2-MOD-S, NCS 55A2-MOD-SE-S, NCS-55A2-MOD-HX-S,NC55A2-MOD-SE-H-S, and NCS 55A2-MOD-HD-S Fan Tray LED

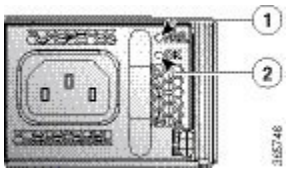


LED	Color	Status
STATUS	Green	Fans are operating normally.
	Flashing Amber	One or more fans are failed.
	Amber	Fan tray is inserted and pending to come online.
	Off	Fan tray is not receiving power.

Power Supply LEDs

NCS 55A1-24H, NCS-55A1-48Q6H, NCS-55A1-24Q6H-S, NCS-55A1-24Q6H-SS, NCS 5501 and NCS 5501 SE Power Supply LEDs

Power modules are located on the back side of the chassis. Each power module has an OK and a FAIL LED.



1	Fail	2	OK

Table 18: 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: • High temperature • High power • Slow power supply fan • Low voltage • Power supply is installed in the chassis but was disconnected from the power source

OK LED	FAIL LED	Status
Off	Amber	Power supply failure—possibly one of the following conditions: • Over voltage • Over current • Over temperature • Power supply fan failure

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

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

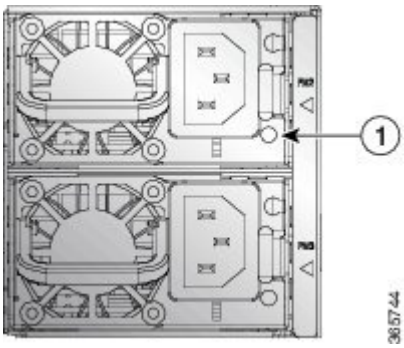
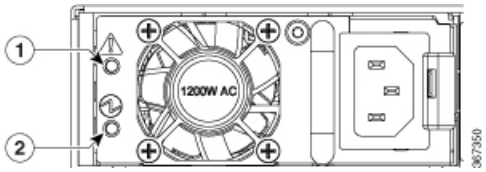


Table 19: Power Supply LED Descriptions

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: • Over voltage • Over current • Over Temperature • Fan failure
	Flashing Amber	Power supply is operating but a warning condition has occurred, due to one of the following conditions: • High temperature • High power • Slow fan
	Off	Power supplies are not receiving power.

NCS 55A2-MOD-S , NCS 55A2-MOD-SE-S, NCS-55A2-MOD-HX-S, NC55A2-MOD-SE-H-S,and NCS 55A2-MOD-HD-S Power Supply LEDs

Power modules are located in the front of the chassis. Each power module has an OK and a FAIL LED.



1	Fail	2	OK

Table 20: 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.

OK LED	FAIL LED	Status
Off	Flashing amber	Power supply is operating but a warning condition has occurred—possibly one of the following conditions: • High temperature • High power • Slow power supply fan • Low voltage • Power supply is installed in the chassis but was disconnected from the power source
Off	Amber	Power supply failure—possibly one of the following conditions: • Over voltage • Over current • Over temperature • Power supply fan failure

Port Status LEDs

Each port has an LED. The following table describes port status LEDs.

Table 21: Port Status LEDs (one per port)

LED Color	Description
Off	Port is administratively shut down.
Green	Port is administratively enabled and the link is up.
Amber	Port is administratively enabled and the link is down.
Single Amber Flash	Card reload is occurring. The LED blinks off-amber-off.

GNSS LED

The GNSS LED is located on the rear side of the NCS-55A2-MOD-SL, NCS-55A2-MOD-HD-S, NCS-55A2-MOD-HX-S, NCS-55A2-MOD-SE-S, NCS-55A1-24Q6H-S/NCS-55A1-24Q6H-SS and NCS-55A1-48Q6H chassis.

Table 22: GNSS LED

LED Color	Description
Green	GNSS Normal State. Self survey is complete.
Amber	All other states