Cisco Nexus 9508 Switch Site Preparation and Hardware Installation Guide

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Preface

This preface include the following sections:

Audience

This publication is for hardware installers and network administrators who install, configure, and maintain Cisco Nexus devices.

Document Conventions

Command descriptions use the following conventions:

Convention	Description
bold	Bold text indicates the commands and keywords that you enter literally as shown.
Italic	Italic text indicates arguments for which the user supplies the values.
[x]	Square brackets enclose an optional element (keyword or argument).
[x | y]	Square brackets enclosing keywords or arguments separated by a vertical bar indicate an optional choice.
{x | y}	Braces enclosing keywords or arguments separated by a vertical bar indicate a required choice.

Convention	Description
[x {y | z}]	Nested set of square brackets or braces indicate optional or required choices within optional or required elements. Braces and a vertical bar within square brackets indicate a required choice within an optional element.
`variable`	Indicates a variable for which you supply values, in context where italics cannot be used.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.

Examples use the following conventions:

Convention	Description
`screen font`	Terminal sessions and information the switch displays are in screen font.
`boldface screen font`	Information you must enter is in boldface screen font.
italic screen font	Arguments for which you supply values are in italic screen font.
< >	Nonprinting characters, such as passwords, are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

This document uses the following conventions:

Note Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the manual.

Caution Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Warning **Statement 1071—**Warning Definition

IMPORTANT SAFETY INSTRUCTIONS

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.

SAVE THESE INSTRUCTIONS

Related Documentation for Cisco Nexus 9000 Series NX-OS Software

The entire Cisco NX-OS 9000 Series documentation set is available at the following URL:

http://www.cisco.com/en/US/products/ps13386/tsd_products_support_series_home.html

Release Notes

The release notes are available at the following URL:

http://www.cisco.com/en/US/products/ps13386/prod_release_notes_list.html

Configuration Guides

These guides are available at the following URL:

http://www.cisco.com/en/US/products/ps13386/products_installation_and_configuration_guides_list.html

The documents in this category include:

- *Cisco Nexus 2000 Series NX-OS Fabric Extender Software Configuration Guide for Cisco Nexus 9000 Series Switches*
- *Cisco Nexus 9000 Series NX-OS Fundamentals Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS High Availability and Redundancy Guide*
- *Cisco Nexus 9000 Series NX-OS Interfaces Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS Layer 2 Switching Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS Multicast Routing Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS Quality of Service Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS Security Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS System Management Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS Unicast Routing Configuration Guide*
- *Cisco Nexus 9000 Series NX-OS Verified Scalability Guide*
- *Cisco Nexus 9000 Series NX-OS VXLAN Configuration Guide*

Other Software Documents

- *Cisco Nexus 7000 Series and 9000 Series NX-OS MIB Quick Reference*
- *Cisco Nexus 9000 Series NX-OS Programmability Guide*
- *Cisco Nexus 9000 Series NX-OS Software Upgrade and Downgrade Guide*
- *Cisco Nexus 9000 Series NX-OS System Messages Reference*
- *Cisco Nexus 9000 Series NX-OS Troubleshooting Guide*
- *Cisco NX-OS Licensing Guide*
- *Cisco NX-OS XML Interface User Guide*

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For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see *What's New in Cisco Product Documentation* at: http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html

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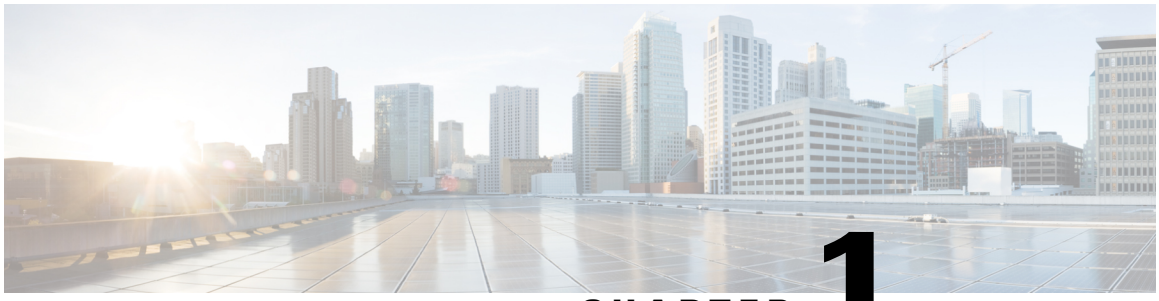


CHAPTER 1

Overview

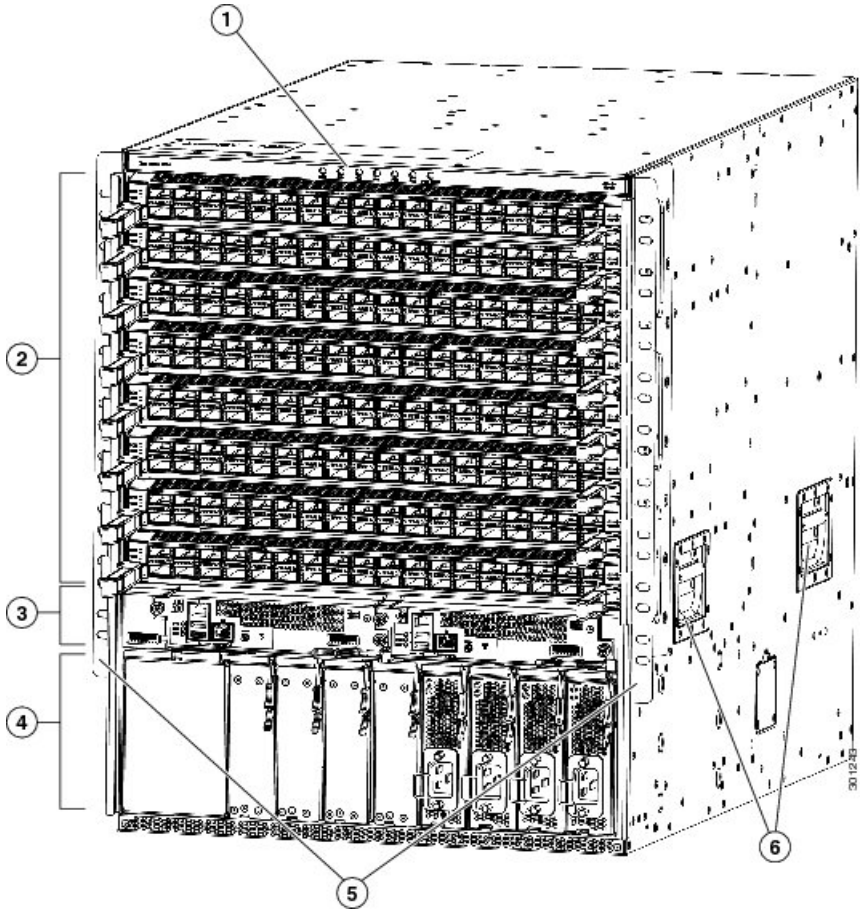
Overview

The Cisco Nexus 9508 switch chassis (N9K-C9508) holds the following components:

- Supervisor modules (up to two supervisor modules) (N9K-SUP-A)
- System controllers (up to two system controller modules) (N9K-SC-A)
- I/O modules (up to eight I/O modules)
  - 48-port 1-/10-Gigabit SFP+ plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9464PX)
  - 48-port 1-/10-GBASE-T plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9464TX)
  - 48-port 1-/10-GBASE-T plus 4-port QSFP+ I/O module (N9K-X9564TX)
  - 48-port 1-/10-Gigabit SFP+ plus 4-port QSFP+ I/O module (N9K-X9564PX)
  - 36-port 40-Gigabit QSFP+ aggregation (non-blocking) I/O module (N9K-X9636PQ)
  - 36-port 40-Gigabit QSFP+ I/O module (N9K-X9536PQ)
  - 32-port 40-Gigabit QSFP+ I/O module (N9K-X9432PQ)
- Fabric modules (up to six fabric modules [N9K-C9508-FM] behind the fan trays)
- Fan trays (three) (N9K-C9508-FAN)
- AC power supplies (N9K-PAC-3000W-B)
  - Optical I/O modules require up to four power supplies
  - BASE-T I/O modules require up to six power supplies

The following figure shows the hardware features seen from the front of the chassis.

Figure 1: Hardware Features on the Front of the Cisco Nexus 9508 Chassis

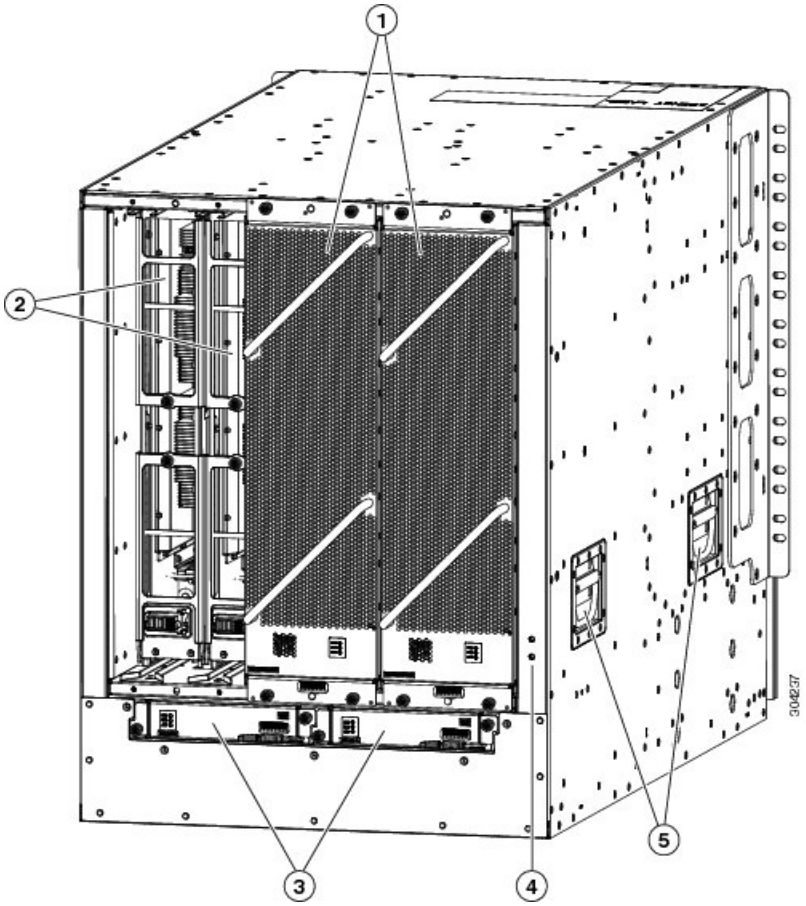


1	Chassis LEDs	4	3-kW AC power supplies (up to four if using optical I/O modules with power redundancy; up to six if using BASE-T copper modules with power redundancy) in slots 1 through 8 (labeled from left to right as PS 1 to PS 8)
2	I/O modules (up to eight) in slots 1 to 8 (labeled from top to bottom as LC 1 to LC 8	5	Two vertical mounting brackets used to mount the chassis onto a rack

3	Supervisor modules (one or two) in slots 27 and 28 (labeled from left ro right as SUP 1 and SUP 2)	6	Chassis handles (used only for positioning the chassis on the bottom support rails—do not use these handles for lifting the chassis)

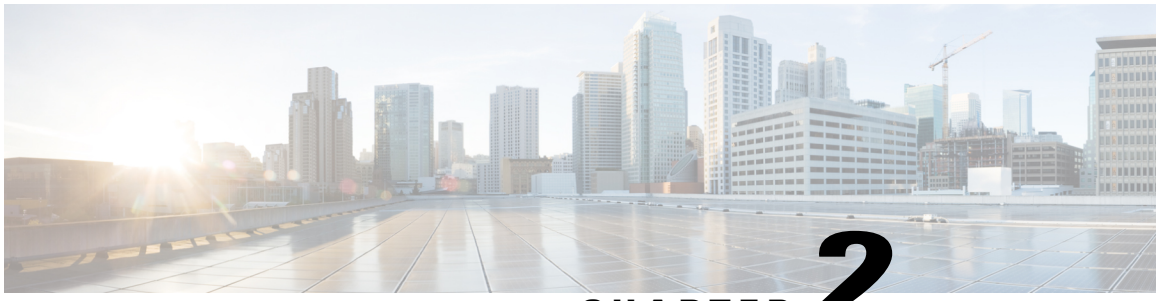
The following figure shows the hardware features seen from the rear of the chassis (one fan tray has been removed to show the fabric modules behind the fan trays).

Figure 2: Hardware Features on the Rear of the Cisco Nexus 9508 Chassis



1	Fan trays (three—one not shown in order to display the fabric modules located behind the fan trays) in slots 41 to 43 (labeled from left to right as FAN 1 to FAN 3)	4	Grounding pad

2	Fabric modules (up to six—up to two behind each fan tray) in slots 21 to 26 (labeled as FM 1 to FM 6).	5	Chassis handles (used only for positioning the chassis on the bottom support rails—do not use these handles for lifting the chassis)
3	System controllers (two) in slots 29 and 30 (labeled as slots 29 and 30 (labeled as SC 1 and SC 2)		



CHAPTER 2

Preparing the Site

Temperature Requirements

The switch requires a operating temperature of 32 to 104° F (1 to 40° C). If the switch is not operating, the temperature must be between –40 to 158° F (–40 to 70° C).

Humidity Requirements

High humidity can cause moisture to enter the switch. Moisture can cause corrosion of internal components and degradation of properties such as electrical resistance, thermal conductivity, physical strength, and size. The switch is rated to operate at 8 to 80 percent relative humidity, with a humidity gradation of 10 percent per hour. For nonoperating conditions, the switch can withstand from 5 to 95 percent relative humidity. Buildings in which the climate is controlled by air-conditioning in the warmer months and by heat during the colder months usually maintain an acceptable level of humidity for the switch equipment. However, if the switch is located in an unusually humid location, you should use a dehumidifier to maintain the humidity within an acceptable range.

Altitude Requirements

If you operate a switch at a high altitude (low pressure), the efficiency of forced and convection cooling is reduced and can result in electrical problems that are related to arcing and corona effects. This condition can also cause sealed components with internal pressure, such as electrolytic capacitors, to fail or to perform at a reduced efficiency. This switch is rated to operate at altitudes from –500 to 13,123 feet (–152 to 4,000 meters). You can store the switch at altitudes of –1,000 to 30,000 feet (–305 to 9,144 meters).

Dust and Particulate Requirements

Exhaust fans cool power supplies and system fan trays cool switches by drawing in air and exhausting air out through various openings in the chassis. However, fans also ingest dust and other particles, causing contaminant buildup in the switch and increased internal chassis temperature. A clean operating environment can greatly reduce the negative effects of dust and other particles, which act as insulators and interfere with the mechanical components in the switch.

In addition to regular cleaning, follow these precautions to avoid contamination of your switch:

- Do not permit smoking near the switch.
- Do not permit food or drink near the switch.

Minimizing Electromagnetic and Radio Frequency Interference

Electromagnetic interference (EMI) and radio frequency interference (RFI) from the switch can adversely affect other devices such as radio and television (TV) receivers operating near the switch. Radio frequencies that emanate from the switch can also interfere with cordless and low-power telephones. Conversely, RFI from high-power telephones can cause spurious characters to appear on the switch monitor.

RFI is defined as any EMI with a frequency above 10 kHz. This type of interference can travel from the switch to other devices through the power cable and power source or through the air like transmitted radio waves. The Federal Communications Commission (FCC) publishes specific regulations to limit the amount of EMI and RFI that can be emitted by computing equipment. Each switch meets these FCC regulations.

To reduce the possibility of EMI and RFI, follow these guidelines:

- Cover all open expansion slots with a blank filler plate.
- Always use shielded cables with metal connector shells for attaching peripherals to the switch.

When wires are run for any significant distance in an electromagnetic field, interference can occur between the field and the signals on the wires with the following implications:

- Bad wiring can result in radio interference emanating from the plant wiring.
- Strong EMI, especially when it is caused by lightning or radio transmitters, can destroy the signal drivers and receivers in the chassis and even create an electrical hazard by conducting power surges through lines into equipment.

Note To predict and prevent strong EMI, you might need to consult experts in radio frequency interference (RFI).

The wiring is unlikely to emit radio interference if you use twisted-pair cable with a good distribution of grounding conductors. If you exceed the recommended distances, use a high-quality twisted-pair cable with one ground conductor for each data signal when applicable.

Caution If the wires exceed the recommended distances, or if wires pass between buildings, give special consideration to the effect of a lightning strike in your vicinity. The electromagnetic pulse caused by lightning or other high-energy phenomena can easily couple enough energy into unshielded conductors to destroy electronic switches. You might want to consult experts in electrical surge suppression and shielding if you had similar problems in the past.

Shock and Vibration Requirements

The switch has been shock- and vibration-tested for operating ranges, handling, and earthquake standards.

Grounding Requirements

The switch is sensitive to variations in voltage supplied by the power sources. Overvoltage, undervoltage, and transients (or spikes) can erase data from the memory or cause components to fail. To protect against these types of problems, ensure that there is an earth-ground connection for the switch. You can connect the grounding pad on the switch either directly to the earth-ground connection or to a fully bonded and grounded rack.

You must provide the grounding cable to make this connection, but you can connect the grounding wire to the switch using a grounding lug that ships with the switch. Size the grounding wire to meet local and national installation requirements. Depending on the power supply and system, a 12 AWG to 6 AWG copper conductor is required for U.S. installations (for those installations, we recommend that you use commercially available 6 AWG wire). The length of the grounding wire depends on the proximity of the switch to proper grounding facilities.

Note You automatically ground the AC power supplies when you connect them to a power source. You must also connect the chassis to the facility earth ground.

Planning for Power Requirements

To plan for the power requirements of a switch, you must determine each of the following:

- Power requirements for all of the switch components
- Minimum number of power supplies required to power the components installed in the switch

- Power mode to use and the number of additional power supplies required for that mode

You must also ensure that the circuit used for the switch is dedicated to the switch to minimize the possibility of circuit failure.

When you know the amount of power that is required for operations (available power) and redundancy (reserve power), you can plan for the required number of input power receptacles within reach of the switch location.

Step 1 Determine the power requirement for the switch by summing the maximum wattage for each installed module (see the following table).

Table 1: Power Requirements for the Cisco Nexus 9508 Switch Modules

Component	Quantity	Maximum	Typical
Supervisor Modules	1 or 2	—	—
– Supervisor (N9K-SUP-A)		80 W	69 W
System Controller Modules	2	—	—
– System Controller (N9K-SC-A)		25 W	13 W
I/O Modules	1 to 8 (can mix types)	—	—
– 48-port 1-/10-Gigabit SFP+ plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9464PX)		430 W	300 W
– 48-port 1-/10-GBASE-T plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9464TX)		200 W	160 W
– 48-port 1-/10-GBASE-T plus 4-port QSFP+ I/O module (N9K-X9564TX)		550 W	450 W
– 48-port 1-/10-Gigabit SFP+ plus 4-port QSFP+ I/O module (N9K-X9564PX)		430 W	300 W
– 36-port 40-Gigabit QSFP+ aggregation I/O module (N9K-X9636PQ)		400 W	260 W
– 36-port 40-Gigabit QSFP+ I/O module (N9K-X9536PQ)		420 W	360 W
– 32-port 40-Gigabit QSFP+ I/O module (N9K-X9432PQ)		300 W	240 W
Fabric Modules (N9K-C9508-FM)	3 to 6	250 W	176 W
Fan Trays (N9K-C9508-FAN)	3	250 W	176 W

To determine the maximum amount of power that can be consumed by this switch when fully loaded with components, add the maximum power consumed by two supervisors (2 x 80 W = 160 W), two system controllers (2 x 25 W = 50 W),

eight 48-port 1- and 10-Gigabit BASE-T I/O modules (8 x 550 W = 4400 W), six fabric modules (6 x 250 W = 1500 W), and three fan trays (3 x 250 W = 750 W). The total is 6860 W.

Step 2 Determine the number of power supplies needed for the available power requirement by dividing the power requirement amount (see Step 1) by the output wattage of the power supplies installed in the switch.
For 3-kW power supplies, round up a fractional result to the nearest ones digit to determine the number of power supplies needed.

For example, if you are installing a switch with 3-kW power supplies and have a maximum consumption of 6960 W, you need three power supplies (6960 W / 3000 W = 2.32 [rounded up to 3 power supplies]) to operate the switch and its modules.

Step 3 Select one of the following power modes to determine the number of additional power supplies required for reserve power:

- Combined power—Do not add any power supplies to the number of power supplies calculated for the available power in Step 2. This power mode does not provide power redundancy, so no extra power supplies are needed.
- Power supply redundancy (*n*+1 redundancy)—Add one power supply (reserve power supply) that can output as much power as the most powerful power supply used for active power. This form of power redundancy provides a reserve power supply that can replace any active power supply that goes offline.
- Input source redundancy (grid or *n*+*n* redundancy)—Add enough power supplies (reserve power supplies) to at least equal the total output of the active power supplies (the number of power supplies calculated in Step 2). Typically, you double the number of power supplies. You must plan for a second power source for the reserve power supplies. For example, if you calculate that you need two 3-kW power supplies for 6 kW of available power, you need another two 3-kW power supplies for 6 kW of reserve power (for a total of four 3-kW power supplies used for available and reserve power).

Step 4 Be sure that the power source circuits are dedicated to the switch and not to other electrical equipment.
For combined power mode (no power redundancy) or power supply (*n*+1) redundancy, you need only one dedicated circuit. For input-source (grid or *n*+*n*) redundancy, you must have two dedicated power circuits, with each circuit powering half of the 3-kW power supplies. The requirements for each circuit are listed in the following table.

Power Supply	Number of Circuits	Requirement for Each Circuit
3-kW AC power supply (N9K-PAC-3000W-B)	1 (no redundancy or power supply redundancy) 2 (input-source redundancy)	16 A at 210 to 240 VAC

Step 5 Plan the placement of the input power receptacles within reach of the power cables used for each power supply (see the following table for the maximum distances).
Typically, power receptacles are placed on the rack with the switch.

Power Supply	Maximum Distance Between Receptacle and Power Supply
All AC power supplies	12 feet (3.5 m)

Rack and Cabinet Requirements

You can install the following types of racks or cabinets for your switch:

- Standard perforated cabinets
- Solid-walled cabinets with a roof fan tray (bottom to top cooling)
- Standard open four-post Telco racks

To correctly install the switch in a cabinet that is located in a hot-aisle/cold-aisle environment, you should fit the cabinet with baffles to prevent exhaust air from recirculating into the chassis air intake.

Work with your cabinet vendors to determine which of their cabinets meet the following requirements or see the Cisco Technical Assistance Center (TAC) for recommendations:

- Use a standard 19-inch (48.3 cm), 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 height of the rack or cabinet must accommodate the 13-RU (22.7 inches or 57.8 cm) height of the switch and its bottom support bracket.
- The depth of a four-post rack must be 24 to 32 inches (61.0 to 81.3 cm) between the front and rear mounting brackets.
- Required clearances between the chassis and the edges of its rack or the interior of its cabinet are as follows:
  - 4.5 inches (11.4 cm) between the front of the chassis and the front of the rack or interior of the cabinet (required for cabling).
  - 3.0 inches (7.6 cm) between the rear of the chassis and the interior of the cabinet (required for airflow in the cabinet if used).
  - No clearance is required between the chassis and the sides of the rack or cabinet (no side airflow).

Additionally, you must consider the following site requirements for the rack:

- Power receptacles must be located within reach of the power cords used with the switch.

  Power cords for 3-kW AC power supplies are 8 to 12 feet (2.5 to 4.3 m) long. For the power cord specifications, see AC Power Cord Specifications.
- Clearance is required for cables that connect to as many as 384 ports (in addition to the cabling required for other devices in the same rack). These cables must not block access to any removable chassis modules or block airflow into or out of the chassis. Route the cables through the cable management frames on the left and right sides of the chassis.

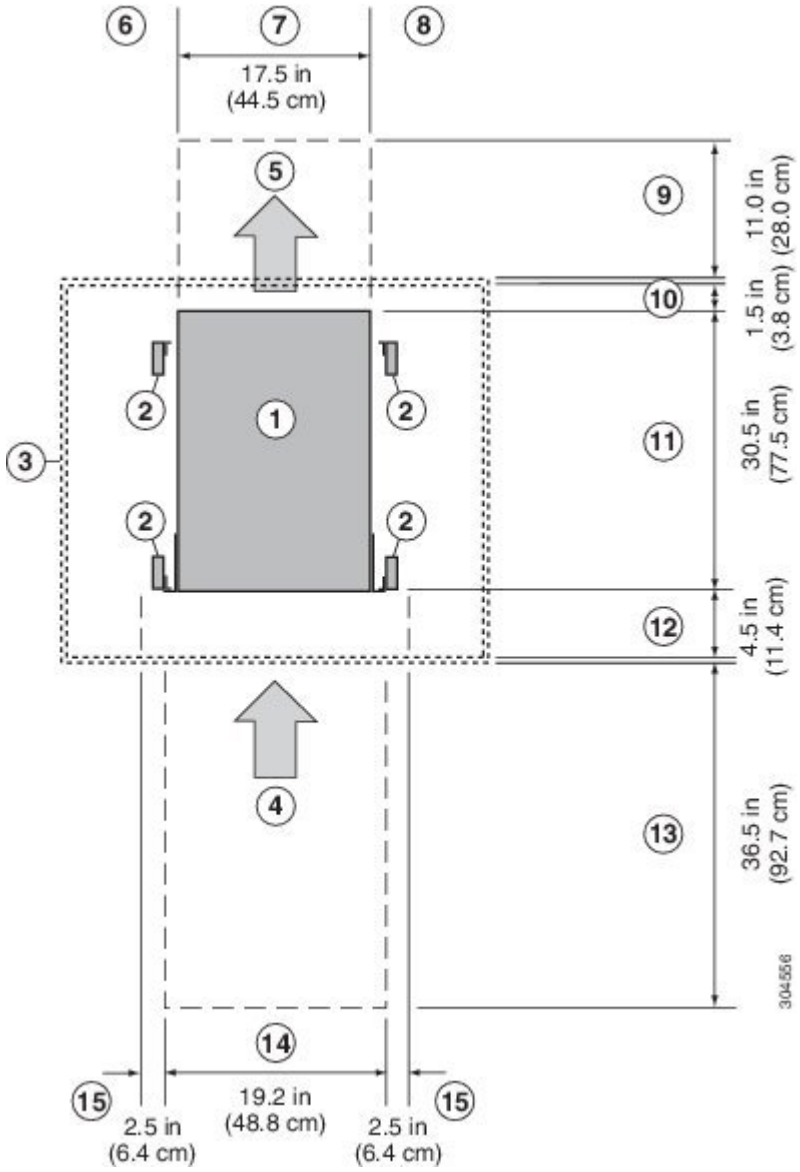
Warning **Statement 1048—**Rack Stabilization

Stability hazard. 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 can cause the rack to tip over.

Clearance Requirements

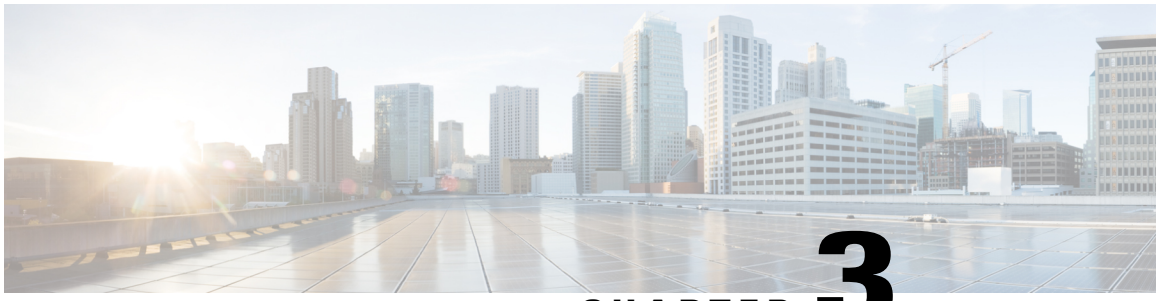
You must provide the chassis with adequate clearance between the chassis and any other rack, device, or structure so that you can properly install the chassis, route cables, provide airflow, and maintain the switch. For the clearances required for an installation of this chassis, see the following figure.

Figure 3: Clearances Required Around the Chassis



1	Chassis	9	Rear service clearance required to replace fan trays and fabric modules

2	Vertical rack-mount posts and rails	10	Clearance area required at the rear of the chassis within the cabinet (if used) or to the edge of the hot aisle (if no cabinet) for module handles
3	Nearest object or inside of cabinet (no side clearance required)	11	Chassis depth
4	Air intake from the cold aisle for all modules and power supplies	12	Clearance required between the front of the chassis and the inside of the cabinet (if used) or the edge of the cold aisle (if no cabinet) for cable management and ejector handles on I/O modules
5	Air exhaust to the hot aisle for all modules and power supplies	13	Front service clearance required for installing the chassis and replacing the modules on the front of the chassis
6	No left side clearance required (no airflow on left side)	14	Width of the chassis plus vertical mounting brackets on each side
7	Chassis width	15	Side clearance required by the front of the chassis for rotation of I/O module handles (keep this area clear of rack, cable management, and other components that can prevent full rotation of the ejector levers)
8	No right side clearance required (no airflow on right side)		



CHAPTER 3

Installing a Chassis

Installing a Rack or Cabinet

Before you install the switch, you must install a standard four-post, 19-inch (48.3 cm) EIA data center rack (or a cabinet that contains such a rack) that meets the requirements listed in Rack and Cabinet Requirements, on page 10.

Step 1 Bolt the rack to the subfloor before moving the chassis onto it.

Warning **Statement 1048—**Rack Stabilization

Stability hazard. 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 can cause the rack to tip over.

Step 2 If the rack has bonded construction, connect it to the earth ground. This action enables you to easily ground the switch and its components and to ground your electrostatic discharge (ESD) wrist strap to prevent discharge damage when you handle ungrounded components during installation.

Step 3 If you need access to the source power at the rack, include AC power receptacles with the amperage required by the switch that you are installing. For amperage and other circuit requirements, see Rack and Cabinet Requirements, on page 10.

Warning **Statement 1018—**Supply Circuit

Take care when connecting units to the supply circuit so that wiring is not overloaded.

Note If you are using the combined power mode or power-supply redundancy, you need only one power source. If you are using input-source redundancy, you need two power sources.

Unpacking and Inspecting a New Switch

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

Caution When you handle the chassis or its components, you must follow ESD protocol at all times to prevent ESD damage. This protocol includes but is not limited to wearing an ESD wrist strap that you connect to the earth ground.

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

Step 1 Compare the shipment to the equipment list that is provided by your customer service representative and verify that you have received all of the ordered items. The shipment should include boxes for the following:

- System chassis, which includes the following installed components:
  - One or two supervisor modules (N7K-SUP-A)
  - Two system controllers (N9K-SC-A)
  - One to eight I/O modules of the following types:
    - 48-port 1-/10-Gigabit SFP+ plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9464PX)
    - 48-port 1-/10-GBASE-T plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9464TX)
    - 48-port 1-/10-GBASE-T plus 4-port QSFP+ I/O module (N9K-X9564TX)
    - 48-port 1-/10-Gigabit SFP+ plus 4-port QSFP+ I/O module (N9K-X9564PX)
    - 36-port 40-Gigabit QSFP+ aggregation (non-blocking) I/O module (N9K-X9636PQ)
    - 36-port 40-Gigabit QSFP+ I/O module (N9K-X9536PQ)
    - 32-port 40-Gigabit QSFP+ I/O module (N9K-X9432PQ)
  - Three or six fabric modules (N9K-C9508-FM)
  - Three fan trays (N9K-C9508-FAN)
  - One to six 3-kW AC power supply units (N9K-PAC-3000W-B)
- Switch accessory kit

  To see a list of what is included in this kit, see Accessory Kit Contents, on page 105.

Step 2 Check the contents of each box for damage.

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

- Invoice number of the shipper (see the packing slip)
- Model and serial number of the missing or damaged unit
- Description of the problem and how it affects the installation

Installing the Bottom-Support Rails

The bottom-support rails support the weight of the switch chassis in the rack or cabinet. To maximize the stability of the rack, you must attach these rails at the lowest possible rack unit (RU).

Warning **Statement 1006—**Chassis Warning for Rack-Mounting and Servicing

To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit 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 unit in the rack.

Before You Begin

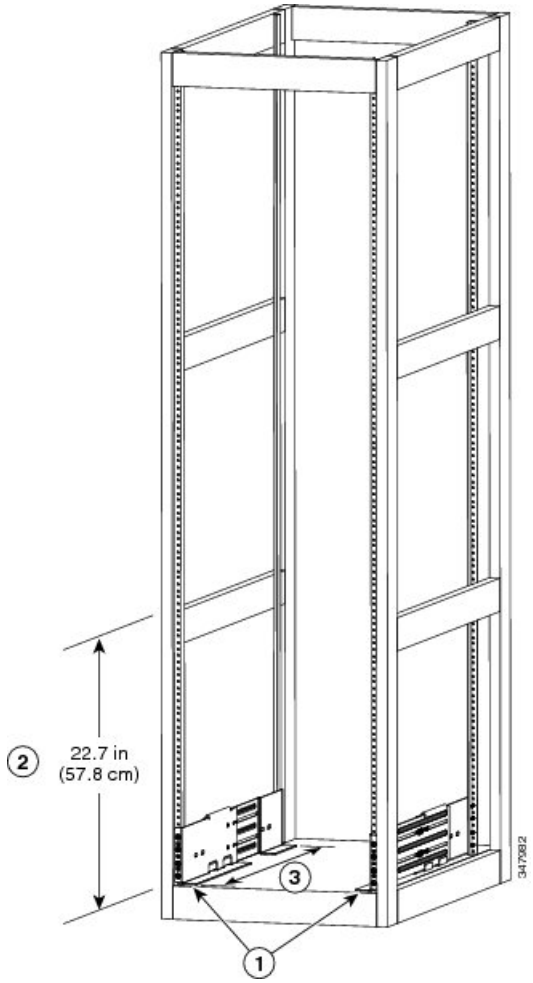
Before you can install the bottom support rails for the chassis, you must do the following:

- Verify that a four-post rack or cabinet is installed and secured to the concrete subfloor (see Installing a Rack or Cabinet).
- If any other devices are stored in rack or cabinet, verify that they are located below where you plan to install the switch. Also, verify that lighter devices in the same rack are located above where you plan to install this switch.
- Verify that the bottom-support rails kit is included in the switch accessory kit (see Unpacking and Inspecting a New Switch).

Step 1 Position one of the two adjustable bottom-support rails at the lowest possible RU in the rack or cabinet and adjust the length of each rail so that it stretches from the outer edges of the front and rear vertical mounting rails on the rack. Be sure there is at least 13 RU (22.75 in [57.8 cm]) of vertical space above the rails to install the chassis (see the following figure).

You can expand the rail so that its mounting brackets are spaced between 24 to 32 inches (61.0 to 81.3 cm).

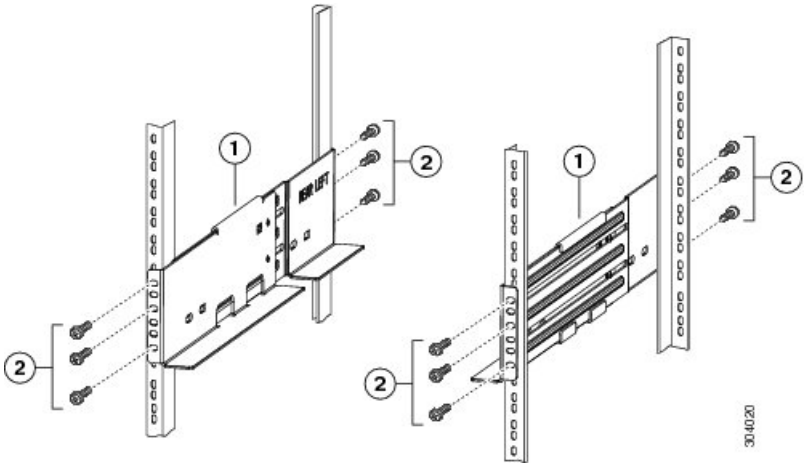
Figure 4: Positioning the Bottom-Support Rails



1	Position two bottom-support rails at the lowest RU on the rack.	**2**	Allow at least 13 RU (22.7 in [57.8 cm]) for each chassis.

Step 2 Attach the bottom-support rail to the rack or cabinet using a Phillips torque screwdriver on three M6 x 19 mm or 12-24 x 3/4 inch screws for each end of the rail (using a total of 6 screws for the rail as shown in the following figure) and tighten each screw to 40 in-lbs (4.5 N.m) of torque.

Figure 5: Attaching Bottom-Support Rails to a Rack



1	Adjustable bottom-support rails (2)	2	M6 x 19 mm (or 12-24 x 3/4 in.) Phillips screws (at least 6 per rail)

Note Use at least three screws on each end of each bottom-support rail.

Step 3 Repeat Steps 1 and 2 to attach the other bottom-support rail to the rack.

Note Make sure that the two bottom-support rails are level with one another. If they are not level, adjust the higher rail down to the level of the lower rail.

What to Do Next

When the bottom-support rails are installed at the lowest possible RU and are level, you are ready to install the chassis in the rack or cabinet.

Installing a Chassis in a Rack or Cabinet

Before You Begin

- Verify that the chassis shipment is complete and undamaged.
- Verify that a four-post rack or cabinet is installed and secured to the concrete subfloor.

Warning **Statement 1048—**Rack Stabilization

Stability hazard. 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 can cause the rack to tip over.

- Verify that the bottom-support rails have been attached to the lowest possible RU in the rack or cabinet and there is 13 RU (22.7 in [57.8 cm]) of space above the rails to install the chassis.
- If there are other devices in the rack, verify that the devices that are heavier than this chassis are installed below where you are going to install the chassis and that the lighter devices are installed above where you are going to install the chassis.
- Verify that the data center ground is accessible where you are installing the chassis.
- Verify that you have the following tools and equipment:
  - Mechanical lift capable of lifting the full weight of the chassis and its installed modules

Note The chassis can weigh up to 395 pounds (179 kg) when it is fully loaded. You can lighten the chassis for easier moving by removing its power supplies, fan trays, and fabric modules. To determine the full weight of the chassis and the appropriate weight rating for the mechanical lift, see Weights and Quantities for the Chassis, Modules, Fan Trays, and Power Supplies, on page 86.

Caution You must use a mechanical lift to elevate a switch that weighs over 120 pounds (55 kg).

  - Phillips-head torque screwdriver
  - Bottom-support rails kit (shipped with the accessory kit)

    Part of this kit has already been used to install the bottom-support rails. You should still have eight 12-24 x 3/4-inch or M6 x 19 mm Phillips screws, which are required for attaching the chassis to the rack.

Note You should also have at least two persons to push the chassis and one person to guide the chassis when you slide it into the rack.

Warning **Statement 1006—**Chassis Warning for Rack-Mounting and Servicing

To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit 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 unit in the rack.

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

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

Step 1 If you need to make the chassis as light as possible for moving, remove the following modules and place them where their connectors will not be damaged:

- Power supplies—For each power supply, press and hold the eject lever, and use the handle on the front of the power supply to pull the power supply out of the chassis.
- Fan trays—Unscrew the four captive screws, and use the two handles on the fan tray to pull the fan tray out of the chassis.
- Fabric modules—For each fabric module, keep your face at least 12 inches (30 cm) away from the modules, press both eject buttons on the front, rotate both levers away from the front of the module, use the levers to pull the module out of the chassis.

Step 2 Load the chassis onto a mechanical lift as follows:

a) Position the mechanical lift next to the shipping pallet that holds the chassis.
b) Elevate the lift platform to the level of the bottom of the chassis (or no more than 1/4 inch [0.635 cm] below the bottom of the chassis).
c) Use at least two persons to slide the chassis fully onto the lift so that the side of the chassis touches or is close to the vertical rails on the lift. Make sure that the front and rear of the chassis are unobstructed so you can easily push the chassis into the rack.

Warning **Statement 1032—**Lifting the Chassis

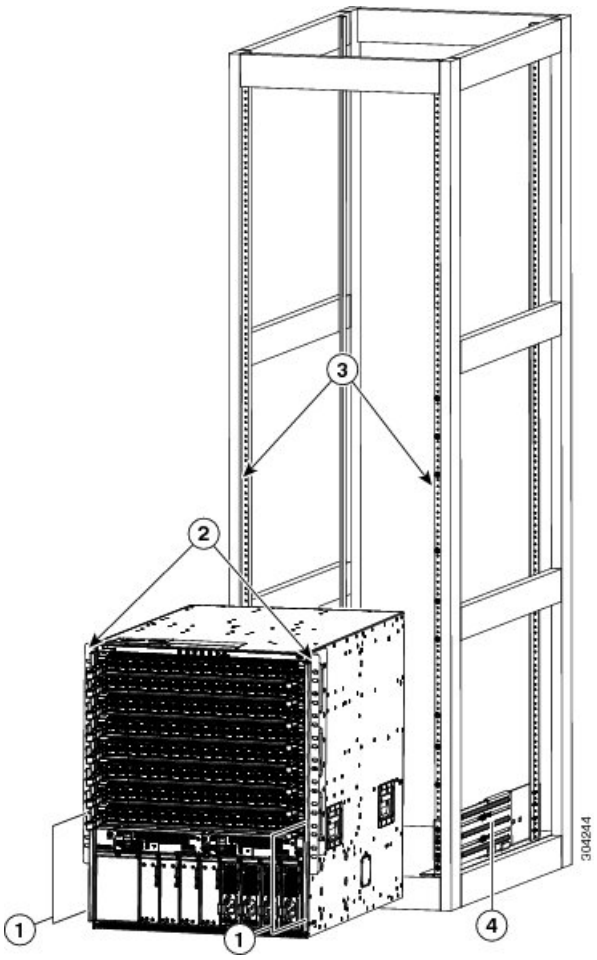
To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on modules (such as power supplies, fans, or cards); these types of handles are not designed to support the weight of the unit.

Note To lift the chassis, use a mechanical lift. Do not use the handles on the side of the chassis (the handles are not rated for lifting over 200 pounds [91 kg]). Use the side handles for only repositioning the chassis after it is already on the mechanical lift or in the rack or cabinet.

Step 3 Use the mechanical lift to move and align the rear of the chassis to the front of the four-post rack or cabinet. Make sure that the bottom of the chassis is elevated to the height of the bottom-support rails or no more than 1/4 inch (0.6 cm) above the bracket.

Step 4 Push the chassis halfway onto the rack or cabinet.
Use at least two persons to push the chassis onto the bottom-support rails and one person to guide the chassis down the center of the rails. Push the lower half of the front side of the chassis so that the back side enters the rack first, and push until the chassis is halfway onto the rack (see the following figure). Ensure that the chassis does not get caught on any of the expansion edges of the bottom-support rail.

Figure 6: Moving a Chassis onto a Rack or Cabinet



1	Push the sides of the lower half of the front side of the chassis.	3	Rack vertical mounting rails on the rack.
2	Chassis mounting brackets.	4	Bottom-support rails

Tip To adjust the placement of the chassis on the bottom-support rails, you can use the chassis handles (see Callout 1 in the following figure).

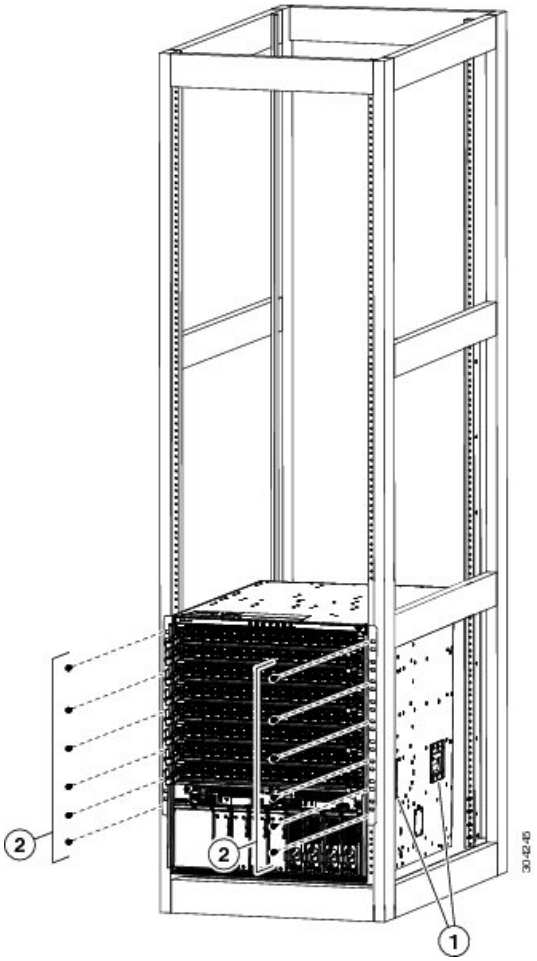
Step 5 If the mechanical lift is raised above the height of the bottom-support rails, gently lower it to the level of the rails or no more than 1/4 inch (0.6 cm) below the rails.

This action helps to prevent the bottom of the chassis from getting caught on the expansion edges of the bottom-support rails.

Step 6 Push the chassis all the way onto the rack so that the vertical mounting brackets on the front of the chassis come in contact with the vertical mounting rails on the rack.

Step 7 Use four M6 x 19 mm or 24 x 3/4-inch screws to attach each of the two chassis vertical mounting brackets to the two rack vertical mounting rails (total of eight screws). See Callout 2 in the following figure.

Figure 7: Attaching the Chassis to the Rack



1	Handles used to adjust the chassis placement	2	Six M6 x 19 mm or 10-24 x 3/4 in. Phillips screws used to attach each side bracket to a front mounting rail (use a total of 12 screws)

What to Do Next

After you have secured the chassis to the rack, you can connect the chassis to the data center ground.

Grounding the Chassis

The switch is grounded when you connect the chassis and the power supplies to the earth ground in the following ways:

- You connect the chassis (at its grounding pad) to either the data center ground or to a fully-bonded and grounded rack.

Note The chassis ground connection is active even when the AC power cables are not connected to the system.

- You connect the AC power supplies to the earth ground automatically when you connect an AC power supply to an AC power source.

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

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

Before You Begin

Before you can ground the chassis, you must have a connection to the earth ground for the data center building. If you installed the switch chassis into a bonded rack (see the rack manufacturer's instructions for more information) that now has a connection to the data center earth ground, you can ground the chassis by connecting its grounding pad to the rack. Otherwise, you must connect the chassis grounding pad directly to the data center ground.

To connect the switch chassis to the data center ground, you need the following tools and materials:

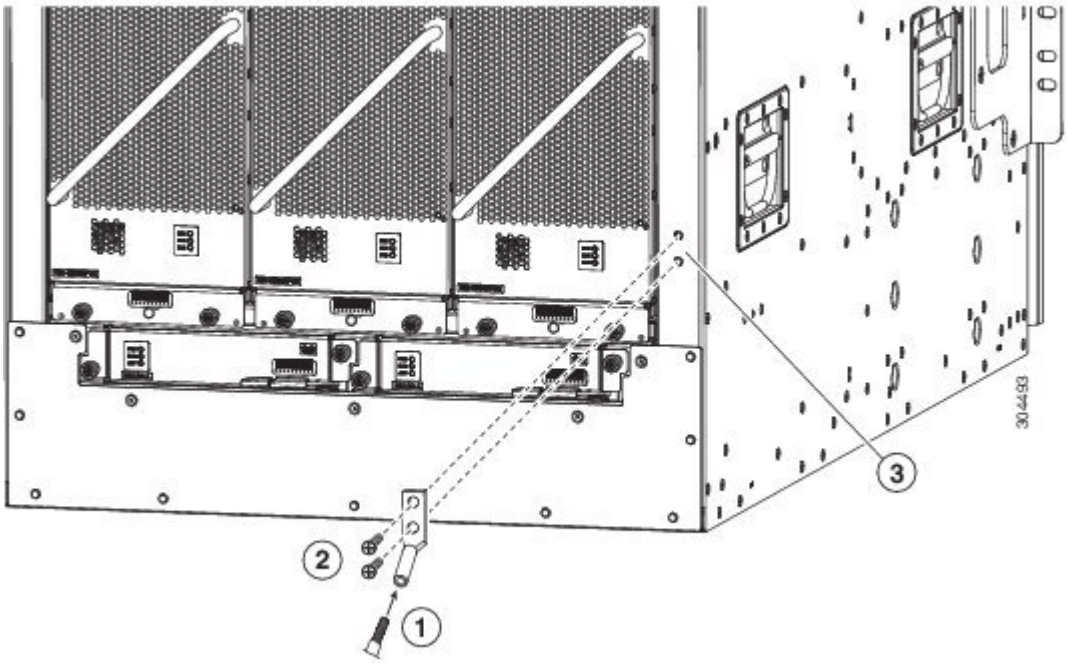
- Grounding lug—A two-holed standard barrel lug that supports up to 6 AWG wire. This lug is supplied with the accessory kit.
- Grounding screws—Two M4 x 8 mm (metric) pan-head screws. These screws are shipped with the accessory kit.
- Grounding wire—Not supplied with the accessory kit. This wire should be sized to meet local and national installation requirements. Depending on the power supply and system, a 12 AWG to 6 AWG copper conductor is required for U.S. installations. We recommend that you use commercially available 6 AWG wire. The length of the grounding wire depends on the proximity of the switch to proper grounding facilities.
- Number 1 Phillips-head torque screwdriver.
- Crimping tool to crimp the grounding wire to the grounding lug.

- Wire-stripping tool to remove the insulation from the grounding wire.

Step 1 Use a wire-stripping tool to remove approximately 0.75 inch (19 mm) of the covering from the end of the grounding wire.

Step 2 Insert the stripped end of the grounding wire into the open end of the grounding lug, and use a crimping tool to crimp the lug to the wire (see Callout 2 in the following figure). Verify that the ground wire is securely attached to the grounding lug by attempting to pull the wire out of the crimped lug.

Figure 8: Grounding the Chassis



1	Chassis grounding pad	3	Two M4 screws used to secure the grounding lug to the chassis
2	Grounding cable, with 0.75 in. (19 mm) of insulation stripped from one end, inserted into the grounding lug and crimped in place		

Step 3 Secure the grounding lug to the chassis grounding pad with two M4 screws (see Callouts 1 and 3 in the previous figure), and tighten the screws to 11.5 to 15 in-lb (1.3 to 1.7 N·m) of torque.

Step 4 Prepare the other end of the grounding wire and connect it to an appropriate grounding point in your site to ensure an adequate earth ground for the switch. If the rack is fully bonded and grounded, connect the grounding wire as explained in the documentation provided by the vendor for the rack.

Connecting the Switch to an AC Power Source

You turn on the switch as soon as you connect its AC power supplies to one or two AC power sources.

Warning **Statement 1004—**Installation Instructions

Read the installation instructions before connecting the system to the power source.

Warning **Statement 1018—**Supply Circuit

Take care when connecting units to the supply circuit so that wiring is not overloaded.

Before You Begin

Before you can turn on the switch, you must ensure the following:

- The switch has enough power supplies to output the power required for all of the modules installed in the switch. Depending on the power mode that you use for the switch, you need to consider the following:
  - For combined power mode (no power redundancy), there must be enough power supplies to power all of the modules in the chassis (no extra power supplies are needed for redundancy). A maximum of two power supplies are needed if using only optical I/O modules or a maximum of three power supplies are needed if using only BASE-T (copper) I/O modules.
  - For power supply redundancy (*n*+1) mode, there must be enough power supplies to power all of the modules in the chassis and there must be one extra power supply to provide redundancy if one power supply goes down or is replaced. The maximum number of power supplies needed is the number used for combined power mode plus one (*n*+1) for redundancy.
  - For input-source redundancy (*n*+*n*) mode, there must be two equal sets of power supplies, each of which can power all of the modules in the chassis and is connected to a separate power source. If one power source goes down, the power supplies connected to the other power source can power the switch. The maximum number of power supplies is the number of power supplies required for combined power plus the same number of power supplies (*n*+*n*) for redundancy.
- The power supplies are installed in the appropriate chassis slots as follows:
  - For combined power mode or power-supply redundancy mode, the power supplies can be installed in any power supply slot in the chassis.
  - For input-source redundancy mode, the power supplies must be divided into two equal sets and installed as follows:
    - Slots 33 through 36 (labeled as PS 1 to PS 4) must be connected to one grid (Grid A)

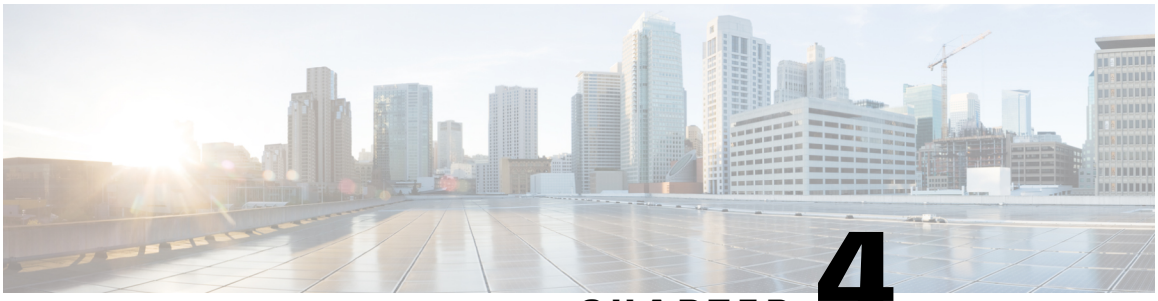
- Slots 37 through 40 (labeled as PS 5 to PS 8) must be connected to another grid (Grid B)

Step 1 For each power supply, connect an AC power cable to the AC power source and to the power receptacle on the power supply.

Step 2 Verify that the Output Power LED turns on and becomes green.

What to Do Next

When the power supplies are operating and the switch is fully powered, you are ready to connect the switch to the network.



CHAPTER 4

Connecting the Switch to the Network

Guidelines for Connecting Ports

You can use Quad Small Form-Factor Pluggable Plus (QSFP+), Small Form-Factor Pluggable Plus (SFP+), SFP transceivers, or RJ-45 connectors to connect the ports on the I/O modules to other network devices.

The RJ-45 connectors and the transceivers used with copper cables come already assembled with their cables. The transceivers used with fiber-optic cables come separated from their cables. To prevent damage to the fiber-optic cables and their transceivers, we recommend that you keep the transceivers disconnected from their fiber-optic cables when installing the transceiver in the I/O module. Before removing a transceiver for a fiber-optic cable, remove the cable from the transceiver.

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

- Wear an ESD-preventative wrist strap that is connected to an earth ground whenever handling transceivers. The switch 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 if they are exposed to dust or accidentally touched. Both wet and dry cleaning techniques can be effective; refer to your site's fiber-optic connection cleaning procedures.

- 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.

Connecting a Console to the Switch

Before you create a network management connection for the switch or connect the switch to the network, you must create a local management connection through a console terminal and configure an IP address for the switch. 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 switch using the command-line interface (CLI).
- Monitor network statistics and errors.
- Configure Simple Network Management Protocol (SNMP) agent parameters.
- Download software updates.

You make this local management connection between the asynchronous serial port on a supervisor module and a console device capable of asynchronous transmission. Typically, you can use a computer terminal as the console device. On the supervisor modules, you use the console serial port.

Note Before you can connect the console port to a computer terminal, make sure that the computer terminal supports VT100 terminal emulation. The terminal emulation software makes communication between the switch and computer possible during setup and configuration.

Before You Begin

- The switch 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 switch accessory kit.
  - Network cabling should already be routed to the location of the installed switch.

Step 1 Configure the console device to match the following default port characteristics:

- 9600 baud

- 8 data bits
- 1 stop bit
- No parity

Step 2 Connect an RJ-45 rollover cable to the CONSOLE SERIAL PORT.
You can find this cable in the accessory kit.

Step 3 Route the RJ-45 rollover cable through the center slot in the cable management system and then to the console or modem.

Step 4 Connect the other end of the RJ-45 rollover cable to the console or to a modem.
If the console or modem cannot use an RJ-45 connection, use the DB-9F/RJ-45F PC terminal adapter found in the accessory kit for the switch. Alternatively, you can use an RJ-45/DSUB F/F or RJ-45/DSUB R/P adapter, but you must provide those adapters.

What to Do Next

You are ready to create the initial switch configuration (see Creating the Initial Switch Configuration, on page 32).

Connecting the Management Interface

The supervisor management port (MGMT ETH) provides out-of-band management, which enables you to use the command-line interface (CLI) to manage the switch by its IP address. This port uses a 10/100/1000 Ethernet connection with an RJ-45 interface.

Note In a dual supervisor switch, you can ensure that the active supervisor module is always connected to the network by connecting the management interface on both supervisor modules to the network (that is, you can perform this task for each supervisor module). No matter which supervisor module is active, the switch automatically has a management interface that is running and accessible from the network.

Caution To prevent an IP address conflict, do not connect the MGMT 10/100/1000 Ethernet port until the initial configuration is complete. For more information, see Creating the Initial Switch Configuration, on page 32.

Before You Begin

You must have completed the initial switch configuration (see Creating the Initial Switch Configuration, on page 32).

Step 1 Connect a modular, RJ-45, UTP cable to the MGMT ETH port on the supervisor module.

Step 2 Route the cable through the central slot in the cable management system.

Step 3 Connect the other end of the cable to a 10/100/1000 Ethernet port on a network device.

What to Do Next

You are ready to connect the interface ports on each of the I/O modules to the network.

Creating the Initial Switch Configuration

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

When you initially power up the switch, it boots up and asks you a series of questions to configure the switch. To enable you to connect the switch to the network, you can use the default choices for each configuration except the IP address, which you must provide. You can perform the other configurations at a later time as described in the *Cisco Nexus 9000 Series NX-OS Fundamentals Configuration Guide*.

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

Before You Begin

- A console device must be connected with the switch.
- The switch must be connected to a power source.
- Determine the IP address and netmask needed for the following interfaces:
  - Management (Mgmt0) interface

Step 1 Power up the switch by connecting each installed power supply to an AC circuit.
If you are using the combined or power-supply (n+1) power mode, connect all of the power supplies to the same AC circuit. If you are using the input-source (n+n) power mode, connect half of the power supplies to one AC circuit and the other half to another AC circuit.

The Input and Output LEDs on each power supply light up (green) when the power supply units are sending power to the switch, and the software asks you to specify a password to use with the switch.

Step 2 Enter a new password to use for this switch.

The software checks the security strength of your password and rejects your password if it is not considered to be a strong password. To increase the security strength of your password, make sure that it adheres to the following guidelines:

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

Examples of strong passwords include the following:

- If2CoM18
- 2004AsdfLkj30
- Cb1955S21

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

Tip If a password is trivial (such as a short, easy-to-decipher password), the software will reject your password configuration. Be sure to configure a strong password as explained in this step. Passwords are case sensitive.

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

Step 3 Enter the same password again.
If you enter the same password, the software accepts the password and begins asking a series of configuration questions.

Step 4 Until you are asked for an IP address, you can enter the default configuration for each question.
Repeat this step for each question until you are asked for the Mgmt0 IPv4 address.

Step 5 Enter the IP address for the management interface.
The software asks for the Mgmt0 IPv4 netmask.

Step 6 Enter a network mask for the management interface.
The software asks if you need to edit the configuration.

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

Step 8 Enter **yes** to save the configuration.

What to Do Next

You can now set up the management interface for each supervisor module on the switch.

Connecting Interface Ports to the Network

You can connect BASE-T (copper) and optical interface ports on I/O modules with other devices for network connectivity.

Connecting a BASE-T Port to the Network

You can connect an I/O-module BASE-T (copper) port to another device on the network using a copper network interface cable with RJ-45 connectors on either end.

Before You Begin

- You must follow the ESD-preventative protocol, such as wearing a grounded ESD wrist strap, whenever handling electronic components.
- You must have BASE-T ports available for connection on a 48-port 10/100/1000 Ethernet I/O module installed on the switch.
- You must have BASE-T ports available on another networked device, which can be another switch.

Step 1 Route the copper interface cable from the other networking device to the switch. At the switch, route the cable through the cable management slot next to the 48-port 10/100/1000 Ethernet I/O module that you are connecting.

Step 2 Insert the RJ-45 connector for the new interface cable into the appropriate port on the I/O module.
Check the port LED to be sure that it turns on and turns green.

Disconnecting a BASE-T Port from the Network

You can disconnect a BASE-T (copper) port from the network by removing a copper network interface cable with RJ-45 connectors from the I/O module interface port.

Before You Begin

You must follow ESD-preventative protocol, such as wearing a grounded ESD wrist strap, whenever handling electronic components.

Step 1 Remove the RJ-45 connector from the interface port that you are disconnecting on the I/O module.
The port LED turns off.

Step 2 (Optional) You can remove the interface cable from the device on the other end of the cable.

Connecting a Fiber-Optic Port to the Network

Depending on the I/O module model that you are using, you can use SFP, SFP+, or QSFP+ transceivers. Some of these transceivers work with fiber-optic cables that you attach to the transceivers and other transceivers work with preattached 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 before installing the fiber-optic cable in the transceivers.

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

Disconnecting Optical Ports from the Network

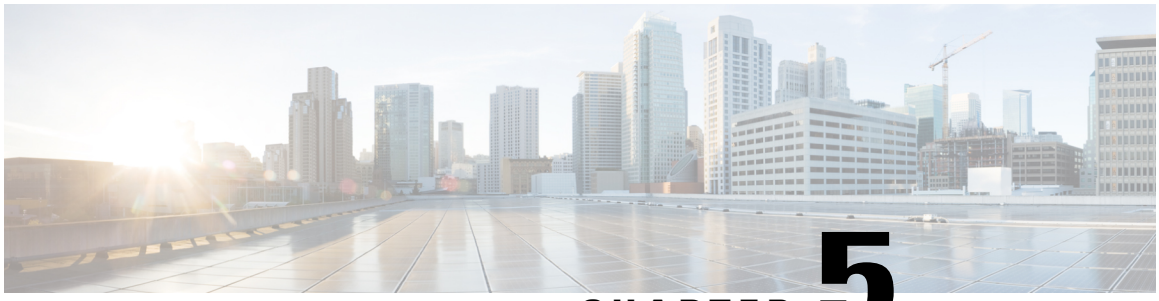
When removing fiber-optic transceivers, you must remove the fiber-optic cables from a transceiver before removing the transceiver from the port.

Maintaining Transceivers and Optical Cables

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

Consider the following maintenance guidelines:

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



CHAPTER 5

Managing the Switch

Displaying Information About the Installed Hardware Modules

You can display information about the switch hardware and the hardware modules installed in the switch chassis by using the **show hardware** command.

```
switch# show hardware
Cisco Nexus Operating System (NX-OS) Software
TAC support: http://www.cisco.com/tac
```

```
Documents: http://www.cisco.com/en/US/products/ps9372/tsd_products_support_seri
es_home.html
Copyright (c) 2002-2013, Cisco Systems, Inc. All rights reserved.
The copyrights to certain works contained herein are owned by
other third parties and are used and distributed under license.
Some parts of this software are covered under the GNU Public
License. A copy of the license is available at
http://www.gnu.org/licenses/gpl.html.

Software
  ...

Hardware
  cisco Nexus9000 C9508 (8 Slot) Chassis ("Supervisor Module")
  Intel(R) Xeon(R) CPU E5-2403 with 16402560 kB of memory.
  Processor Board ID SAL17184072

  Device name: cloud-n9k
  bootflash:   20971520 kB
Kernel uptime is 10 day(s), 19 hour(s), 55 minute(s), 55 second(s)

Last reset
  Reason: Unknown
  System version:
  Service:

plugin
  Core Plugin, Ethernet Plugin
--------------------------------
Switch hardware ID information
--------------------------------

Switch is booted up
  Switch type is : Nexus9000 C9508 (8 Slot) Chassis
  Model number is N9K-C9508
  H/W version is 0.2010
  Part Number is 73-15298-01
  Part Revision is 1
  Manufacture Date is Year 17 Week 25
  Serial number is SAL17257PBN
  CLEI code is 12345678

--------------------------------
Chassis has 12 Module slots and 6 Fabric modules slots
--------------------------------

Module1  empty

Module2  empty

Module3  empty

Module4  ok
  Module type is : 36p 40G Ethernet Module
  0 submodules are present
  Model number is N9k-X9636PQ
  H/W version is 0.1010
  Part Number is
  Part Revision is 1
  Manufacture Date is Year 17 Week 25
  Serial number is SAL17257AHD
  CLEI code is

Module5  empty

Module6  empty

Module7  empty

Module8  empty

FM21  empty
```

```
FM22  ok
  Module type is : Fabric Module
  0 submodules are present
  Model number is N9K-C9508-FM
  H/W version is 0.1010
  Part Number is 73-15287-01
  Part Revision is 1
  Manufacture Date is Year 17 Week 19
  Serial number is SAL17194HVX
  CLEI code is 12345678

FM23  empty

FM24  powered-dn
  Module type is : Fabric Module
  0 submodules are present
  Model number is N9K-C9508-FM
  H/W version is 0.1010
  Part Number is 73-15287-01
  Part Revision is 1
  Manufacture Date is Year 17 Week 19
  Serial number is SAL17194HRK
  CLEI code is 12345678

FM25  empty

FM26  powered-dn
  Module type is : Fabric Module
  0 submodules are present
  Model number is N9K-C9508-FM
  H/W version is 0.1010
  Part Number is 73-15287-01
  Part Revision is 1
  Manufacture Date is Year 17 Week 19
  Serial number is SAL17194HSR
  CLEI code is 12345678

Module27  ok
  Module type is : Supervisor Module
  0 submodules are present
  Model number is N9K-SUP-A
  H/W version is 0.3011
  Part Number is 73-15279-03
  Part Revision is 1
  Manufacture Date is Year 17 Week 18
  Serial number is SAL17184072
  CLEI code is 12345678

Module28  ok
  Module type is : Supervisor Module
  0 submodules are present
  Model number is N9K-SUP-A
  H/W version is 1.0
  Part Number is 73-15279-05
  Part Revision is A0
  Manufacture Date is Year 17 Week 39
  Serial number is SAL1739DAUL
  CLEI code is CMUCAE2BAA

Module29  ok
  Module type is : System Controller
  0 submodules are present
  Model number is N9K-SC-A
  H/W version is 0.2010
  Part Number is 73-15294-02
  Part Revision is 1
  Manufacture Date is Year 17 Week 22
  Serial number is SAL17225YFS
  CLEI code is

Module30  ok
  Module type is : System Controller
  0 submodules are present
```

```
  Model number is N9K-SC-A
  H/W version is 0.2010
  Part Number is 73-15294-02
  Part Revision is 1
  Manufacture Date is Year 17 Week 22
  Serial number is SAL17225YG8
  CLEI code is

--------------------------------------
Chassis has 8 PowerSupply Slots
--------------------------------------

PS1 ok
  Power supply type is: 3000.00W 220v AC
  Model number is N9K-PAC-3000W-B
  H/W version is 0.2
  Part Number is 341-0580-01
  Part Revision is 02
  Manufacture Date is Year 17 Week 22
  Serial number is DTM1722000A
  CLEI code is 12345678

PS2 absent

PS3 absent

PS4 fail/shutdown
  Power supply type is: 3000.00W 220v AC
  Model number is N9K-PAC-3000W
  H/W version is 0.0
  Part Number is
  Part Revision is 1
  Manufacture Date is Year 16 Week 46
  Serial number is DTM164601XC
  CLEI code is 12345678

PS5 absent

PS6 absent

PS7 absent

PS8 absent

---------------------------------
Chassis has 3 Fan slots
---------------------------------

Fan1 ok
  Model number is N9K-C9508-FAN
  H/W version is 0.5020
  Part Number is 73-15288-05
  Part Revision is 02
  Manufacture Date is Year 17 Week 18
  Serial number is SAL171843HG
  CLEI code is 12345678

Fan2 ok
  Model number is N9K-C9508-FAN
  H/W version is 0.5020
  Part Number is 73-15288-05
  Part Revision is 02
  Manufacture Date is Year 17 Week 18
  Serial number is SAL171843K2
  CLEI code is 12345678

Fan3 ok
  Model number is N9K-C9508-FAN
  H/W version is 0.5010
  Part Number is 73-15288-05
  Part Revision is 2
  Manufacture Date is Year 17 Week 14
  Serial number is SAL171421SY
```

```
  CLEI code is
switch#
```

Displaying the Hardware Inventory for a Switch

You can display information about the field replaceable units (FRUs), including product IDs, serial numbers, and version IDs by using the **show inventory** command.

```
switch# show inventory
NAME: "Chassis",  DESCR: "Nexus9000 C9508 (8 Slot) Chassis "
PID: N9K-C9508           ,  VID: V01 ,  SN: SAL17257PBN

NAME: "Slot 4",  DESCR: "36p 40G Ethernet Module"
PID: N9k-X9636PQ         ,  VID:     ,  SN: SAL17257AHD

NAME: "Slot 22",  DESCR: "Fabric Module"
PID: N9K-C9508-FM        ,  VID: V01 ,  SN: SAL17194HVX

NAME: "Slot 24",  DESCR: "Fabric Module"
PID: N9K-C9508-FM        ,  VID: V01 ,  SN: SAL17194HRK

NAME: "Slot 26",  DESCR: "Fabric Module"
PID: N9K-C9508-FM        ,  VID: V01 ,  SN: SAL17194HSR

NAME: "Slot 27",  DESCR: "Supervisor Module"
PID: N9K-SUP-A           ,  VID: V01 ,  SN: SAL17184072

NAME: "Slot 28",  DESCR: "Supervisor Module"
PID: N9K-SUP-A           ,  VID: V01 ,  SN: SAL1739DAUL

NAME: "Slot 29",  DESCR: "System Controller"
PID: N9K-SC-A            ,  VID:     ,  SN: SAL17225YFS

NAME: "Slot 30",  DESCR: "System Controller"
PID: N9K-SC-A            ,  VID:     ,  SN: SAL17225YG8

NAME: "Slot 33",  DESCR: "Nexus9000 C9508 (8 Slot) Chassis Power Supply"
PID: N9K-PAC-3000W-B     ,  VID: V01 ,  SN: DTM1722000A

NAME: "Slot 36",  DESCR: "Nexus9000 C9508 (8 Slot) Chassis Power Supply"
PID: N9K-PAC-3000W       ,  VID: V01 ,  SN: DTM164601XC

NAME: "Slot 41",  DESCR: "Nexus9000 C9508 (8 Slot) Chassis Fan Module"
PID: N9K-C9508-FAN       ,  VID: V01 ,  SN: SAL171843HG

NAME: "Slot 42",  DESCR: "Nexus9000 C9508 (8 Slot) Chassis Fan Module"
PID: N9K-C9508-FAN       ,  VID: V01 ,  SN: SAL171843K2

NAME: "Slot 43",  DESCR: "Nexus9000 C9508 (8 Slot) Chassis Fan Module"
PID: N9K-C9508-FAN       ,  VID:     ,  SN: SAL171421SY
switch#
```

Displaying the Backplane and Serial Number Information

You can display the backplane information, including the serial number for the switch by using the **show sprom backplane** command.

Note The following example shows the contents of the first instance of the backplane SPROM.

```
switch# show sprom backplane 1
DISPLAY backplane sprom contents:
Common block:
```

```
 Block Signature : 0xabab
 Block Version   : 3
 Block Length    : 160
 Block Checksum  : 0x15a3
 EEPROM Size     : 65535
 Block Count     : 5
 FRU Major Type  : 0x6001
 FRU Minor Type  : 0x0
 OEM String      : Cisco Systems, Inc.
 Product Number  : N9K-C9508
 Serial Number   : SAL17257PBN
 Part Number     : 73-15298-01
 Part Revision   : 1
 Mfg Deviation   : 0
 H/W Version     : 0.2010
 Mfg Bits        : 0
 Engineer Use    : 0
 snmpOID         : 0.0.0.0.0.0.0.0
 Power Consump   : 0
 RMA Code        : 0-0-0-0
 CLEI Code       : 12345678
 VID             : V01
Chassis specific block:
 Block Signature : 0x6001
 Block Version   : 3
 Block Length    : 39
 Block Checksum  : 0x42c
 Feature Bits    : 0x0
 HW Changes Bits : 0x0
 Stackmib OID    : 0
 MAC Addresses   : 00-22-bd-f6-ce-70
 Number of MACs  : 128
 OEM Enterprise  : 9
 OEM MIB Offset  : 5
 MAX Connector Power: 0
WWN software-module specific block:
 Block Signature : 0x6005
 Block Version   : 1
 Block Length    : 0
 Block Checksum  : 0x66
wwn usage bits:
 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00
 00 00 00 00 00 00 00 00
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 00 00 00 00 00 00 00 00
 00 00
```

```
License software-module specific block:
 Block Signature : 0x6006
 Block Version   : 1
 Block Length    : 16
 Block Checksum  : 0x77
lic usage bits:
 00 00 00 00 00 00 00 00
Second Serial number specific block:
 Block Signature : 0x6007
 Block Version   : 1
 Block Length    : 28
 Block Checksum  : 0x34a
 Serial Number   : SAL17257PBN
switch#
```

Displaying Environmental Information for the Switch

You can display all of the environment-related switch information by using the **show environment** command.

```
switch# show environment
Power Supply:
Voltage: 12 Volts
Power                                  Actual      Actual        Total
Supply    Model                        Output      Input      Capacity    Status
                                      (Watts )    (Watts )    (Watts )
-------  -------------------  ----------  ----------  ----------  -------------
-
1        N9K-PAC-3000W-B           517 W       563 W      3000 W     Ok
2        ------------                0 W         0 W         0 W     Absent
3        ------------                0 W         0 W         0 W     Absent
4        N9K-PAC-3000W               0 W         0 W         0 W     Shutdown
5        ------------                0 W         0 W         0 W     Absent
6        ------------                0 W         0 W         0 W     Absent
7        ------------                0 W         0 W         0 W     Absent
8        ------------                0 W         0 W         0 W     Absent


                                     Actual        Power
Module    Model                        Draw    Allocated    Status
                                     (Watts )    (Watts )
-------  -------------------  -----------  -----------  --------------
4        N9k-X9636PQ             178.00 W      399.60 W    Powered-Up
22       N9K-C9508-FM            118.00 W      300.00 W    Powered-Up
24       N9K-C9508-FM              N/A         0.00 W    Powered-Dn
26       N9K-C9508-FM              N/A         0.00 W    Powered-Dn
27       N9K-SUP-A               47.00 W      79.92 W    Powered-Up
28       N9K-SUP-A               45.00 W      79.92 W    Powered-Up
29       N9K-SC-A                12.00 W      60.00 W    Powered-Up
30       N9K-SC-A                22.00 W      60.00 W    Powered-Up
fan1     N9K-C9508-FAN              47 W      225.00 W    Powered-Up
fan2     N9K-C9508-FAN              48 W      225.00 W    Powered-Up
fan3     N9K-C9508-FAN              46 W      249.00 W    Powered-Up

N/A - Per module power not available


Power Usage Summary:
--------------------
Power Supply redundancy mode (configured)                Non-Redundant(combined
)
Power Supply redundancy mode (operational)               Non-Redundant(combined
)

Total Power Capacity (based on configured mode)            3000.00 W
Total Power of all Inputs (cumulative)                     3000.00 W
Total Power Output (actual draw)                            517.00 W
Total Power Input (actual draw)                             563.00 W
Total Power Allocated (budget)                             1728.24 W
Total Power Available for additional modules               1271.76 W
```

```
Clock:
----------------------------------------------------------
Clock           Model                Hw         Status
----------------------------------------------------------


Fan:
-----------------------------------------------------
Fan             Model                Hw         Status
-----------------------------------------------------
Fan1(sys_fan1)  N9K-C9508-FAN        0.5020     Ok
Fan2(sys_fan2)  N9K-C9508-FAN        0.5020     Ok
Fan3(sys_fan3)  N9K-C9508-FAN        0.5010     Ok
Fan_in_PS1      --                   --         Ok
Fan_in_PS2      --                   --         None
Fan_in_PS3      --                   --         None
Fan_in_PS4      --                   --         None
Fan_in_PS5      --                   --         None
Fan_in_PS6      --                   --         None
Fan_in_PS7      --                   --         None
Fan_in_PS8      --                   --         None
Fan Zone Speed: Zone 1: 0x0
Fan Air Filter : NotSupported


Temperature:
--------------------------------------------------------------------------
Module   Sensor        MajorThresh   MinorThres   CurTemp     Status
                        (Celsius)     (Celsius)    (Celsius)
--------------------------------------------------------------------------
4        CPU              105           95           32          Ok
4        TD2-1            105           95           41          Ok
4        TD2-2            105           95           41          Ok
4        TD2-3            105           95           41          Ok
4        VRM-1            110           100          41          Ok
4        VRM-2            110           100          45          Ok
4        VRM-3            110           100          40          Ok
22       CPU              105           95           34          Ok
22       TD2-1            105           95           45          Ok
22       TD2-2            105           95           41          Ok
22       VRM-1            110           100          49          Ok
22       VRM-2            110           100          47          Ok
27       OUTLET           75            55           29          Ok
27       INLET            60            42           21          Ok
27       CPU              90            80           27          Ok
28       OUTLET           75            55           27          Ok
28       INLET            60            42           21          Ok
28       CPU              90            80           32          Ok
29       CPU              105           95           40          Ok
30       CPU              105           95           34          Ok
switch#
```

Displaying the Current State of a Module

You can display information about the modules installed in the switch chassis by using the **show module** command. This information includes module type, bootup status, MAC addresses, serial numbers, software versions, and hardware versions. You can use this command in the following ways to display information about all of the installed module or specific modules:

- For information on all modules, use the **show module** command.
- For information on a specific supervisor, system controller, I/O, or fabric module, use the **show module** *slot_number* command to specify a slot number.

Note To determine the slots to specify, use the **show inventory** command.

This table provides descriptions of the module status displayed by the **show module** commands.

I/O Module State	Description
powered up	The hardware has electrical power. When the hardware is powered up, the software begins booting.
testing	The module has established connection with the supervisor and the module is performing bootup diagnostics.
initializing	The diagnostics have completed successfully and the configuration is being downloaded.
failure	The switch detects a module failure upon initialization and automatically attempts to power-cycle the module three times. After the third attempt, the module powers down.
ok	The switch is ready to be configured.
power-denied	The switch detects insufficient power for an I/O module to power up.
active	This module is the active supervisor or system controller module and the switch is ready to be configured.
HA-standby	The HA switchover mechanism is enabled on the standby supervisor module.
standby	The switchover mechanism is enabled on the standby system controller module.

Use the **show module** [*slot_number*] command to display information about all of the installed modules or for the module that you specify by its slot number.

This example shows how to display information about all the modules installed in a chassis.

```
switch# show module
Mod  Ports  Module-Type                        Model              Status
---  -----  ---------------------------------- ------------------ ----------
4    36     36p 40G Ethernet Module            N9k-X9636PQ        ok
22   0      Fabric Module                      N9K-C9508-FM       ok
24   0      Fabric Module                      N9K-C9508-FM       powered-dn
26   0      Fabric Module                      N9K-C9508-FM       powered-dn
27   0      Supervisor Module                  N9K-SUP-A          active *
28   0      Supervisor Module                  N9K-SUP-A          ha-standby
29   0      System Controller                  N9K-SC-A           active
30   0      System Controller                  N9K-SC-A           standby

Mod  Power-Status  Reason
---  ------------  --------------------------
24   powered-dn     Configured Power down
26   powered-dn     Configured Power down

Mod  Sw              Hw
---  --------------  ------
4    6.1(4.11)       0.1010
22   6.1(4.11)       0.1010
```

```
27   6.1(4.11)       0.3011
28   6.1(4.11)       1.0
29   6.1(4.11)       0.2010
30   6.1(4.11)       0.2010


Mod  MAC-Address(es)                         Serial-Num
---  --------------------------------------  ----------
4    00-22-bd-f8-2a-83 to 00-22-bd-f8-2a-b6  SAL17257AHD
22   00-00-00-00-00-00 to 00-00-00-00-00-00  SAL17194HVX
24   00-00-00-00-00-00 to 00-00-00-00-00-00  SAL17194HRK
26   00-00-00-00-00-00 to 00-00-00-00-00-00  SAL17194HSR
27   00-22-bd-f6-9d-58 to 00-22-bd-f6-9d-69  SAL17184072
28   00-22-bd-fc-04-b0 to 00-22-bd-fc-04-c1  SAL1739DAUL
29   00-00-00-00-00-00 to 00-00-00-00-00-00  SAL17225YFS
30   00-00-00-00-00-00 to 00-00-00-00-00-00  SAL17225YG8

* this terminal session
switch#
```

Note This example shows how to display information about a module in a specific slot (slot 4) of the chassis.

```
switch# show module 4
Mod  Ports  Module-Type                          Model              Status
---  -----  ----------------------------------- ------------------ ----------
4    36     36p 40G Ethernet Module             N9k-X9636PQ        ok

Mod  Sw              Hw
---  --------------  ------
4    6.1(4.11)       0.1010


Mod  MAC-Address(es)                         Serial-Num
---  --------------------------------------  ----------
4    00-22-bd-f8-2a-83 to 00-22-bd-f8-2a-b6  SAL17257AHD
switch#
```

Displaying Temperatures for a Module

You can display temperature readings for module temperature sensors by using the **show environment temperature** command. Each system controller, supervisior, I/O, and fabric module has temperature sensors with two 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 Call Home alerts (if configured)
  - Sends SNMP notifications (if configured)
- Major temperature threshold—When a major threshold is exceeded, a major alarm occurs and the following actions occur:
  - For sensors 1, 3, and 4 (outlet and onboard sensors), the following actions occur:
    - Displays system messages.
    - Sends Call Home alerts (if configured).
    - Sends SNMP notifications (if configured).

- For sensor 2 (intake sensor), the following actions occur:
  - If the threshold is exceeded in a switching module, only that module is shut down.
  - If the threshold is exceeded in an active supervisor module with HA-standby or standby present, only that supervisor module is shut down and the standby supervisor module takes over.
  - If you do not have a standby supervisor module in your switch, 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.

Tip We recommend that you install dual supervisor modules. If you are using a switch without dual supervisor modules, we recommend that you immediately replace the fan module if just one fan is not working.

Note A threshold value of –127 indicates that no thresholds are configured or applicable.

Use the **show environment temperature** command to display the temperature readings for each of the powered-up modules.

```
switch# show environment temperature
Temperature:
-----------------------------------------------------------------------
Module   Sensor        MajorThresh   MinorThres   CurTemp     Status
                       (Celsius)     (Celsius)    (Celsius)
-----------------------------------------------------------------------
4        CPU             105           95           32          Ok
4        TD2-1           105           95           41          Ok
4        TD2-2           105           95           41          Ok
4        TD2-3           105           95           41          Ok
4        VRM-1           110           100          41          Ok
4        VRM-2           110           100          45          Ok
4        VRM-3           110           100          40          Ok
22       CPU             105           95           34          Ok
22       TD2-1           105           95           45          Ok
22       TD2-2           105           95           41          Ok
22       VRM-1           110           100          49          Ok
22       VRM-2           110           100          47          Ok
27       OUTLET          75            55           29          Ok
27       INLET           60            42           20          Ok
27       CPU             90            80           27          Ok
28       OUTLET          75            55           27          Ok
28       INLET           60            42           22          Ok
28       CPU             90            80           33          Ok
29       CPU             105           95           40          Ok
30       CPU             105           95           34          Ok
switch#
```

Connecting to a Module

You can connect to any module by using the **attach module** *slot_number* command. When the the module prompt appears, you can obtain further details about the module by using module-specific commands in EXEC mode.

You can also use the **attach module** command to display the standby supervisor module information, although you cannot configure the standby supervisor module using this command.

Note To see which slots are filled with modules, use the **show inventory** command.

Use the **attach module** *slot_number* command to get direct access to a specific module.

This example shows how to attach to the supervisor in slot 28.

```
switch# attach module 28
Attaching to module 28 ...
To exit type 'exit', to abort type '$.'
Cisco Nexus Operating System (NX-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2002-2013, Cisco Systems, Inc. All rights reserved.
The copyrights to certain works contained in this software are
owned by other third parties and used and distributed under
license. Certain components of this software are licensed under
the GNU General Public License (GPL) version 2.0 or the GNU
Lesser General Public License (LGPL) Version 2.1. A copy of each
such license is available at
http://www.opensource.org/licenses/gpl-2.0.php and
http://www.opensource.org/licenses/lgpl-2.1.php
switch(standby)#
```

Note To exit the module-specific prompt, use the **exit** command.

Tip If you are not accessing the switch from a console terminal, this command is the only way to access the standby supervisor module.

Saving the Module Configuration

To save the new configuration to nonvolatile storage, use the **copy running-config startup-config** command from EXEC mode. Once you enter this command, the running and the startup copies of the configuration are identical.

The following table lists various scenarios when module configurations are preserved or lost.

Scenario	Result
A particular switching module is removed and you used the **copy running-config startup-config** command again.	The configured module information is lost.
A particular switching module is removed and the same switching module is replaced before you enter the **copy running-config startup-config** command again.	The configured module information is preserved.

Scenario	Result
A particular switching module is removed and replaced with the same type switching module, and you entered the **reload module** *slot_number* command.	The configured module information is preserved.
A particular switching module is reloaded when you enter the **reload module** *slot_number* command.	The configured module information is preserved.

Shutting Down or Starting Up a Module

You can shut down or power up a module by using the **poweroff module** or **no poweroff module** command to specify the module by its slot number in the chassis.

Note To determine the slot number for a module, use the **show inventory** command.

Step 1 Use the **configure terminal** to enter the global configuration mode.

Example:
```
switch# configure terminal
switch(config)#
```

Step 2 Shut down (or alternatively power up) a specific module by entering the [**no**] **poweroff module** *slot_number* command.

Example:
```
switch(config)# poweroff module 3
switch(config)#
```

Example:
```
switch(config)# no poweroff module 3
switch(config)#
```

Purging a Nonfunctioning Module from the Running Configuration

You can clear the running configuration for a system controller, I/O, or fabric slot (slots 1 to 30) that is not functioning by using the **purge module** command in EXEC mode.

Note This command does not work on supervisor slots or on any I/O slot that currently has a powered-up module.

Use the **purge module** *slot_number* **runnning-config** command to clear the running configuration for the specified I/O slot.

```
switch# purge module 4 running-config
```

Before You Begin

Verify that either the system controller, I/O, or fabric slot is empty or that the module installed in the slot is powered down.

For example, suppose that you create an IP storage configuration with an I/O module in slot 3 of Switch A. This module uses an IP address. You decide to remove this I/O module and move it to Switch B, and you no longer need the IP address. If you try to configure this unused IP address, you receive an error message that prevents you from proceeding with the configuration. In this case, you need to enter the **purge module 3 running-config** command to clear the old configuration in Switch A before using the IP address.

Displaying Power Usage Information

To display the power usage information for the entire switch, use the **show environment power** command. This command shows the power usage for the modules installed in the switch.

Note Power usage is reserved for both supervisor modules regardless of whether one or both supervisor modules are present.

Use the **show environment power** command to display power usage information for the switch.

```
switch# show environment power
Power Supply:
Voltage: 12 Volts
Power                              Actual      Actual        Total
Supply    Model                    Output      Input      Capacity    Status
                                  (Watts )    (Watts )    (Watts )
-------  -------------------  ----------  ----------  ----------  -------------
-
1        N9K-PAC-3000W-B           517 W       566 W      3000 W     Ok
2        ------------                0 W         0 W         0 W     Absent
3        ------------                0 W         0 W         0 W     Absent
4        N9K-PAC-3000W               0 W         0 W         0 W     Shutdown
5        ------------                0 W         0 W         0 W     Absent
6        ------------                0 W         0 W         0 W     Absent
7        ------------                0 W         0 W         0 W     Absent
8        ------------                0 W         0 W         0 W     Absent


                                   Actual        Power
Module    Model                      Draw    Allocated    Status
                                  (Watts )    (Watts )
-------  -------------------  -----------  -----------  --------------
4        N9k-X9636PQ              177.00 W      399.60 W    Powered-Up
22       N9K-C9508-FM             118.00 W      300.00 W    Powered-Up
24       N9K-C9508-FM               N/A         0.00 W    Powered-Dn
26       N9K-C9508-FM               N/A         0.00 W    Powered-Dn
27       N9K-SUP-A                47.00 W      79.92 W    Powered-Up
28       N9K-SUP-A                45.00 W      79.92 W    Powered-Up
29       N9K-SC-A                 12.00 W      60.00 W    Powered-Up
30       N9K-SC-A                 23.00 W      60.00 W    Powered-Up
```

```
fan1     N9K-C9508-FAN               47 W      225.00 W    Powered-Up
fan2     N9K-C9508-FAN               48 W      225.00 W    Powered-Up
fan3     N9K-C9508-FAN               47 W      249.00 W    Powered-Up

N/A - Per module power not available


Power Usage Summary:
--------------------
Power Supply redundancy mode (configured)                Non-Redundant(combined
)
Power Supply redundancy mode (operational)               Non-Redundant(combined
)

Total Power Capacity (based on configured mode)            3000.00 W
Total Power of all Inputs (cumulative)                     3000.00 W
Total Power Output (actual draw)                            517.00 W
Total Power Input (actual draw)                             566.00 W
Total Power Allocated (budget)                             1728.24 W
Total Power Available for additional modules               1271.76 W

switch#
```

Power Cycling a Module

You can reset a module by using the **reload module** *slot_number* command and specifying the module by its slot number in the chassis.

Caution Reloading a module disrupts traffic through the module.

Note To see which slots are filled with modules, use the **show inventory** command.

Step 1 Use the **configure terminal** command to enter the global configuration mode.

Example:

```
switch# configure terminal
switch(config)#
```

Step 2 Use the **reload module** *slot_number* command to specify the slot number of the module to reset.

Example:

```
switch(config)# reload module 4
This command will reload module 4. Proceed[y/n]?  [n] y
reloading module 4 ...
switch(config)#
```

Rebooting a Switch

You can reboot or reload the switch by using the **reload** command without any options.

Note If you need to use the **reload** command, be sure to save the running configuration first by using the **copy running-config startup-config** command.

Step 1 Use the **configure terminal** command to enter the global configuration mode.

Example:
```
switch# configure terminal
switch(config)#
```

Step 2 Use the **copy running-config startup-config** command to save the running configuration.

Example:
```
switch(config)# copy running-config startup-config
```

Step 3 Use the **reload** command to reload the switch.

Example:
```
switch(config)# reload
```

Overview of Supervisor Modules

The switch has one or two supervisor modules.

When a switch has two supervisors, one supervisor is automatically active while the other is in standby mode. If the active supervisor goes down or is disconnected for replacement, the standby supervisor automatically becomes active. If you need to replace one of two installed supervisor modules with another module, you can do so without interrupting operations. The supervisor that you are not replacing becomes the active supervisor and retains the kickstart configuration while you replace the other supervisor. If the switch has just one supervisor, you can install the new supervisor in the open supervisor slot during operations and make that supervisor active after the installation.

Supervisor modules are automatically powered up and started with the switch.

To understand the terms used for the supervisors, see the following table.

Module Terms	Usage	Description
module-27 and module-28	Fixed	• Module-27 refers to the supervisor module in chassis slot 27. • Module-28 refers to the supervisor module in chassis slot 28.

Module Terms	Usage	Description
sup-1 and sup-2	Fixed	• sup-1 refers to the supervisor module in slot 27. • sup-2 refers to the supervisor module in slot 28.
sup-active and sup-standby	Relative	• sup-active refers to the active supervisor module—relative to the slot that contains the active supervisor module. • sup-standby refers to the standby supervisor module—relative to the slot that contains the standby supervisor module.
sup-local and sup-remote	Relative	If you are logged into the active supervisor, the following applies: • sup-local refers to the active supervisor module. • sup-remote refers to the standby supervisor module. If you are logged into the standby supervisor, the following applies: • sup-local refers to the standby supervisor module (the one that you are logged into). • There is no sup-remote available from the standby supervisor module (you cannot access a file system on the active supervisor).

Overview of I/O Module Support

The switch supports the following I/O modules in slots 1 through 8:

- 48-port 1-/10-Gigabit SFP+ plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9464PX)
- 48-port 1-/10-GBASE-T plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9464TX)
- 48-port 1-/10-GBASE-T plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9564TX)
- 48-port 1-/10-Gigabit SFP+ plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9564PX)
- 36-port 40-Gigabit QSFP+ aggregation (non-blocking) I/O module (N9K-X9636PQ)
- 36-port 40-Gigabit QSFP+ I/O module (N9K-X9536PQ)
- 32-port 40-Gigabit QSFP+ I/O module (N9K-X9432PQ)

Note The slots are labeled as LC 1 to LC 8.

Accessing an I/O Module Through a Console

You can troubleshoot bootup problems for an I/O module by accessing the module through its console port. This action establishes a console mode that you must exit in order to use other Cisco NX-OS commands.

To attach to the console port for an I/O module, use the **attach console module** command to specify the module that you need to work with. Specify a slot from 1 to 8.

Use the **attach console module** *slot_number* command to attach the console to a specific I/O module.

```
switch# attach console module 3
connected
Escape character is `~,' (tilde comma]
```

Note To exit the console mode, enter the **~,** command.

Overview of Fabric Modules

The switch supports up to six fabric modules in the chassis. Two of these modules are located behind each fan tray. The following table lists which fabric modules are behind each fan tray. The fan tray has an LED that displays the status for the two fabric modules behind it. To replace a fabric module, you must first remove the fan tray that covers it.

Fan Tray Slot	Fabric Module Slots
41 (labeled as FAN 1)	21 (labeled as FM 1)
	22 (labeled as FM 2)
42 (labeled as FAN 2)	23 (labeled as FM 3)
	24 (labeled as FM 4)
43 (labeled as FAN 3)	25 (labeled as FM 5)
	26 (labeled as FM 6)

We recommend that you install three to six fabric modules in the switch. To ensure that each of the fan trays is powered up, be sure that the fabric modules are installed in the slots specifed in the following table and install blank filler modules in the remaining slots to maintain the designed airflow.

Quantity of Fabric Modules Installed	Slots filled with fabric modules
1	—

Quantity of Fabric Modules Installed	Slots filled with fabric modules
2	—
3	22, 24, and 26 (labeled as FM 2, FM 4, and FM 6)
4	22, 23, 24, and 26 (labeled as FM 2, FM 3, FM 4, and FM6)
5	21, 22, 23, 24, and 26 (labeled as FM 1, FM 2, FM 3, FM 4, and FM 6) or 22, 23, 24, 25, and 26 (labeled as FM 2, FM 3, FM 4. FM 5, and FM 6)
6	21, 22, 23, 24, 25, and 26 (labeled as FM 1, FM 2, FM 3, FM 4, FM 5, and FM 6)

Overview of Power Modes

You can configure one of the following power modes to either use the combined power provided by the installed power supply units (no power redundancy) or to provide power redundancy for when there is a power loss:

Combined mode

This mode allocates the combined power of all power supplies to active power for switch operations. This mode does not allocate reserve power for power redundancy in case of power outages or power supply failures.

Power-supply (*n*+1) redundancy mode

This mode allocates one power supply as a reserve power supply in case an available power supply fails. The remaining power supplies are allocated for available power. The reserve power supply must be at least as powerful as each power supply used for the available power.

For example, if a switch requires 2.0 kW of available power and the switch has two power supplies that each output 3 kW, then one of the power supplies provides 3.0 kW of available power and one power supply provides 3.0 kW of reserve power in case the other power supply fails.

Input-source (grid *n*+*n*) redundancy mode

This mode allocates half of the power to available power and the other half to reserve power. You must use a different power source for the active and reserve power sources so that if the power source used for active power fails, the other power source used for the reserve power can provide power for the switch.

For example, if the switch requires 4.0 kW of power, the switch has four power supplies that each output 3 kW. If you have two power grids, you use grid A to power two 3-kW power supplies that provide the available power for the switch and you use grid B to power the other two 3-kW power supplies that provide the reserve power in case grid A fails.

Power Mode Configuration Guidelines

The amounts of available and reserve power depend on the power redundancy mode that you specify and the number of power supplies installed in the switch. For each redundancy mode, consider the following:

Combined mode

The available power equals the combined output of all installed power supplies. There is no reserve power. You activate this mode by using the **power redundancy-mode combined** command.

For example, if the power requirement for a switch is 5.2 kW and the switch has one 3-kW power supply with 220 V input and 3.0-kW output, consider the following power planning scenarios:

- Scenario 1—No added power supplies

  If you do not add a power supply unit, the available power (3.0 kW) is insufficient for the switch power requirement of 5.2 kW, so the switch powers the supervisor modules, system controllers, fan trays, and at least one fabric module before powering as many of the fabric and I/O modules as the remaining available power can support (one or more fabric or I/O modules might not be powered).

- Scenario 2—Install an extra 3-kW power supply

  If you install an additional 3-kW power supply unit that can output 3.0 kW, the available power becomes 6.0 kW. The increased amount of available power exceeds the switch power requirement of 5.2 kW, so all of the modules and fan trays in the switch can power up.

The following table shows the results for each scenario.

Scenario	Power Requirement	Power Supply 1 Output	Power Supply 2 Output	Available Power	Reserve Power	Result
1	5.2 kW	3.0 kW	—	3.0 kW	—	Available power is less than the power requirement for the switch, so you cannot power the entire switch (some of the I/O modules will not be able to power up).
2	5.2 kW	3.0 kW	3.0 kW	6.0 kW	—	Available power exceeds the power requirement for the switch, so the entire switch can power up.

Power supply (*n*+1) redundancy mode

The power supply that outputs the most power provides the reserve power so that it can take over for any other power supply that fails, and all of the other installed power supplies provide the available power. You activate this power mode by using the **power redundancy-mode ps-redundant** command.

For example, if the power requirement for a switch is 5.2 kW and the switch has two 3.0-kW power supplies outputting 3.0 kW each, consider the following power planning scenarios:

- Scenario 1—No added power supplies

  One 3-kW power supply provides the reserve power and the other 3-kW power supply, also outputting 3.0 kW, provides the available power. The available power (3.0 kW) does not meet the switch requirements of 5.2 kW, so the switch powers up except for some of its I/O modules.

- Scenario 2—Adding one 3-kW power supply

  One 3-kW power supply, which outputs 3.0 kW, provides the reserve power and the other two 3-kW power supplies, also outputting 3.0 kW each, provide a sufficient amount of power (6.0 kW) to meet the switch requirements (5.2 kW), so the entire switch powers up.

The following table shows the results for each scenario.

Scenario	Power Requirement	Output (kW) for Power Supplies			Available Power	Reserve Power	Result
		1	2	3			
1	5.2 kW	3.0 kW	3.0 kW	—	3.0 kW	3.0 kW	Available power is less than the power requirement for the switch, so you cannot power the entire switch (one or two of the I/O modules will not be able to power up).
2	5.2 kW	3.0 kW	3.0 kW	3.0 kW	6.0 kW	3.0 kW	Available power exceeds the power requirement for the switch, so the entire switch can power up.

Input-source (grid or *n*+*n*) redundancy mode

Half of the 3-kW power supplies are connected to one power source (grid) and the other half are connected to another power source. The available power is provided by one power source and the reserve power is provided by the other power source. If the power source that provides the available power fails, the switch uses the reserve power source to provide its required power. You activate this power mode by using the **power redundancy-mode insrc_redundant** command.

For example, if the power requirement for a switch is 5.2 kW and the switch has two power supplies that output 3 kW, consider the following power planning scenarios:

- Scenario 1—No added power supplies

  The available power is 3.0 kW (output from one 3-kW power supply) and the reserve power is 3.0 kW (output from the other power supply). The available power (3.0 kW) does not meet the switch requirements (5.2 kW), so most of the modules will power up but some of the I/O modules will not be able to power up.

- Scenario 2—Adding two 3-kW power supplies

  The available power is 6.0 kW (output from two 3-kW power supplies on grid A) and the reserve power is 6.0 kW (output from the other two power supplies on grid B). The available power (6.0 kW) exceeds the power requirement of the switch (5.2 kW), so the entire switch can power up.

The following table shows the results for each scenario.

Scenario	Power Requirement	Output for Power Supplies				Available Power	Reserve Power	Result
		1	2	3	4			
1	5.2 kW	3.0 kW	3.0 kW	—	—	3.0 kW	3.0 kW	Available power (3.0 kW) is less than the power requirement for the switch (5.2 kW), so most of the switch can power up but one or more I/O modules cannot power up.
2	5.2 kW	3.0 kW	3.0 kW	3.0 kW	3.0 kW	6.0 kW	6.0 kW	Available power (6.0 kW) exceeds the power requirement for the switch (5.2 kW), so the entire switch can power up.

Setting the Power Mode

You can configure the power supply mode by using the **power redundancy-mode** command.

Note To display the current power supply configuration, use the **show environment power** command.

Step 1 Use the **configure terminal** command to enter the global configuration mode.

Example:
```
switch# configure terminal
switch(config)#
```

Step 2 Use the **power redundancy-mode** *mode* command to specify one of the following power modes:

- For combined mode, include the **combined** keyword.
- For power supply redundancy mode, include the **ps-redundant** keyword.
- For input source redundancy mode, include the **insrc_redundant** keyword.

Example:
```
switch(config)# power redundancy-mode insrc_redundant
switch(config)#
```

Overview of Fan Trays

Fan trays provide airflow through the switch for cooling. Each fan tray contains multiple fans to provide redundancy. The switch can continue functioning in the following situations:

- One or more fans fail within a fan tray—Even with multiple fan failures, the switch can continue functioning. When a fan fails within a tray, the functioning fans in the module increase their speed to compensate for the failed fans.
- The fan tray is removed for replacement—The fan tray is designed to be removed and replaced while the switch is operating without presenting an electrical hazard or damage to the switch. The switch can operate for three minutes without the fan tray that you are replacing, but if the switch air-inlet temperature is less than 86° Fahrenheit (30° C), you have up to 72 hours to replace the fan tray. Because temperatures can change over time, we recommend that you replace the fan tray within three minutes.
- If you remove more than one fan tray at a time, the switch can operate up to three minutes before shutting down. To prevent a shutdown, remove only one fan tray at a time.

Note When a fan fails or when you remove a fan tray, the remaining operating fans speed up to compensate for the loss of fans. This process can increase the noise made by the fan trays until you replace the missing fan tray or replace the defective fan tray.

Note When replacing a failed fan tray in a running system, be sure to promptly replace the fan tray.

Tip If one or more fans fail within a fan tray, the Fan Status LED turns red. A fan failure could lead to temperature alarms if not corrected immediately.

The fan status is continuously monitored by the software. In case of a fan failure, the following actions occur:

- System messages are displayed.
- Call Home alerts are sent (if configured).
- SNMP notifications are sent (if configured).

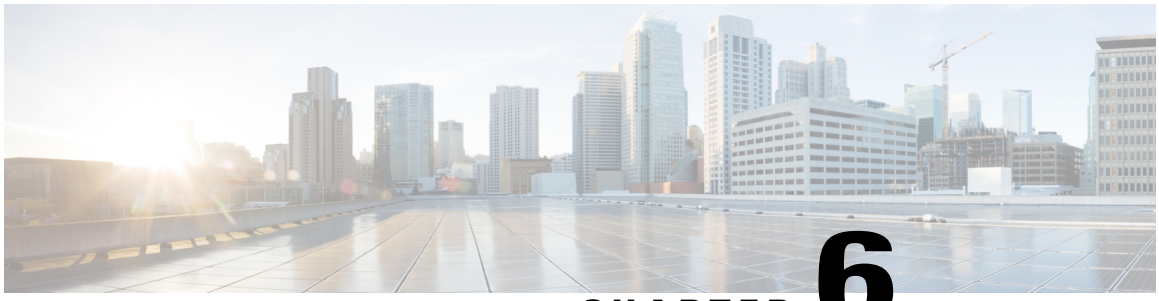
To display the fan module statuses, see Displaying the Status for the Fan Trays, on page 60.

Note The fan trays fill slots 41 (labeled as FAN 1), 42 (labeled as FAN 2), and 43 (labeled as 43) in the chassis.

Displaying the Status for the Fan Trays

You can display the status of the fan trays by using the **show environment fan** command.

```
switch# show environment fan
Fan:
-----------------------------------------------------
Fan              Model                Hw         Status
-----------------------------------------------------
Fan1(sys_fan1)   N9K-C9508-FAN        0.5020     Ok
Fan2(sys_fan2)   N9K-C9508-FAN        0.5020     Ok
Fan3(sys_fan3)   N9K-C9508-FAN        0.5010     Ok
Fan_in_PS1       --                   --         Ok
Fan_in_PS2       --                   --         None
Fan_in_PS3       --                   --         None
Fan_in_PS4       --                   --         None
Fan_in_PS5       --                   --         None
Fan_in_PS6       --                   --         None
Fan_in_PS7       --                   --         None
Fan_in_PS8       --                   --         None
Fan Zone Speed: Zone 1: 0x0
Fan Air Filter : NotSupported
switch#
```



CHAPTER 6

Replacing or Installing Modules, Fan Trays, and Power Supplies

Grounding Yourself Before Handling Modules

To prevent electrostatic damage (ESD) to electronic components, which include but are not limited to switch modules, that you handle, you must be sure that you are grounded while handling electronic components.

Before You Begin

The switch must be connected to the facility earth ground.

Step 1 Attach an ESD wristband to your arm and be sure that it touches your skin.

Step 2 Attach the alligator clip on the other end of the strap to the grounding cable for the switch or to the screws holding the grounding cable to the switch.

Step 3 Verify that the grounding cable is attached to the facility earth ground.

Installing or Replacing a Supervisor Module

The switch can operate with one or two supervisor modules installed in the chassis. If there are two supervisor modules, you can remove the standby supervisor and replace it with another supervisor. If you start to remove the active supervisor, the switch automatically makes the other supervisor active and makes the module that you are removing the standby supervisor. If the switch has only one installed supervisor module, you can install the new supervisor in the empty supervisor slot during operations.

Warning **Statement 1029—**Blank Faceplates and Cover Panels

Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.

Warning **Statement 1034—**Backplane Voltage

Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing

Before You Begin

- You must wear an electrostatic discharge (ESD) wriststrap or other ESD protective device while handling modules.
- Prepare an antistatic surface or packing materials for each module that you remove from the chassis.

Step 1 Open the packaging for the new supervisor module and inspect the module for damage.
If the module is damaged, alert the Technical Assistance Center (TAC).

Step 2 If you are installing the module in an empty slot, remove the blank module that is already in that slot by unscrewing its captive screw and pulling it out of the slot. Go to Step 4.

Step 3 If you are replacing a module that is currently in the chassis, remove the existing module from the chassis by following these steps:

a) Disconnect and label the following cables from the module:

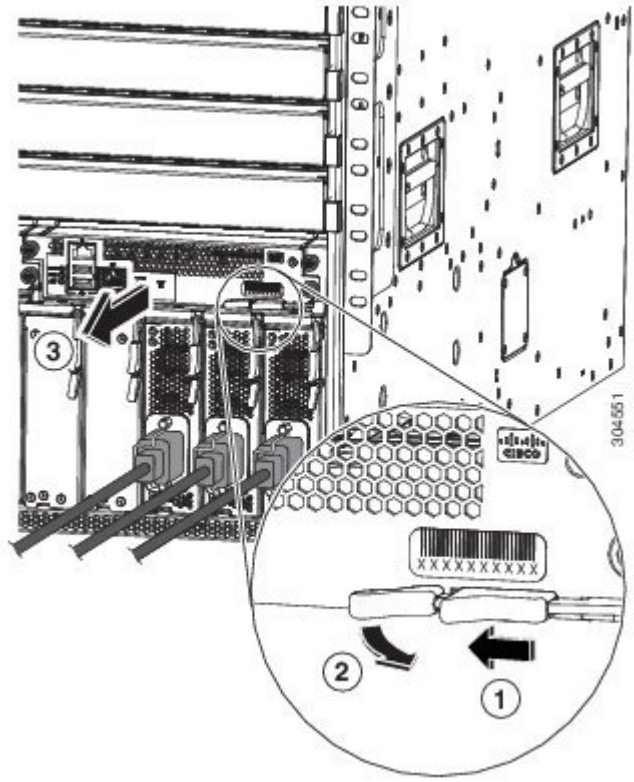
- Console cable
- Ethernet Management cable

b) If there are any external drives attached to the module through its USB ports, detach those drives.

c) Slide the middle section of the ejector handle toward the end of the handle and rotate the handle away from the front of the module (see Callouts 1 and 2 in the following figure).

The module unseats its connectors from the midplane and moves slightly out of the chassis.

Figure 9: Removing a Supervisor Module from a Chassis



1	Slide the middle handle toward the end of the ejector lever.	3	Pull on the lever to slide the module part way out of the chassis. Release the lever, hold the front of the module and pull the module all the way out of the chassis.
2	Rotate the ejector lever away from the module.		

d) Use one hand to hold the front of the module, place your other hand under the module to support its weight, pull the module out of the chassis, and set the it on an antistatic surface or inside an antistatic bag.

Step 4 To install the new module, follow these steps:

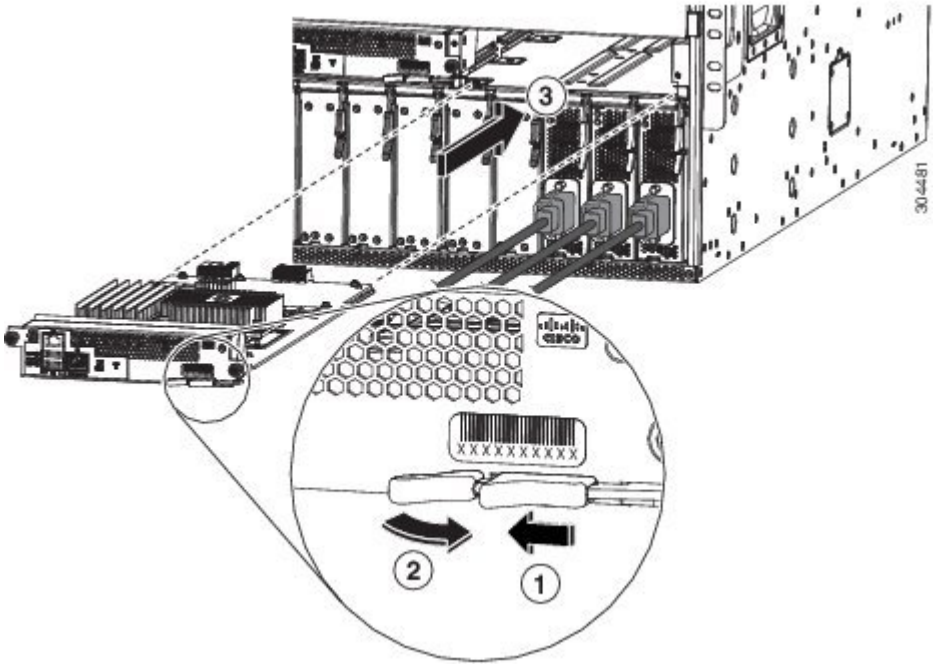
a) Pull the middle section of the ejector handle toward the end of the handle and rotate the handle away from the front of the module.
This action opens the lever so that the module can be fully inserted into the slot.

b) Hold the front of the module with one hand and place your other hand under the module to support its weight.

c) Align the back of the module to the guides in the open supervisor slot and slide the module all the way into the slot (see the following figure).

The module stops when its front is about 0.25 inches (0.6 cm) outside the front of the chassis.

Figure 10: Installing a Supervisor Module from a Chassis



1	Slide the middle handle toward the end of the ejector lever.	3	Slide the back end of the module into the open supervisor slot.
2	Rotate the ejector lever away from the module.		

d) Rotate the lever all the way to the front of the chassis until it locks in place with a click.
Make sure that the other end of the lever engages behind the front of the slot so that the module fully seats onto the connectors on the midplane.

e) Screw in the two captive screws to secure the module to the chassis. Tighten the screws to 8 in-lb (0.9 N·m) of torque.

f) Attach the following cables to the module:

- Console cable—Attach to the Console port.
- Management cable—Attach to the Management Ethernet port.

g) Verify that the supervisor module LEDs turn on and appear as follows:

- The Status (STS) LED is green.
- The Active (ACT) LED is amber or green.

Installing or Replacing a System Controller Module

The switch can operate with one or two system controller modules installed in the chassis. You can replace one system controller module while there is another one installed in the chassis.

Warning **Statement 1029—**Blank Faceplates and Cover Panels

Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.

Warning **Statement 1034—**Backplane Voltage

Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing

Before You Begin

- You must wear an electrostatic discharge (ESD) wrist strap or other ESD protective device while handling modules.
- Prepare an antistatic surface or packing materials for each module that you remove from the chassis.

Step 1 Open the packaging for the new system controller module and inspect the module for damage.
If the module is damaged, alert the Technical Assistance Center (TAC).

Step 2 If you are installing the module in an empty slot, remove the blank module that is already in that slot by unscrewing its captive screw and pulling it out of the slot. Go to Step 4.

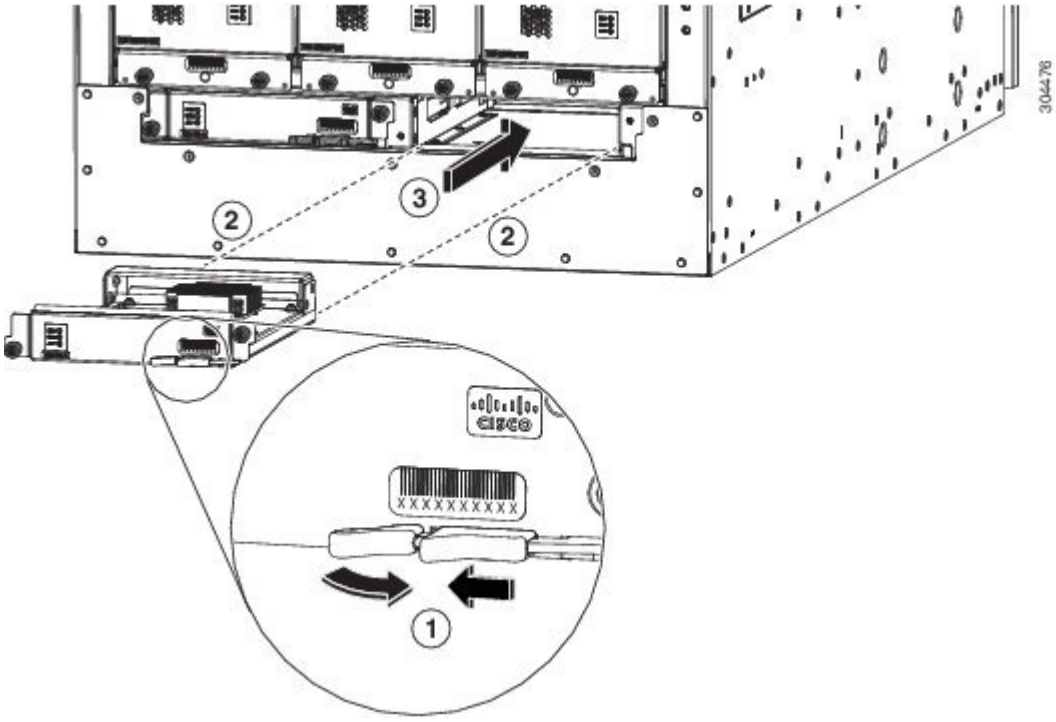
Step 3 If you are replacing a module that is currently in the chassis, remove the existing module from the chassis by following these steps:

a) Unscrew the two captive screws (one on the left side of the module and one on the right side) until the screws are no longer in contact with the chassis.
b) Slide and hold the middle handle on the ejector lever toward the end of the lever.
c) Rotate the ejector lever away from the front of the module.
As you rotate the lever, the module unseats from the midplane and moves slightly forward.
d) Use the lever to pull the module a couple of inches (about 5 cm) out of the slot.
e) Use one hand to hold the front of the module, place your other hand under the module to support its weight, pull the module out of the chassis, and set the it on an antistatic surface or inside an antistatic bag.

Step 4 To install the new module, follow these steps:

a) Slide and hold the middle handle on the ejector lever toward the end of the lever (see the following figure).

Figure 11: Removing a System Controller Module from a Chassis



1	Slide the middle handle on the ejector lever to the end of the lever and rotate the lever away from the module.	3	Rotate the ejector lever to the front of the module so that its locking knob grabs the chassis frame and seats the module on the midplane.
2	Slide the module all the way into the slot.		

b) Hold the front of the module with one hand and place your other hand under the module to support it.
c) Align the back of the module to the guides in the open controller slot and slide the module all the way into the slot. The module stops when its front is about 0.25 inches (0.6 cm) outside the front of the chassis.
d) Rotate the ejector lever all the way to the front of the chassis until it locks in place with a click. The module is fully seated on the midplane.
e) Screw in the two captive screws to secure the module to the chassis. Tighten each of these screws to 8 in-lb (0.9 N·m) of torque.
f) Verify that the Status (STS) LED turns on and becomes green.

Installing or Replacing an I/O Module

The switch can operate with one or more I/O modules installed in the chassis. If there is at least one I/O module installed and operating in the chassis, you can replace another I/O module or install a new I/O module in an empty I/O module slot.

Warning **Statement 1029—**Blank Faceplates and Cover Panels

Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.

Warning **Statement 1034—**Backplane Voltage

Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing

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.

Before You Begin

- You must wear an electrostatic discharge (ESD) wrist strap or other ESD protective device while handling modules.
- Prepare an antistatic surface or packing materials for each module that you remove from the chassis.

Step 1 Open the packaging for the new I/O module and inspect the module for damage.
If the module is damaged, contact the Technical Assistance Center (TAC).

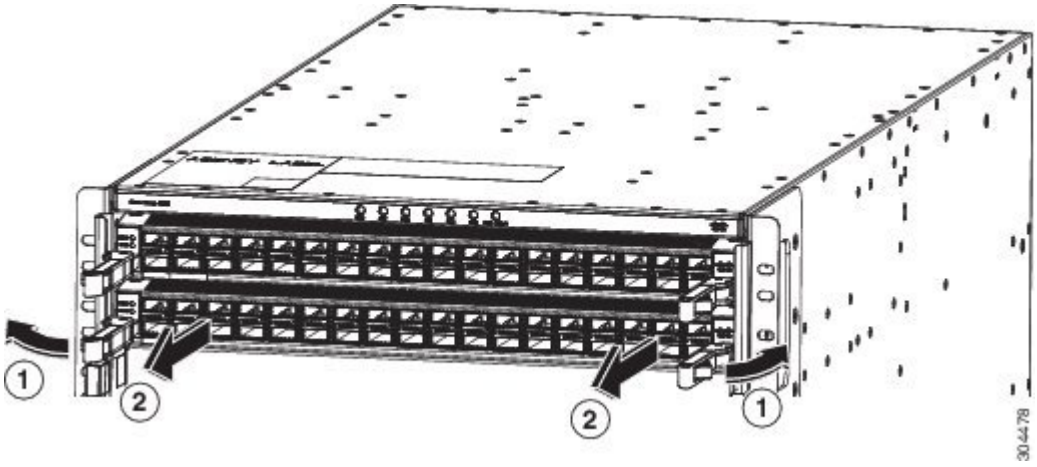
Step 2 If you are installing the module in an empty slot, remove the blank module that is already in that slot by unscrewing its two captive screws and pulling it out of the slot. Go to Step 4.

Step 3 If you are replacing a module that is currently in the chassis, remove the existing module from the chassis by following these steps:

a) Disconnect and label each of the interface cables from the module.

b) Rotate each of the two ejector levers away from the center of the chassis (see the following figure).

Figure 12: Removing an I/O Module from the Chassis



1	Rotate the ejector handle on each end of the module away from the center of the chassis until they no longer hold onto the mounting bracket.	2	Pull each ejector handle to remove the module part way from the chassis.

The levers unlock themselves from the brackets on the side of the chassis.

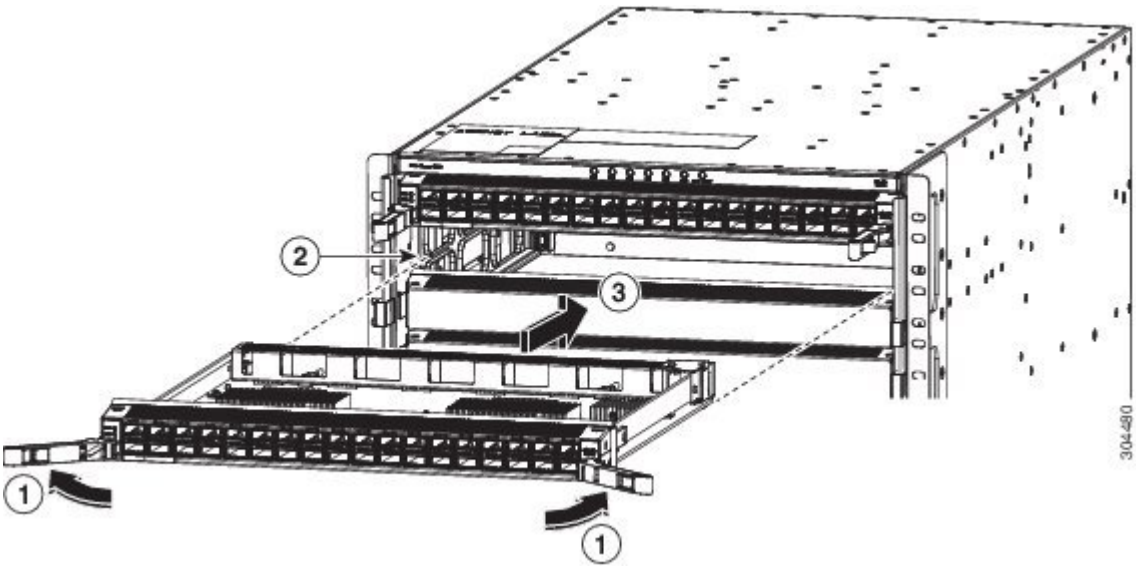
c) Use the levers to pull the module a couple of inches (about 5 cm) from the chassis.
d) Use one hand to hold the front of the module, place your other hand under the module to support its weight, pull it out of the chassis, and set it on an antistatic surface or inside an antistatic bag.

Step 4 To install the new module, follow these steps:

a) Rotate the end of each of the two ejector levers away from the center of the chassis.
b) Hold the front of the module with one hand and place your other hand under the module to support its weight.
c) Align the back of the module to the guides in the open I/O module slot and slide the module all the way into the slot (see the following figure).

The module stops when its front is about 0.25 inches (0.6 cm) outside the front of the chassis. The two levers move part way to the front of the chassis.

Figure 13: Inserting an I/O Module in the Chassis



1	Rotate the ejector handle on each end of the module away from the center of the chassis.	3	Slide the module all the way into the slot.
2	Align the bottom of the back of the module with tracks on either side of the slot.		

d) Rotate the ends of the two levers toward the center of the chassis.
When the levers point straight out from the chassis, their other ends should be locked onto the brackets on the side of the chassis.

As you rotate the levers, the front of the module moves all the way to the front of the chassis and the module fully seats on the midplane of the chassis.

e) Attach each interface cable to the appropriate port on the I/O module. Use the label on each cable to determine which port each cable attaches to.

f) Verify that the I/O module LEDs turn on and appear as follows:

- The Status (STS) LED turns on and becomes green.
- For each connected port, the port LED turns on and becomes green or amber.

Replacing a Fan Tray

You can remove a fan tray to either replace it with another fan tray or to replace a fabric modules located behind it.

The switch uses three fan trays but it can operate with two fan trays while you replace one or remove one to replace one of the fabric modules behind the fan tray. When you remove one fan tray, the other fan trays speed up their fans to maintain the designed airflow.

Note If you cannot replace a fan tray within three minutes, we recommend that you leave it in the chassis until you are ready to replace it.

Note If you remove more than one fan tray at a time during operations, the switch allows up to two minutes of operations before shutting down unless you replace extra missing fan trays within that time. If the switch senses an overtemperature condition when multiple fan trays are removed, the shutdown can occur in less than two minutes.

To replace a fan tray, you must perform the following functions:

1. Remove the fan tray as explained in t_n95xx_install_fan_tray.xml.
2. If you need to replace a fabric module behind the removed fan tray, see t_n95xx_install_fabric.xml
3. Install a fan tray as explained in t_n95xx_remove_fan_tray.xml.

Warning **Statement 1034—**Backplane Voltage

Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing

Removing a Fan Tray

Remove only one fan tray at a time during switch operations. If you remove more than one fan tray at a time, the switch will shut down within two minutes unless you replace the extra fan trays that you removed within that time.

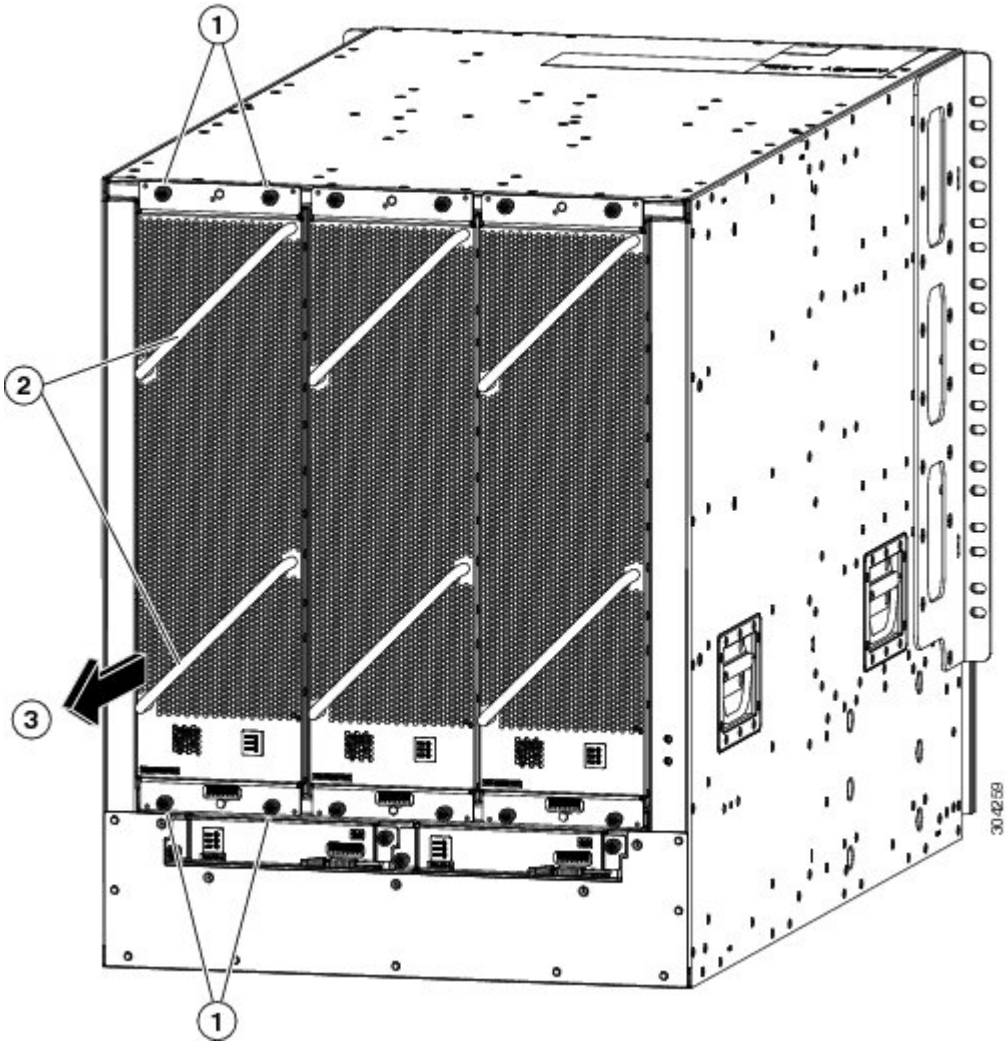
Before You Begin

- You must wear an electrostatic discharge (ESD) wrist strap or other ESD protective device while handling modules.
- Prepare an antistatic surface or packing materials for each module that you remove from the chassis.

- If you are replacing a fan tray, open the packaging for the new fan tray and inspect it for damage. If the module is damaged, contact the Technical Assistance Center (TAC) and wait until you have an undamaged fan tray to install.

Step 1 Unscrew the four captive screws on the front of the fan tray (one on each corner of the front of the fan tray) until each screw is free of the chassis (see Callout 1 in the following figure).

Figure 14: Removing a Fan Tray from the Chassis



1	Unscrew four captive screws (two at the top of the module and two at the bottom of the module).	3	Pull on the fan tray to slide it out of the chassis. Set the fan tray on an antistatic surface.
2	Hold the two fan tray handles with your two hands.		

Step 2 Hold both handles on the front of the fan tray with both of your hands and pull the fan tray out of the slot.

Step 3 Set the fan tray on antistatic material or inside an antistatic bag.

Installing a Fan Tray

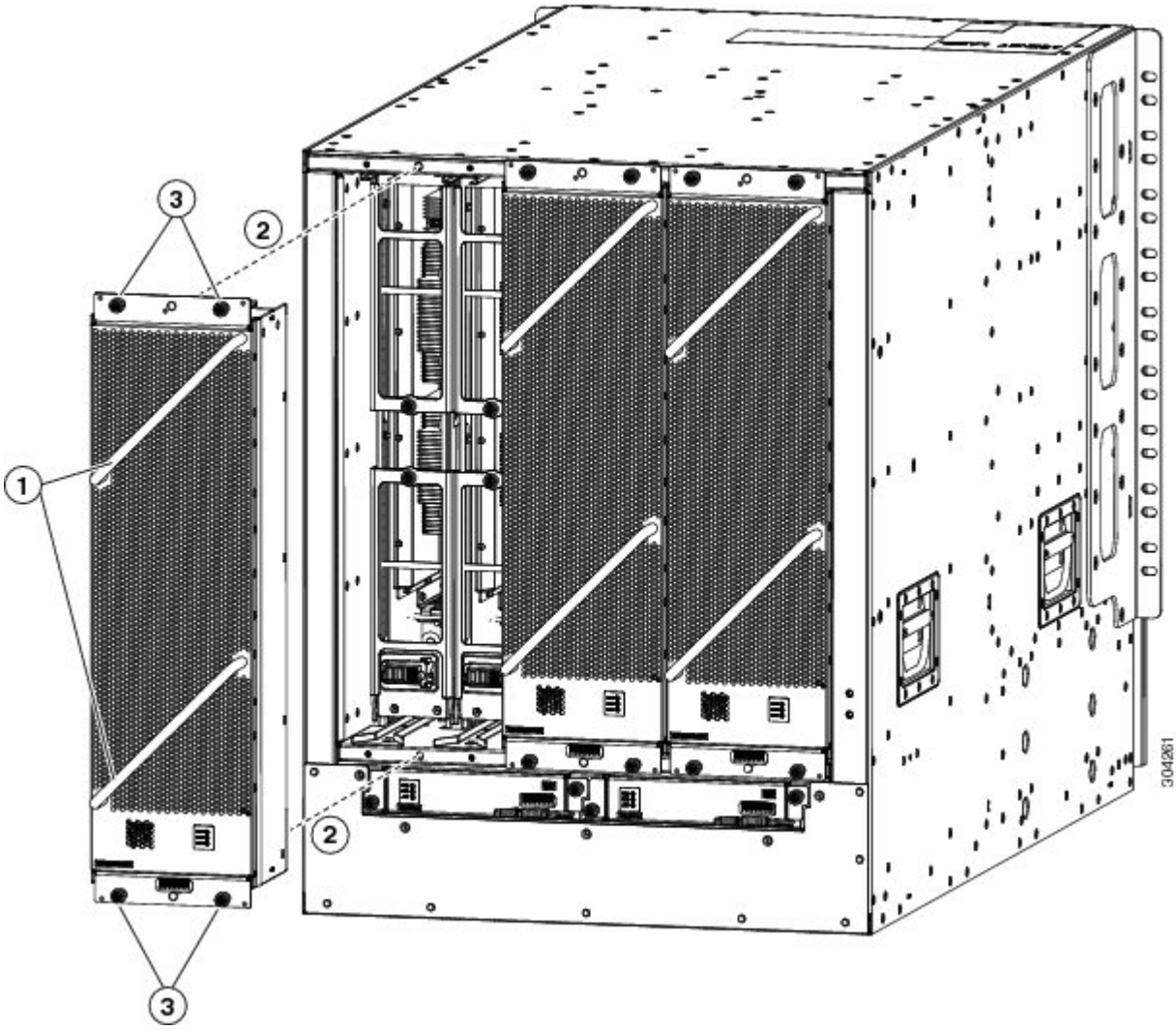
Before You Begin

- Fan tray slot is open in the chassis.
- Fan tray is available for installation.

- If you were replacing a fabric module behind the open fan tray slot, that replacement operation is completed.

Step 1 Use both of your hands to hold the two handles on the front of the fan tray that you are installing.

Figure 15: Installing a Fan Tray in the Chassis



1	Hold the two fan tray handles with your two hands.	3	Screw in four captive screws and tighten each screw to 8 in-lb (0.9 N·m) of torque.

2	Position the back of the fan tray to the open fan tray slot. The pins on the top and bottom of the fan tray should align to holes in the chassis and the two sets of rails on the top of the fan tray should align to two sets of tracks on the top of the open slot. Slide the fan tray all the way into the slot.		

Step 2 Position the fan tray with its rear (the side with the electrical connectors at the opening for the fan tray slot in the chassis.

Step 3 Align the two tracks on the top of the fan tray with the two sets of rails at the top of the open fan tray slot in the chassis.

Step 4 Slide the fan tray all the way into the slot until the front of the fan tray touches the chassis.
Make sure that the four captive screws on the front of the fan tray align with the four screw holes in the chassis.

Step 5 Screw in the four captive screws to secure the fan tray to the chassis. Tighten the screws to 8 in-lb (0.9 N·m) of torque.

Step 6 Verify that the fan tray STATUS LED turns on and becomes green.

Replacing a Fabric Module

The switch uses either three or six fabric modules but you can replace a fabric module while others are operating. To replace a fabric module, you must do each of the following:

- Shutdown the fabric module being replaced.
- Remove the fan tray covering the fabric module in the chassis.
- Remove the fabric module.
- Install the new fabric module.
- Reinstall the fan tray over the fabric module.
- Activate the fabric module.

To maintain the designed airflow while you remove the fan tray, the fans in the other fan trays increase their speed. During operations, we recommend that you remove only one fan tray at a time and replace that fan tray within three minutes to avoid the possibility of having the switch overheat and shut down. If you remove more than one fan tray at a time, the switch will shut down if you do not replace the extra missing fan trays within two minutes (the shutdown can occur earlier if an overtemperature condition occurs).

Note If the switch does not have all of the fabric slots filled, fill them as indicated in the following table and insert blank filler plates in the open slots. If you do not fill the recommended slots with fabric modules, some of the fans will not power up.

Number of Fabric Modules	Slots to be Filled
1 (Not allowed)	N.A.

Number of Fabric Modules	Slots to be Filled
2 (Not recommended)	N.A.
3 (Minimum recommended number)	22, 24, and 26
4	22, 23, 24, and 26
5	21, 22, 23, 24, and 26, or 22, 23, 24, 25, and 26
6 (Fully populated)	21, 22, 23, 24, 25, and 26

To replace a fabric module, you must perform the following operations:

1. Remove the fan tray that covers the fabric module that you are replacing.
2. Shutdown and remove the fabric module.
3. Install the new fabric module.
4. Install the fan tray over the new fabric module.

Warning **Statement 1034—**Backplane Voltage

Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing

Removing a Fabric Module

Before You Begin

- You must wear an electrostatic discharge (ESD) wrist strap or other ESD protective device while handling modules.
- Prepare an antistatic surface or packing materials for each module that you remove from the chassis.
- You must remove the fan tray that covers the fabric module that you are removing (see t_n95xx_remove_fan_tray.xml.

Step 1 If you are replacing a fabric module, open the packaging for the new module and inspect it for damage. If the module is damaged, alert the Technical Assistance Center (TAC) and stop this replacement process until you have an undamaged module to install.

Step 2 Shut down the fabric module that you are removing by using the **poweroff module** *slot_number* command. Use a slot number between 21 and 26. Verify that the Fabric LED for the slot that you specified turns off.

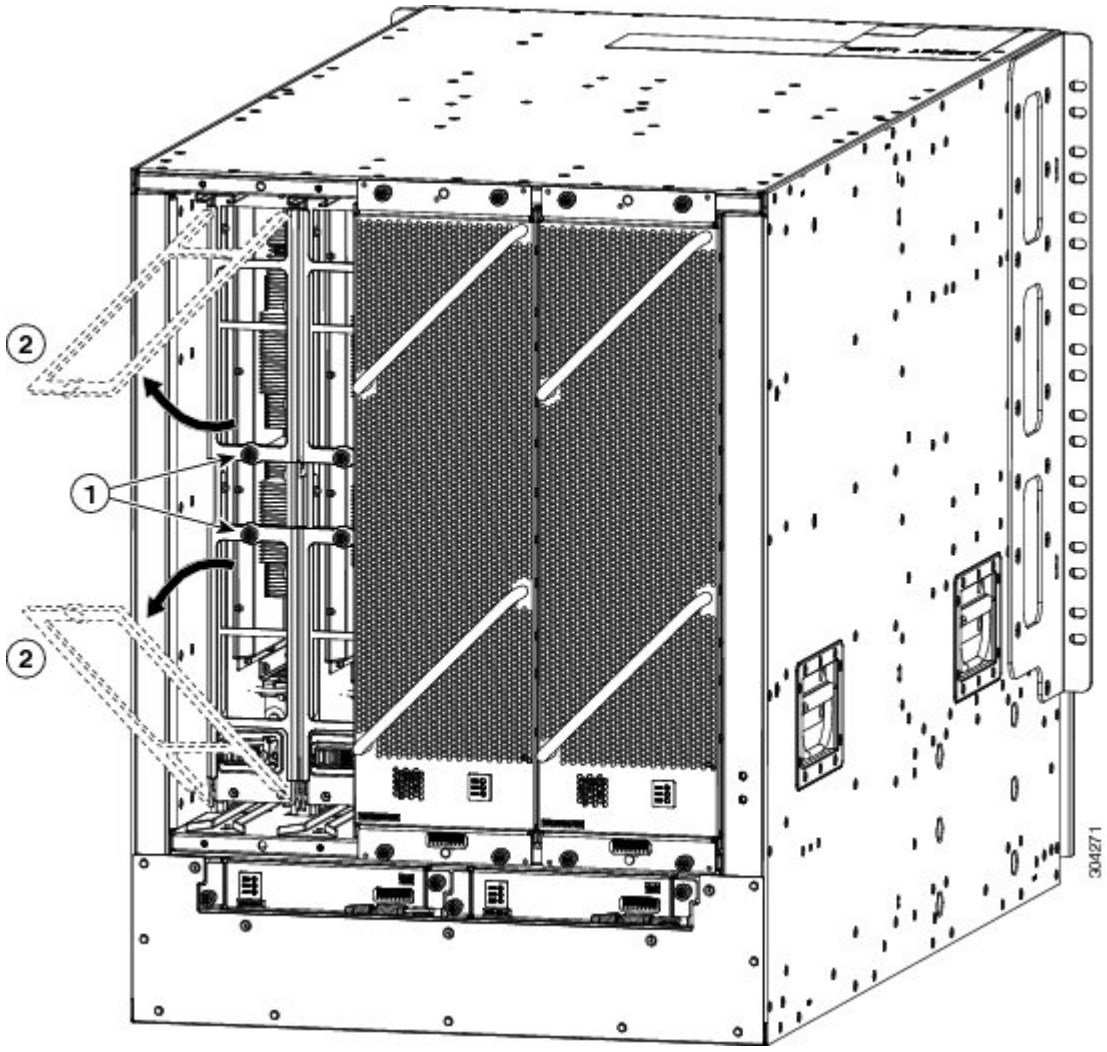
Note If you do not shut down the fabric module, packets can be lost.

Step 3 Remove the fabric module that you are replacing by following these steps:

Caution If you have not already shut down the fabric module that you are removing, use the **poweroff module** command to prevent the loss of any packets.

a) Unscrew the screw on the center of each of the two handles on the fabric module (see Callout 1 in the following figure).

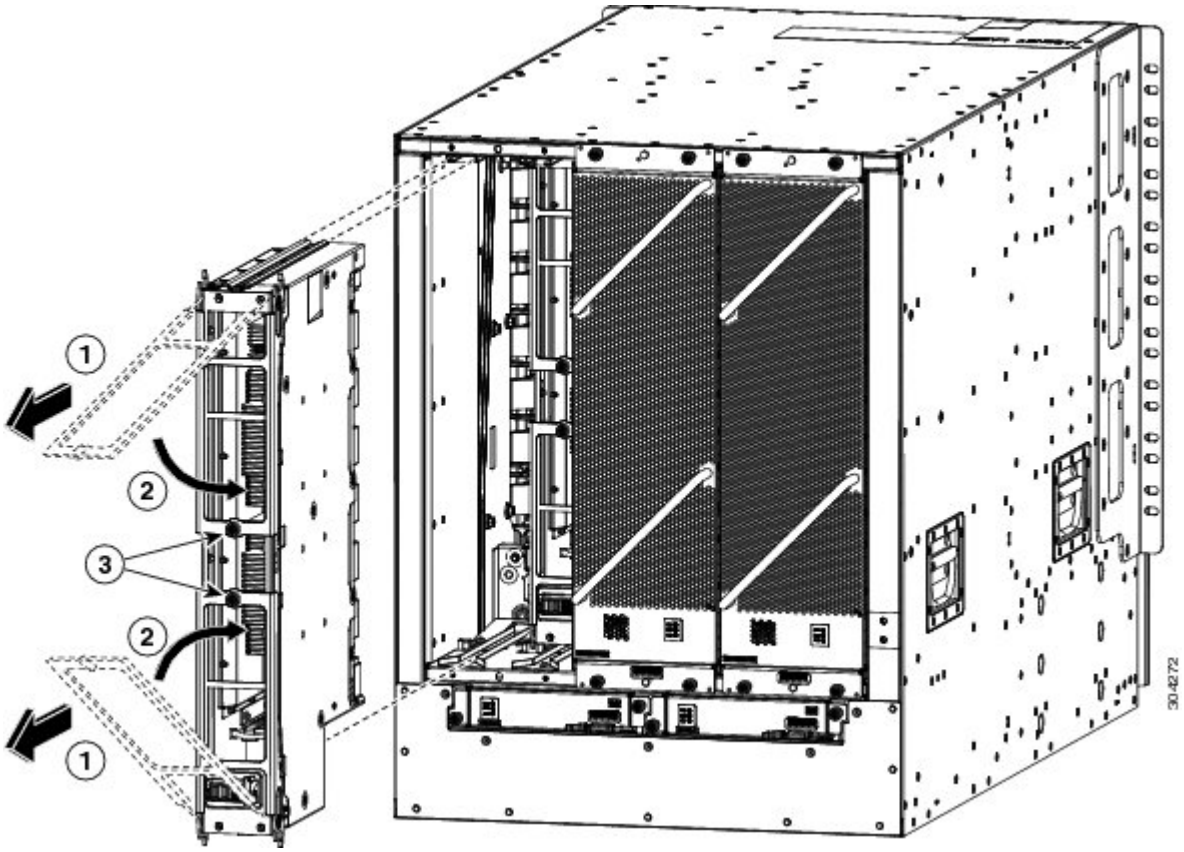
Figure 16: Unlocking a Fabric Module from its Slot in the Chassis



1	Unscrew two captive screws (one on each ejector handle).	2	Rotate both ejector handles away from the front of the fabric module.

b) Rotate the two handles at least 30 degrees so that the other end of each handle no longer holds the module in the slot (see Callout 2 in the previous figure).
c) With each of the two handles in your two hands, pull the module a couple of inches (about 5 cm) out of the slot (see the following figure).

Figure 17: Removing a Fabric Module from the Chassis



1	Pull on both handles to partially remove the fabric module from the chassis	3	Screw in the two captive screws (one on each handle) to the module. Tighten each of these screws to 8 in-lb (0.9 N·m) of torque.
2	Rotate both ejector handles to the front of the module.		

d) Rotate both handles back to the front of the module until they click in place. Fasten each handle to the module using the captive screw on the back of the handle. Tighten the screw to 8 in-lb (0.9 N·m) of torque (see Callouts 2 and 3 in the previous figure).
e) Place one hand under the fabric module to support its weight, place your other hand on the front of the module, and slide the module out of the slot.

f) Rotate the module 90 degrees and lay it flat on an antistatic surface or in an antistatic bag.

What to Do Next

You are ready to install a fabric module into the open slot (see t_n95xx_install_fabric.xml.

Installing a Fabric Module

Before You Begin

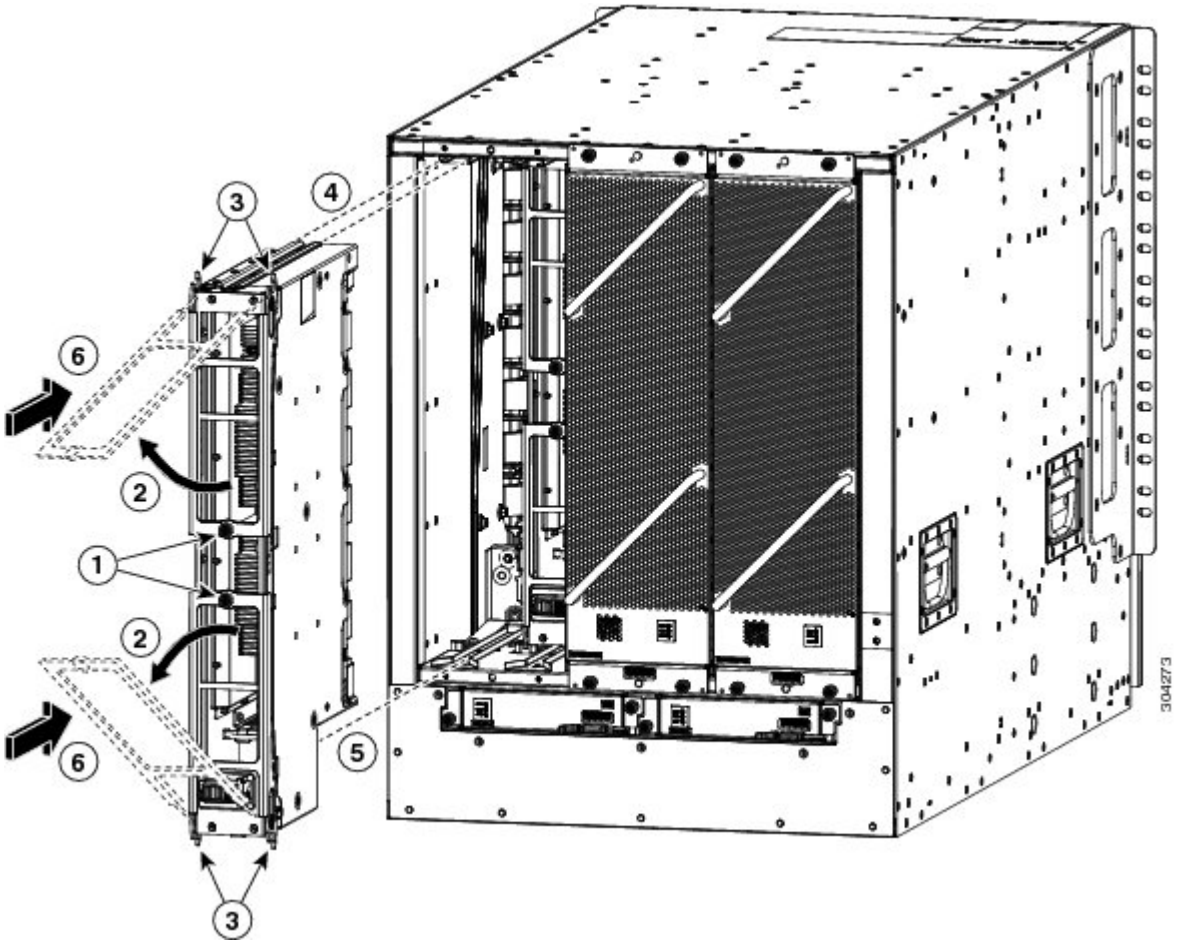
- You must wear an electrostatic discharge (ESD) wrist strap or other ESD protective device while handling modules.

- Prepare an antistatic surface or packing materials for each module that you remove from the chassis.

Step 1 Place one hand on the front of the module and turn the module 90 degrees so that the electrical connectors are on the bottom.

Step 2 Unscrew the two captive screws (one on each ejector handle) and rotate the ejector handles away from the chassis (see Callouts 1 and 2 in the following figure). Be sure that the locking posts on the top and bottom of the chassis (see Callout 3) rotate into the module so that the module can slide fully into the slot.

Figure 18: Installing a Fabric Module in a Chassis



1	Unscrew two captive screws (one on each ejector handle).	4	Align the rails on the top of the module to the track on the top of the open slot.
2	Rotate both ejector handles away from the front of the module.	5	Align the bottom of the module so that it slides into the tracks on the bottom of the open slot.

3	Be sure that the locking posts fully rotate down into the module	6	Slide the module all the way into the slot.

Step 3 Fit the guide rails on the top of the module into the track on the top of the slot and make sure that the guide bar on the bottom of the module goes into the module guide at the bottom of the slot.

Step 4 Slide the module all the way into the slot.

Step 5 Rotate both ejector levers to the front of the chassis and be sure that the module is locked to the top and bottom of the slot.

Step 6 Screw in the captive screw on each of the two levers so that each lever is locked in place on the module. Tighten each screw to 8 in-lb (0.9 N·m) of torque.

Step 7 Power up the fabric module by using the **no poweroff module** *slot_number*. Use a slot number between 21 and 26.

Note If you did not use the **poweroff module** command to shut down the original fabric module before removing it, do not use the **no poweroff module** command (the module will begin to power up as soon as you connect it to an AC power source and the chassis).

Step 8 Place your other hand under the module to support its weight and position the module so that its rear is at the open fabric slot in the chassis.

What to Do Next

You are ready to reinstall the fan tray that covers the newly installed fabric module.

Installing a 3-kW AC Power Supply

The number of 3-kW power supplies that you install depends on the power requirements of the switch and the power mode that you are using. To determine the power requirements of the switch, see the Power Requirements section.

If you are using only one power source for combined mode or power-supply (*n*+1) redundancy mode, you can install the power supplies in any of the power supply slots on the chassis. If you are using two power sources for input-source (grid or *n*+*n*) redundancy mode, you must connect the power supplies in slots 1 through 4 to one power source and the power supplies in slots 5 through 8 to the other power source. With input-source redundancy mode, divide the power supplies evenly between the first four slots and the last four slots so that the amount of redundant power for the switch equals the amount of available power for the switch.

Warning **Statement 1034—**Backplane Voltage

Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing

Warning **Statement 1029—**Blank Faceplates and Cover Panels

Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.

Before You Begin

- The AC power source must be installed within reach of the power cables.
- The AC power source must meet the power specifications required by the switch.
- There are one or two AC power sources available. If using input-source (grid or *n*+*n*) redundancy, there must be two power sources available. Otherwise, only one power source is required.

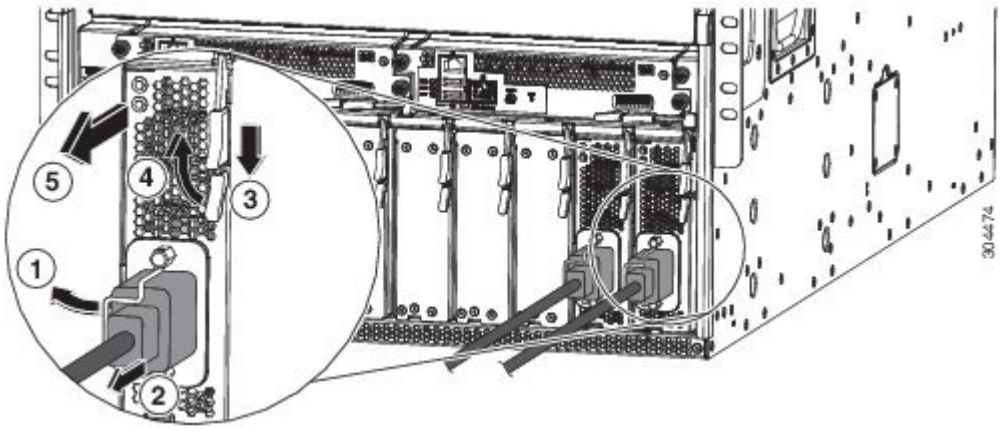
Step 1 Open the packaging for the new 3-kW AC power supply and inspect the module for damage.
If the module is damaged, contact the Technical Assistance Center (TAC).

Step 2 If you are installing the module in an empty slot, remove the blank filler plate that is already in that slot by unscrewing its captive screw and pulling it out of the slot. If you are using the combined power mode (no power redundancy) or power-supply (*n*+1) redundancy, you can use any power supply slot in the chassis. If you are using input-source (grid or *n*+*n*) redundancy mode, you must be sure that you are inserting the power supply in a slot used for the desired power supply (the power supplies in slots 1 through 4 must be connected to one power source and the power supplies in slots 5 through 8 must be connected to the other power source). Go to Step 4.

Step 3 If you are replacing a power supply that is currently in the chassis, remove the existing module from the chassis by following these steps:

a) Disconnect the power cable from the power supply and verify that the output and input LEDs turn off.
b) Slide the middle of the ejector lever down to the end of the lever and rotate the lever up so that its other end no longer holds onto the chassis (see the following figure).
The power supply unlocks from the chassis and moves out slightly.

Figure 19: Removing a Power Supply from the Chassis



1	Rotate the cable retention clip off of the power cable plug.	4	Rotate the ejector lever away from the module.
2	Pull the power cable plug out of the receptacle.	5	Pull on the ejector lever to slide the power supply partially (2 inches [5 cm]) out of the chassis. Hold the front of the power supply and pull it all the way out of the chassis.
3	Slide and hold the middle handle on the ejector lever toward the end of the lever.		

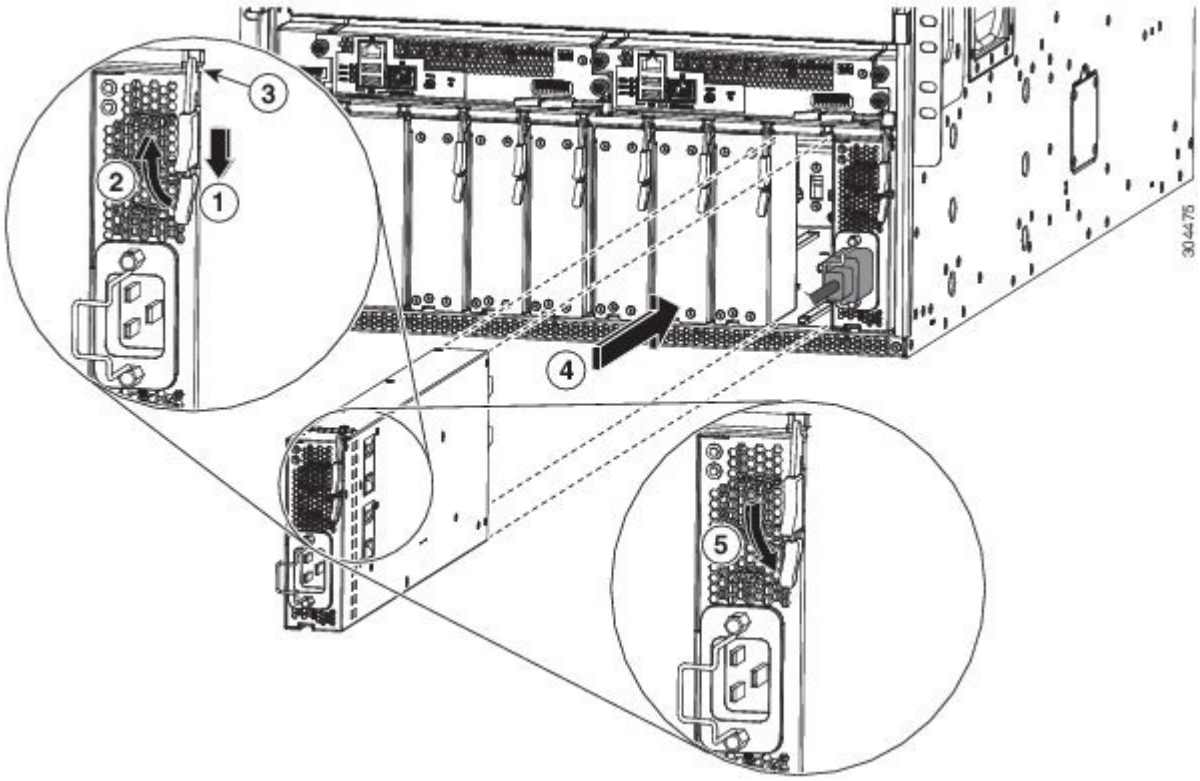
c) Pull on the lever to move the power supply about 2 inches (5 cm) out of the slot.
d) Place one hand on the front of the power supply and your other hand under the power supply to support its weight.
e) Pull the module out of the slot and place it on an antistatic surface or inside an antistatic bag.

Step 4 To install the new power supply, follow these steps:

a) Ensure that the power supply is not connected to an AC power source. If it is connected to a power source, remove the power cable from the power supply and wait at least five seconds before doing the next step.
b) Hold the front of the module with one hand and place your other hand under the module to support its weight.
c) Rotate the power supply 90 degrees so that the power receptacle is positioned on the lower front side and so that the back of the power supply is oriented to slide into the open power supply slot.
d) Slide the guide bracket that is located on the top of the power supply into the track at the top of the power supply slot. Slide the power supply all the way into the slot.
The front of the power supply will be about 0.25 inches (0.6 cm) outside the chassis.

e) Slide the handle on the middle of the power supply ejector handle about 0.25 inches (0.6 cm) and rotate the lever away from the front of the power supply while pushing the power supply all the way into the chassis (see the following figure).

Figure 20: Installing a Power Supply in a Chassis



1	Slide and hold the middle handle on the ejector lever toward the end of the lever.	4	Slide the rear end of the power supply all the way into the slot and press the ejector lever toward the front of the power supply to lock it in the slot.
2	Rotate the ejector lever away from the module.	5	Rotate the lever to the front of the power supply and verify that the power supply is locked into its slot by trying to pull it out.
3	Make sure that the locking knob has rotated into the power supply and cannot prevent the power supply from sliding all the way into the chassis slot.		

f) Rotate the ejector lever toward the front of the power supply and be sure that the other end of the lever locks into the chassis.

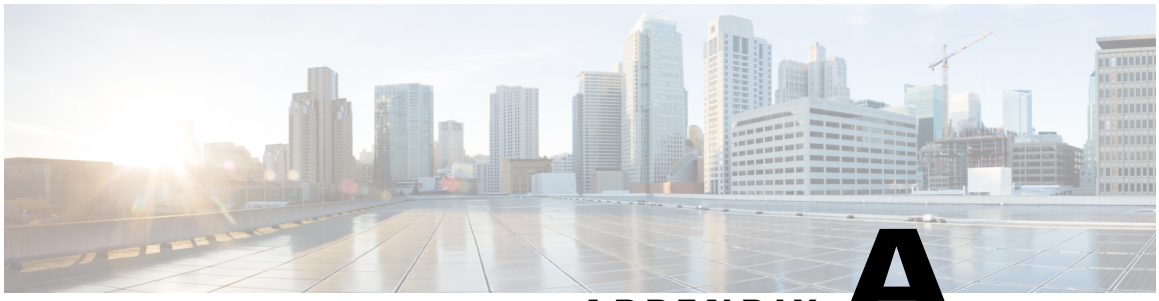
The lever should click when you rotate it all the way to the front of the power supply. Be sure that the power supply is fully inserted into the slot (the front of the power supply should be even with the surface of the chassis) and securely in place.

g) Attach the power cable to the power receptacle on the power supply and rotate the power cable holder onto the plug on the cable.

h) Make sure that the other end of the power cable is attached to the AC power source in one of the following ways:

- If you are using the combined power mode or the power supply redundancy mode, you must connect the power cable to the same power source as used by the other power supplies in the same switch.
- If you are using the input-power source (grid or *n*+*n*) redundancy mode, you must connect the power cable to the same power source as used by the other power supplies in the same set of power supply slots in the chassis. The power cables for slots 1 through 4 must be connected to one power source and the power cables inslots 5 through 8 must be connected to another power source.

i) Verify that the OK LED turns on and eventually becomes green.



APPENDIX A

System Specifications

Environmental Specifications

Environment		Specification
Temperature	Ambient operating	32 to 104°F (0 to 40°C)
	Ambient nonoperating	–40 to 158°F (–40 to 70°C)
Relative humidity	Ambient (noncondensing) operating	5 to 90% (45 to 50% recommended)
	Ambient (noncondensing) nonoperating	5 to 95%
Altitude	Operating	–500 to 13,000 feet (–152 to 4,000 meters)
	Storage	–1,000 to 30,000 feet (–305 to 9,144 meters)

Switch Dimensions

Switch Component	Width	Depth	Height
Cisco Nexus 9508 chassis	17.5 inches (44.5 cm)	30.5 inches (77.5 cm)	22.7 inches (57.8 cm) (13 RU)

Weights and Quantities for the Chassis, Modules, Fan Trays, and Power Supplies

Component	Weight per Unit	Quantity
Cisco Nexus 9508 Chassis (N9K-C9508)	150.0 lb (68.2 kg)	1
Supervisor Module (N9K-SUP-A)	4.8 lb (2.2 kg)	1 or 2
System Controller Module (N9K-SC-A)	1.9 lb (0.9 kg)	2
I/O Modules	—	1 to 8
– 48-port 1-/10-Gigabit SFP+ plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9464PX)	10.8 lb (4.9 kg)	
– 48-port 1-/10-GBASE-T plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9464TX)	10.0 lb (4.5 kg)	
– 48-port 1-/10-GBASE-T plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9564TX)	12.6 lb (5.7 kg)	
– 48-port 1-/10-Gigabit SFP+ plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9564PX)	11.5 lb (5.2 kg)	
– 36-port 40-Gigabit QSFP+ aggregation I/O module (N9K-X9636PQ)	11.5 lb (5.2 kg)	
– 36-port 40-Gigabit QSFP+ I/O module (N9K-X9536PQ)	12.0 lb (5.4 kg)	
– 32-port 40-Gigabit QSFP+ I/O module (N9K-X9432PQ)	10.9 lb (4.9 kg)	
Fabric Modules	—	3 to 6
– Fabric-1 module (N9K-C9508-FM)	9.6 lb (4.4 kg)	
Fan Trays (N9K-C9508-FAN)	8.3 lb (3.7 kg)	3

Component	Weight per Unit	Quantity
Power Supplies	—	1 to 8
– 3-kW AC power supply (N9K-PAC-3000W-B)	6.2 lb (2.8 kg)	

Power Requirements for Switch Modules and Fan Trays

The following table lists the maximum amount of power required for each switch module and fan tray. Typically, power consumption is less for each module.

Component	Quantity	Maximum Power	Typical Power
Supervisor Modules	1 or 2	—	—
– Supervisor (N9K-SUP-A)		80 W	69 W
System Controller Modules	2	—	—
– System Controller (N9K-SC-A)		25 W	13 W
I/O Modules	1 to 8 (can mix types)	—	—
– 48-port 1-/10-Gigabit SFP+ plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9464PX)		430 W	300 W
– 48-port 1-/10-GBASE-T plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9464TX)		360 W	160 W
– 48-port 1-/10-GBASE-T plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9564TX)		550 W	450 W
– 48-port 1-/10-Gigabit SFP+ plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9564PX)		430 W	300 W
– 36-port 40-Gigabit QSFP+ aggregation I/O module (N9K-X9636PQ)		400 W	260 W
– 36-port 40-Gigabit QSFP+ I/O module (N9K-X9536PQ)		420 W	360 W
– 32-port 40-Gigabit QSFP+ I/O module (N9K-X9432PQ)		300 W	240 W
Fabric Modules (N9K-C9508-FM)	3 to 6	250 W	176 W
Fan Tray (N9K-C9508-FAN)	3	250 W	176 W

Maximum Power Available to the Switch

The maximum power available for operations depends on the input power from your power source, the number and output capabilities of your power supplies, and the power redundancy mode that you use. The following table lists the amount of power available for 3-kW power supplies depending on power inputs, numbers of power supplies, and the mode used.

Table 2: Maximum Power Available for a Switch with 3-kW Power Supplies

Power Inputs	Power Supplies	Combined Mode	Power Supply (*n*+1) Redundancy Mode	Input Source (*n*+*n*) Redundancy Mode
1 input (220 V)	1	3000 W	—	—
	2	6000 W	3000 W	3000 W
	3	9000 W	6000 W	3000 W
	4	12000 W	9000 W	6000 W
	5	15000 W	12000 W	6000 W
	6	18000 W	15000 W	9000 W
	7	21000 W	18000 W	9000 W
	8	24000 W	21000 W	12000 W

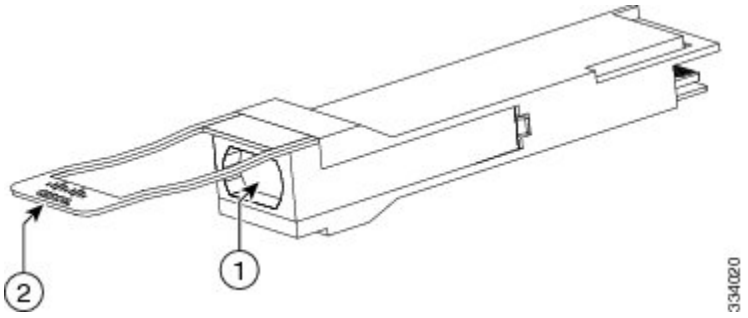
Transceivers, Connectors, and Cables Used with Each I/O Module

40-Gigabit QSFP+ Transceiver Specifications

The 40-Gigabit QSFP+ transceivers are used with the M2-Series 40-Gigabit I/O module (N7K-M206FQ-23L).

The following figure identifies the major features of these transceivers.

Figure 21: QSFP+ Transceiver



1	Optical bore	2	Pull tab

For the cable specifications that apply to these transceivers, see the following table.

Transceiver	Cable Type	Connector Type	Wavelength (nm)	Core Size (microns)	Modal Bandwidth (MHz-km)	Maximum Cable Distance
QSFP-40G-CSR4	MMF	MPO/MTP	850	50.0 50.0 50.0	500 (OM2) 2000 (OM3) 4700 (OM4)	98.4 feet (30 m) 984 feet (300 m) 1312 feet (400 m)
QSFP-40G-SR4	MMF	PC or UPC	850	50.0 50.0 50.0	500 (OM2) 2000 (OM3) 4700 (OM4)	98.4 feet (30 m) 328 feet (100 m) 492 feet (150 m)
QSFP-40G-SR4-BD	MMF	LC	832 to 918	50.0 50.0 50.0	500 (OM2) 2000 (OM3) 4700 (OM4)	98.4 feet (30 m) 328 feet (100 m) 492 feet (150 m)
QSFP-40GE-LR4	SMF	LC	1310	G.652	—	6.1 miles (10 km)

Transceiver	Cable Type	Connector Type	Wavelength (nm)	Core Size (microns)	Modal Bandwidth (MHz-km)	Maximum Cable Distance
QSFP-H40G-CU1M	QSFP+ to QSFP+ copper direct-attach cables	—	—	—	—	3.3 feet (1 m)
QSFP-H40G-CU3M		—	—	—	—	9.8 feet (3 m)
QSFP-H40G-CU5M		—	—	—	—	16.4 feet (5 m)
QSFP-H40G-ACU7M	QSFP+ to QSFP+ copper direct-attach cables	—	—	—	—	23.0 feet (7 m)
QSFP-H40G-ACU10M		—	—	—	—	32.8 feet (10 m)
CVR-QSFP-SFP10G	QSFP40GSR4	MMF	MPO/MTP	850	50.0 50.0 50.0	500 (OM2) 2000 (OM3) 4700 (OM4)

For the optical specifications, see the following table.

Transceiver	Transceiver Type	Transmit Power (dBm)	Receive Power (dBm)	Transmit and Receive Wavelength (nm)
QSFP-40G-CSR4	MMF	0 (maximum per lane) -7.3 (minimum per lane)	0 (maximum per lane) -9.9 (minimum per lane)	840 to 860 nm
QSFP-100G-SR4	MPO/MTP multifiber	-1.0 (maximum per lane) -7.6 (minimum per lane)	2.4 (maximum per lane) -9.5 (minimum per lane)	840 to 860 nm
QSFP-40G-SR4-BD	Duplex MMF	5 (maximum per lane) -4 (minimum per lane)	+5 (maximum per lane) -6 (minimum per lane)	832 to 918
QSFP-40GE-LR4	SMF	2.3 (maximum per lane) -7 (minimum per lane)	2.3 (maximum per lane) -13.7 (minimum per lane)	1271, 1291, 1311, and 1331

For the environmental specifications, see the following table.

Parameter	Specification
Storage temperature	–40 to 185°F (–40 to 85°C)
Operating temperature	32 to 104°F (0 to 40°C)
Case temperature	–40 to 158°F (–40 to 70°C)
Storage relative humidity	5 to 95 percent

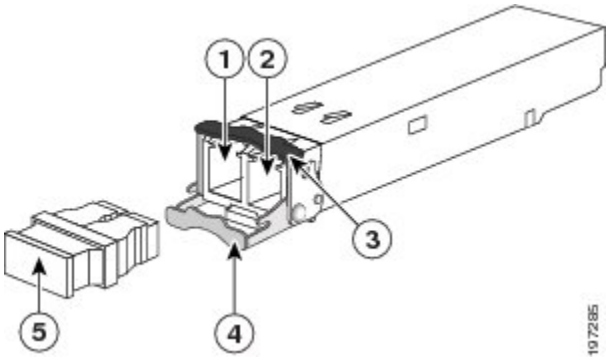
10-Gigabit SFP+ Transceivers

The 10-Gigabit SFP+ transceivers are used with the following I/O modules:

- 48-port 1-/10-Gigabit SFP+ plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9464PX)
- 48-port 1-/10-GBASE-T plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9464TX)
- 48-port 1-/10-Gigabit SFP+ plus 4-port 40-Gigabit QSFP+ I/O module (N9K-X9564PX)

The following figure identifies the major features of these transceivers.

Figure 22: SFP+ Transceiver



1	Receive optical bore	4	Clasp shown in open position
2	Transmit optical bore	5	Dust plug
3	Clasp shown in closed position		

For the cable specifications that apply to these transceivers, see the following table.

Transceiver	Cable Type	Connector Type	Wavelength (nm)	Core Size (microns)	Modal Bandwidth (MHz-km)	Maximum Cable Distance
SFP-10G-LR	Single-mode fiber (SMF) optic	Dual LC/PC	1310	G.652 fiber	—	6.2 miles (10 km)
SFP-10G-SR	MMF	Dual LC/PC	850	62.5 62.5 50 50 50	160 200 400 500 2000	85 feet (26 m) 108 feet (33 m) 216 feet (66 m) 269 feet (82 m) 984 feet (300 m)
SFP-H10GB-CU1M	Twinax cable, passive, 30-AWG cable assembly	—	—	—	—	3.3 feet (1 m)
SFP-H10GB-CU2M	Twinax cable, passive, 30-AWG cable assembly	—	—	—	—	6.6 feet (2 m)
SFP-H10GB-CU3M	Twinax cable, passive, 30-AWG cable assembly	—	—	—	—	9.8 feet (3 m)
SFP-H10GB-CU5M	Twinax cable, passive, 30-AWG cable assembly	—	—	—	—	16.4 feet (5 m)
SFP-H10GB-ACU7M	Twinax cable, active, 30-AWG cable assembly	—	—	—	—	22.8 feet (7 m)
SFP-H10GB-ACU10M	Twinax cable, active, 30-AWG cable assembly	—	—	—	—	32.5 feet (10 m)

For the optical specifications, see the following table.

Transceiver	Transceiver Type	Transmit Power (dBm)	Receive Power (dBm)	Transmit and Receive Wavelength (nm)
SFP-10G-LR	10GBASE-LR, 1310-nm SMF	0.5 (maximum per lane) –8.2 (minimum per lane)	0.5 (maximum per lane) –14.4 (minimum per lane)	1260 to 1355 nm
SFP-10G-SR	10GBASE-SR, 850-nm MMF	–1.2 (maximum per lane)[1] –7.3 (minimum per lane)	0.5 (maximum per lane) –8.2 (minimum per lane)	840 to 860 nm

1 The launch power shall be the lesser of the class 1 safety limit or the maximum receive power. Class 1 laser requirements are defined by IEC 60825-1:2001.

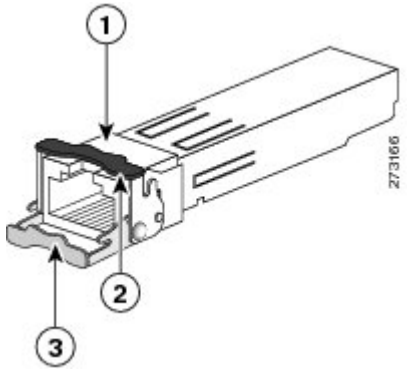
For the environmental specifications, see the following table.

Parameter	Specification
Storage temperature	–40 to 185°F (–40 to 85°C)
Operating temperature	32 to 158°F (0 to 70°C)
Case temperature	–40 to 158°F (–40 to 70°C)
Module supply voltage	3.1 to 3.5 V

1000BASE-T and 1000BASE-X SFP Transceiver Specifications

The 1000BASE-T and 1000BASE-X SFPs are hot-swappable transceivers that you plug into SFP-compatible I/O modules. The 1000BASE-T transceiver, shown in the following figure, provides an RJ-45 connection for copper cables.

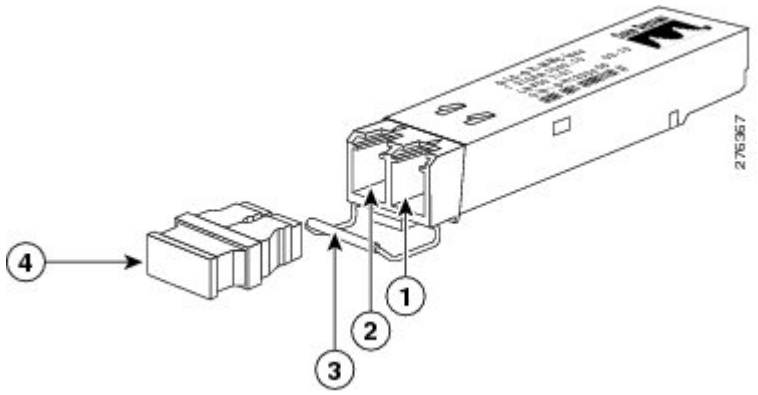
Figure 23: 1000BASE-T SFP Transceiver



1	RJ-45 connector	3	Bail clasp shown in the open (unlocked) position
2	Bail clasp shown in the closed (locked) position		

The 1000BASE-X transceiver, shown in the following figure, provides an optical connection for fiber-optic cables.

Figure 24: 1000BASE-X SFP Transceiver



1	Receive optical bore	3	Bail clasp
2	Transmit optical bore	4	Dust plug

For the 1000BASE-T and 1000BASE-X transceiver cable specifications, see the following table.

Transceiver Type	Cable Type	Connector Type	Wavelength (nm)	Core Size (microns)	Modal Bandwidth (MHz-km)	Maximum Cable Distance
1000BASE-SX (GLC-SX-MM)	Multi-mode fiber (MMF) optic	LC duplex	850	62.5 62.5 50.0 50.0	160 200 400 500	722 feet (220 m) 902 feet (275 m) 1640 feet (500 m) 1804 feet (550 m)
1000BASE-SX (GLC-SX-MMD)						
1000BASE-LX (GLC-LH-SM)	MMF	LC duplex	1310	62.5 50.0 50.0	500 400 500	1804 feet (550 m) 1804 feet (550 m) 1804 feet (550 m) Use a mode-conditioning patch cord regardless of cable span.
	Single-mode fiber (SMF) optic	LC duplex	1310	G.652[2]	—	6.2 miles (10 km)
1000BASE-T (GLC-T)	Category 5, 5E, or 6 UTP/FTP	RJ-45	—	—	—	328 feet (100 meters)
1000BASE-T (SFT-GE-T)			—	—	—	

2 ITU-T G652 SMF as specified by the IEEE 802.32 standard.

RJ-45 Module Connectors

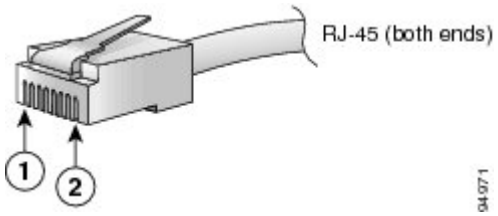
The RJ-45 connector connects Category 3, Category 5, Category 5e, Category 6, or Category 6A foil twisted-pair or unshielded twisted-pair cable from the external network to the following module interface connectors:

- Supervisor modules
  - 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.

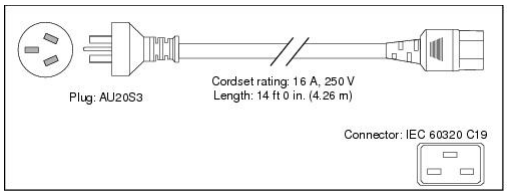
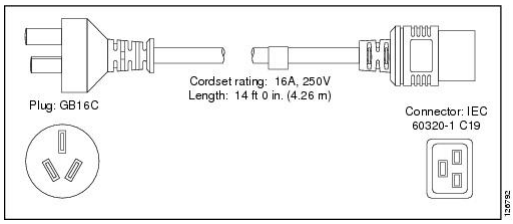
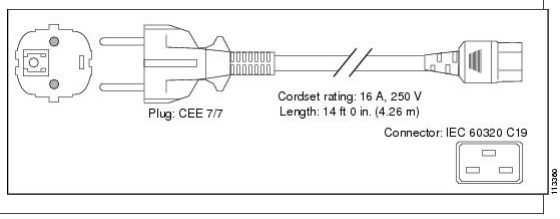
The following figure shows the RJ-45 connector.

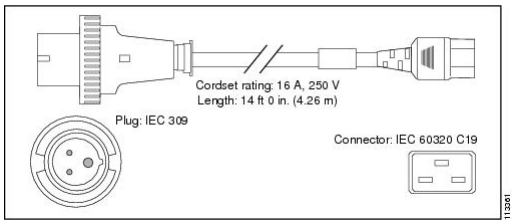
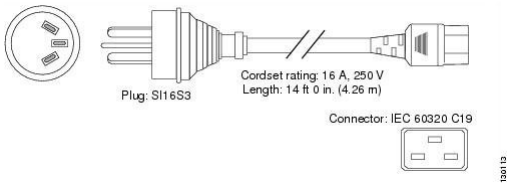
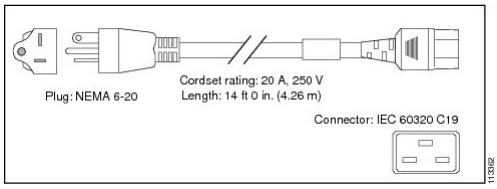
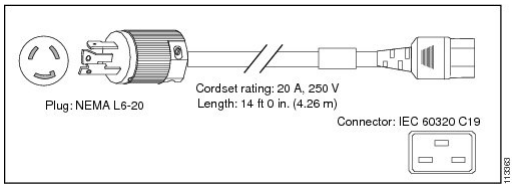
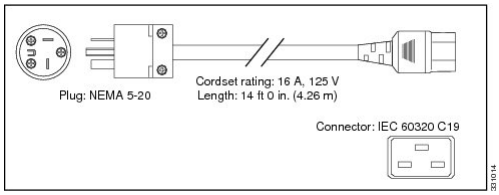
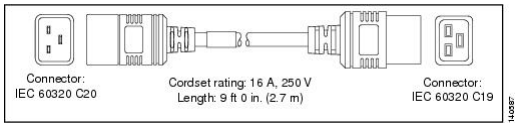
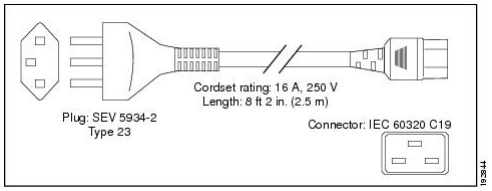
Figure 25: RJ-45 Connector

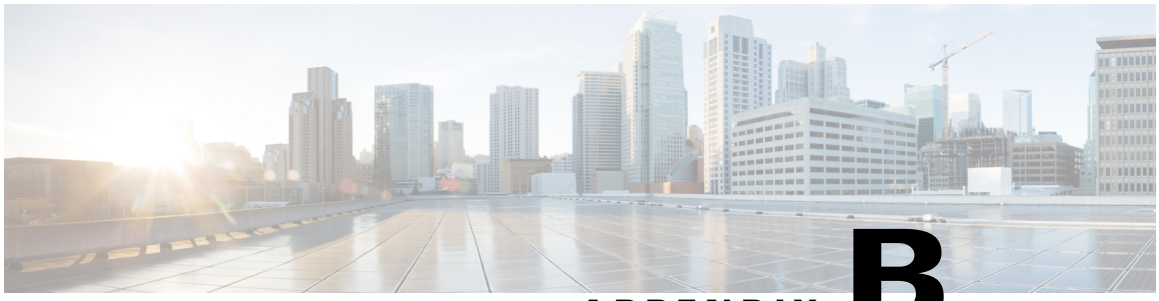


1	Pin 1	2	Pin 2

3-kW AC Power Cord Specifications

Locale	Power Cord Part Number	Cord Set Rating	Power Cord Illustration
Australia and New Zealand	CAB-AC-16A-AUS	16A, 250 VAC	
Peoples Republic of China	CAB-AC-16A-CH	16A, 250 VAC	
Continental Europe	CAB-AC-2500W-EU	16A, 250 VAC	

Locale	Power Cord Part Number	Cord Set Rating	Power Cord Illustration
International	CAB-AC-2500W-INT	16A, 250 VAC	
Israel	CAB-AC-2500W-ISRL	16A, 250 VAC	
Japan and North America (non locking) 200-240 VAC operation	CAB-AC-2500W-US1	16A, 250 VAC	
Japan and North America (locking) 200-240 VAC operation	CAB-AC-C6K-TWLK	16A, 250 VAC	
Japan and North America 100-120 VAC operation	CAB-7513AC	16A, 250 VAC	
Power distribution unit (PDU)	CAB-C19-CBN	16A, 250 VAC	
Switzerland	CAB-ACS-16	16A, 250 VAC	



APPENDIX B

LEDs

Chassis LEDs

The chassis LEDs are located at the top of the front of the chassis. They indicate whether each type of module (supervisors, controllers, I/O modules, fabric modules, fan trays, and power supplies) are fully functional or have a fault condition. The following table describes what each of these LEDs can indicate.

Table 3: Chassis LED Descriptions

LED	Color	Status
BCN	Flashing blue	The operator has activated this LED to identify this chassis.
	Off	This chassis is not being identified.
SUP	Green	Supervisor modules are all operational.
	Amber	Check the Supervisor Module LEDs for more information.
FAB	Green	Fabric modules are all operational.
	Amber	Check the FAB LED description in the Fan Tray LEDs for more information.

LED	Color	Status
IOM	Green	I/O modules are all operational.
	Amber	Check the I/O Module LEDs for more information.
PSU	Green	Power supplies are all operational.
	Amber	Check the Power Supply LEDs for more information.
FAN	Green	Fan trays are all operational.
	Amber	Check the Fan Tray LEDs for more information.
PWR MGMT	Green	Sufficient power is available for all of the installed modules.
	Amber	Either of the following: • Insufficient power for at least one of the installed modules. • The configured power redundancy mode differs from the operational power redundancy.

System Controller LEDs

The system controller module LEDs are located on the left side of the module. The following table describes the possible states for each of these LEDs.

Table 4: System Controller LED Descriptions

LED	Color	Status
BCN	Flashing blue	The operator has activated this LED to identify this module in the chassis.
	Off	This module is not being identified.
STS	Green	This module is operational.
	Flashing amber	This module is booting up.
	Flashing red	Temperature exceeds major alarm threshold.
	Off	The module is not receiving power.

LED	Color	Status
ACT	Green	The controller module is operational and in active mode.
	Amber	The controller module is operational and in standby mode.

Supervisor Module LEDs

The Beacon (BCN), Status (STS), and Active (ACT) LEDs are located on the lower left front of the supervisor module. The management port link and active LEDs are located immediately above the port on the front of the module. The following table describes the possible states for each of these LEDs.

Table 5: Supervisor Module LED Descriptions

LED	Color	Status
BCN	Flashing blue	The operator has activated this LED to identify this module in the chassis.
	Off	This module is not being identified.
STS	Green	This module is operational.
	Flashing amber	This module is booting up.
	Flashing red	Temperature exceeds major alarm threshold.
	Off	The module is not receiving power.
ACT	Green	This module is operational and in active mode.
	Amber	This module is operational and in standby mode.
(management port LINK)	Green	The management port is linked up.
	Off	The management port is not linked up.
(management port ACT)	Green	The management port is linked up.
	Off	The management port is not linked up.

Fan Tray LEDs

The fan tray LEDs are located on the lower right portion of the module. The following table describes the possible states indicated by this module.

Table 6: Fan Tray LED Descriptions

LED	Color	Status
BCN	Blue	The operator has activated this LED to identify this module in the chassis.
	Off	This module is not being identified.
FAN	Green	The fan tray is operational.
	Red	One or more fans in this fan tray has failed.
	Off	No power is going to the fan tray.
FAB	Green	Both fabric modules behind this fan tray are operational.
	Amber	At least one fabric module behind this fan tray is not operating.
	Off	No power is going to the fabric module behind this fan tray.

Fabric Module LEDs

The fabric modules are located behind the fan trays.

Table 7: Fabric Module LED Descriptions

LED	Color	Status
(top LED)	Blue	The operator has activated this LED to identify this module in the chassis.
	Off	This module is not being identified.
(bottom LED)	Green	The fabric module is operational.
	Flashing red	The fabric module has a fault.
	Flashing amber	The fabric module is booting up.
	Off	No power is going to the fabric module.

I/O Module LEDs

The Beacon (BCN) and Status (STS) LEDs are located on the front left of the module, 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).

Table 8: I/O Module LED Descriptions

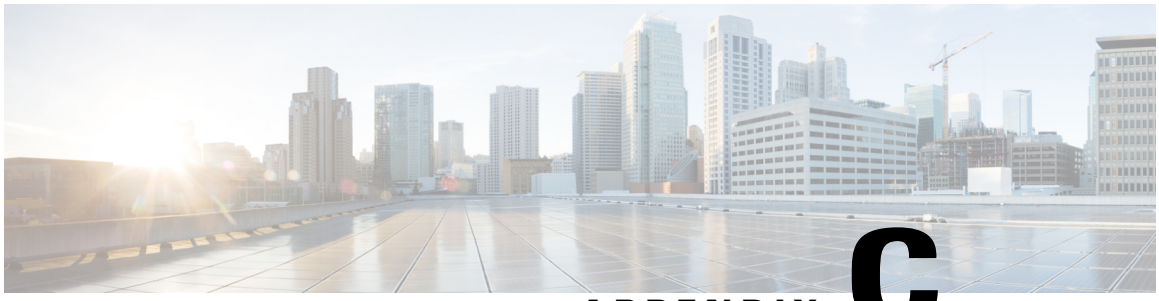
LED	Color	Status
BCN	Flashing blue	The operator has activated this LED to identify this module in the chassis.
	Off	This LED is not being used.
STS	Green	All diagnostics passed. This module is operational (normal initialization sequence).
	Flashing red	Indicates one of the following: • The module has detected a slot ID parity error and will not power on or boot up. • The module is not fully inserted, and it is not making a reliable connection with the supervisor. • The module has failed diagnostic tests and has powered down. • An overtemperature condition has occurred. A major temperature threshold has been exceeded during environmental monitoring
	Flashing amber	Indicates one of the following: • The module is booting up or initializing. • The module is resetting and both ejector levers are out. • The module has been inserted during the initialization process. • The module could not power up because of insufficient power.
	Off	The module is not receiving power.
Link (for each port)	Green	The port is active (the link is connected and 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.

Power Supply LEDs

The power supply LEDs are located on the upper left front portion of the module. Combinations of states indicated by the OK and Fail LEDs indicate the status for the module as shown in the following table.

Table 9: Power Supply LED Descriptions

OK LED	Fail LED	Status
Green	Off	Power supply is on and outputting power to the switch.
Flashing green	Off	Power supply is connected to AC power source but not outputting power to the switch. 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
Off	Flashing amber (10 seconds) then amber	Power supply is installed without a connection to a power source.
Off	Amber	Power supply failure—possibly one of the following conditions: • Over voltage • Over current • Over temperature • Power supply fan failure



APPENDIX C

Accessory Kits

Accessory Kit Contents

The following table lists and illustrates the contents for the accessory kit (N9K-C9500-ACK).

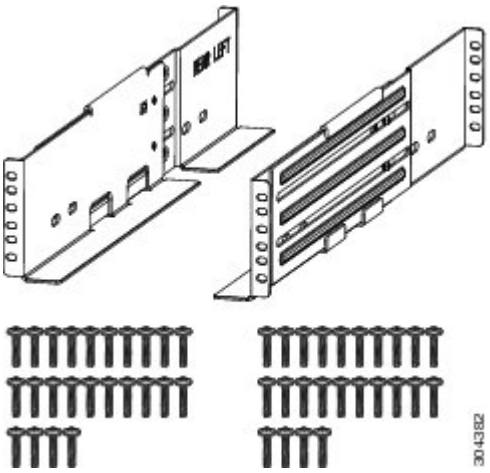
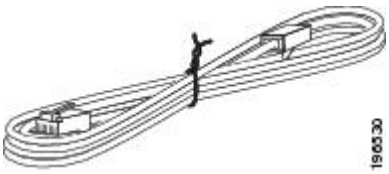
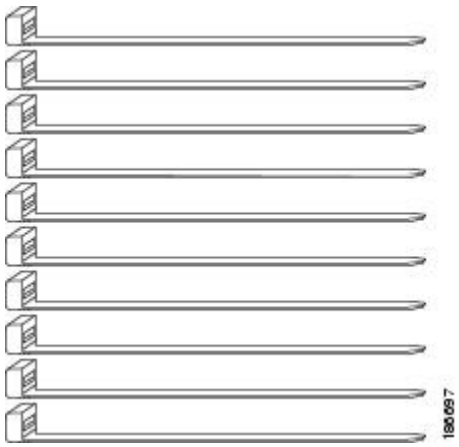
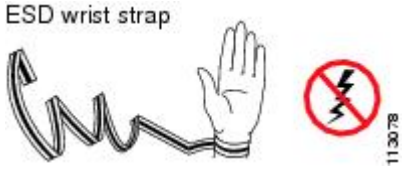
Illustration	Description	Quantity
	Rack-Mount Kit (N9K-C9508-RMK) • 12-24 x 3/4-in. Phillips screws (20) • M6 x 19 mm Phillips screws (20) • Adjustable bottom-support rails (2)	1 kit
	RJ-45 rollover cable	1
	DB-9F/RJ-45F PC terminal	1

Illustration	Description	Quantity
	Ground lug kit • Two-hole lug (1) • M4 x 8-mm Phillips pan-head screws (2)	1 kit
	Cable tie, 8.5 inches (10)	1
	ESD wrist strap (disposable)	1
Not applicable	Hazardous substances list for customers in China	1
Not applicable	Cisco Information Packet	1
Not applicable	1-Year Limited Warranty for Hardware	1

Note If you do not receive a part listed in this document, contact Cisco Technical Support at this URL: http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml.

If you purchased this product through a Cisco reseller, you might receive additional contents in your kit, such as documentation, hardware, and power cables.

The product shipment includes a power cord for each 3-kW AC power supply. You must supply a 6 AWG cable for up to 45 A.

The shipped cables depend on your specification when placing an order. The available power cords for the 3-kW AC power supplies are as follows:

- CAB-AC-16A-AUS—power cord, 250-VAC 16A, C19, Australia

- CAB-AC-16A-CH—power cord, 16-A, China
- CAB-AC-2500W-EU—power cord, 250-VAC 16A, Europe
- CAB-AC-2500W-INT—power cord, 250-VAC 16A, International
- CAB-AC-2500W-ISRL—power cord, 250-VAC 16-A, Israel
- CAB-AC-2500W-US1—power cord, 250-VAC 16A, straight-blade NEMA 6
- CAB-AC-C6K-TWLK—power cord, 250-VAC 16A, twist lock, NEMA L6-20
- CAB-C19-CBN—cabinet jumper power cord, 250-VAC, 16A, C20C
- CAB-ACS-16—power cord, 16-A, Switzerland
- CAB-L520P-C19-US—NEMA L5-20 to IEC-C19, 6 ft, US