



Cisco Nexus 9516 ACI-Mode Switch Hardware Installation Guide

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Audience

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

Documentation Conventions

Command descriptions use the following conventions:

Convention	Description
bold	Bold text indicates the commands and keywords that you enter literally as shown.
<i>Italic</i>	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.
[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.

Convention	Description
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.
<i>italic screen font</i>	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.

Related Documentation

The Application Centric Infrastructure documentation set includes the following documents that are available on Cisco.com at the following URL:

<https://www.cisco.com/c/en/us/support/cloud-systems-management/application-policy-infrastructure-controller-apic/sd-products-support-series-home.html>

Web-Based Documentation

- *Cisco APIC Management Information Mode Reference*
- *Cisco APIC Online Help Reference*
- *Cisco APIC Python SDK Reference*
- *Cisco ACI Compatibility Tool*
- *Cisco ACI MIB Support List*

Downloadable Documentation

- *Knowledge Base Articles (KB Articles)* are available at the following URL:
<https://www.cisco.com/c/en/us/support/cloud-systems-management/application-policy-infrastructure-controller-apic/products-configuration-examples-list.html>
- *Cisco Application Centric Infrastructure Controller Release Notes*
- *Cisco Application Centric Infrastructure Fundamentals Guide*
- *Cisco APIC Getting Started Guide*
- *Cisco ACI Virtualization Guide*
- *Cisco APIC REST API User Guide*
- *Cisco APIC Command Line Interface User Guide*

- *Cisco APIC Faults, Events, and System Messages Management Guide*
- *Cisco ACI System Messages Reference Guide*
- *Cisco APIC Layer 4 to Layer 7 Services Deployment Guide*
- *Cisco APIC Layer 4 to Layer 7 Device Package Development Guide*
- *Cisco APIC Layer 4 to Layer 7 Device Package Test Guide*
- *Cisco ACI Firmware Management Guide*
- *Cisco ACI Troubleshooting Guide*
- *Cisco ACI Switch Command Reference, NX-OS Release 11.0*
- *Cisco Verified Scalability Guide for Cisco ACI*
- *Cisco ACI MIB Quick Reference*
- *Cisco Nexus CLI to Cisco APIC Mapping Guide*
- *Application Centric Infrastructure Fabric Hardware Installation Guide*
- *Cisco NX-OS Release Notes for Cisco Nexus 9000 Series ACI-Mode Switches*
- *Cisco Nexus 9000 Series ACI Mode Licensing Guide*
- *Cisco Nexus 93108TX-EX ACI-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 93108TX-FX ACI-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 93120TX ACI-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 93128TX ACI-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 93180LC-EX ACI-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 93180YC-EX ACI-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 93180YC-FX ACI-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9332PQ ACI-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9336PQ ACI-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9372PX and 9372PX-E ACI-Mode Switches Hardware Installation Guide*
- *Cisco Nexus 9372TX and 9372TX-E ACI-Mode Switches Hardware Installation Guide*
- *Cisco Nexus 9396PX ACI-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9396TX ACI-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9504 ACI-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9508 ACI-Mode Switch Hardware Installation Guide*
- *Cisco Nexus 9516 ACI-Mode Switch Hardware Installation Guide*

Cisco Application Centric Infrastructure (ACI) Simulator Documentation

The following Cisco ACI Simulator documentation is available at

<https://www.cisco.com/c/en/us/support/cloud-systems-management/application-centric-infrastructure-simulator/tsd-products-support-series-home.html>

- *Cisco ACI Simulator Release Notes*
- *Cisco ACI Simulator Installation Guide*
- *Cisco ACI Simulator Getting Started Guide*

Cisco Nexus 9000 Series Switches Documentation

The Cisco Nexus 9000 Series Switches documentation is available at

<https://www.cisco.com/c/en/us/support/switches/nexus-9000-series-switches/tsd-products-support-series-home.html>

Cisco Application Virtual Switch Documentation

The Cisco Application Virtual Switch (AVS) documentation is available at

<https://www.cisco.com/c/en/us/support/switches/application-virtual-switch/tsd-products-support-series-home.html>

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CHAPTER 1

Overview

- [Overview, on page 1](#)

Overview

This switch chassis includes the following modules:

- Supervisor modules (one or two)—one of the following types in slots SUP 1 and SUP 2 (numbered from left to right on the chassis):
- System controllers (two) (N9K-SC-A) in slots SC 1 and SC 2 (numbered from left to right on the chassis)
- Line cards (up to 16) in slots LC 1 through LC 16 (numbered from top to bottom on the chassis) supported by the same type of fabric module

For compatibility information, please refer to the [Line Card and Fabric Module Compatibility](#) data sheets.



Note Do not mix ACI-mode line cards with NX-OS mode line cards in the same switch.



Note The N9K-X9716D-GX line card, is not compatible with this switch.

- Fabric modules in slots FM 1 to FM 6 (numbered from left to right on the chassis)

See the following table for the required fabric module types and quantities that are required for maximum bandwidth.

Table 1: Supported Fabric Modules and Line Cards

Fabric Module	Fabric Modules Required for Maximum Bandwidth	Supported Line Cards
N9K-C9516-FM	4	N9K-X9736PQ

Fabric Module	Fabric Modules Required for Maximum Bandwidth	Supported Line Cards
N9K-C9516-FM-E2	4	N9K-X9732C-EX
	5	N9K-X9736C-FX
	5	N9K-X9736Q-FX

Table 2: FM-25 Feature Support Matrix for Cisco Nexus 9000 Series line cards and fabric modules

	Line cards			
	X9736PQ	X9736Q-FX	X9732C-EX	X9736C-FX
Fabric modules				
C9516-FM-E-E2	No	Yes	Yes	Yes



Note The fabric modules must be installed in specific slots as follows (installing fabric modules in other slots can cause a module mismatch condition):

- For three modules, they must be in slots FM 2, FM 4, and FM 6
- For four modules, they must be in slots FM2, FM 3, FM 4, and FM 6
- For five modules, they can be in slots FM 1, FM 2, FM 3, FM 4, and FM 6. Alternatively, they can be in Slots FM 2, FM 3, FM 4, FM 5, and FM 6.
- For five FM-E or FM-E2 modules, they must be in Slots FM 2, FM 3, FM 4, FM 5, and FM 6
- For six modules, they are in slots FM 1, FM 2, FM 3, FM 4, FM 5, and FM 6



Note All of the fabric modules in a modular switch must be of the same type.



Note Fabric slots FM 2, FM 4, or FM 6 must be filled with functioning fabric modules in order to provide power to the fan trays covering those modules.

If fabric slots FM 1, FM 3, or FM 5 are not filled with a fabric module, you must make sure that they have a blank module (N9K-C9516-FM-CV) installed to preserve the designed airflow.



Note For more information about Line card and fabric module compatibility, see the [Cisco Nexus 9500 Platform Line Cards and Fabric Modules Data Sheet](#).

- Fan trays (three) (N9K-C9516-FAN) in slots FAN 1 to FAN 3 (numbered from left to right on the chassis)
- Power supplies (up to five with the combined power mode, up to six with the $n+1$ power redundancy mode, or up to ten with the $n+n$ power redundancy mode) in slots PS 1 to PS 10 (numbered from left to right on the chassis)
 - Cisco Nexus 9500 Series 3-kW AC power supply (N9K-PAC-3000W-B)
 - Cisco Nexus 9500 Series 3-kW Universal AC/DC power supply (N9K-PUV-3000W-B)
 - Cisco Nexus 9500 Series 3.15-kW Dual Input Universal AC/DC power supply (N9K-PUV2-3000W-B)
 - Cisco Nexus 9500 Series 3-kW (-48 V) DC power supply (N9K-PDC-3000W-B)

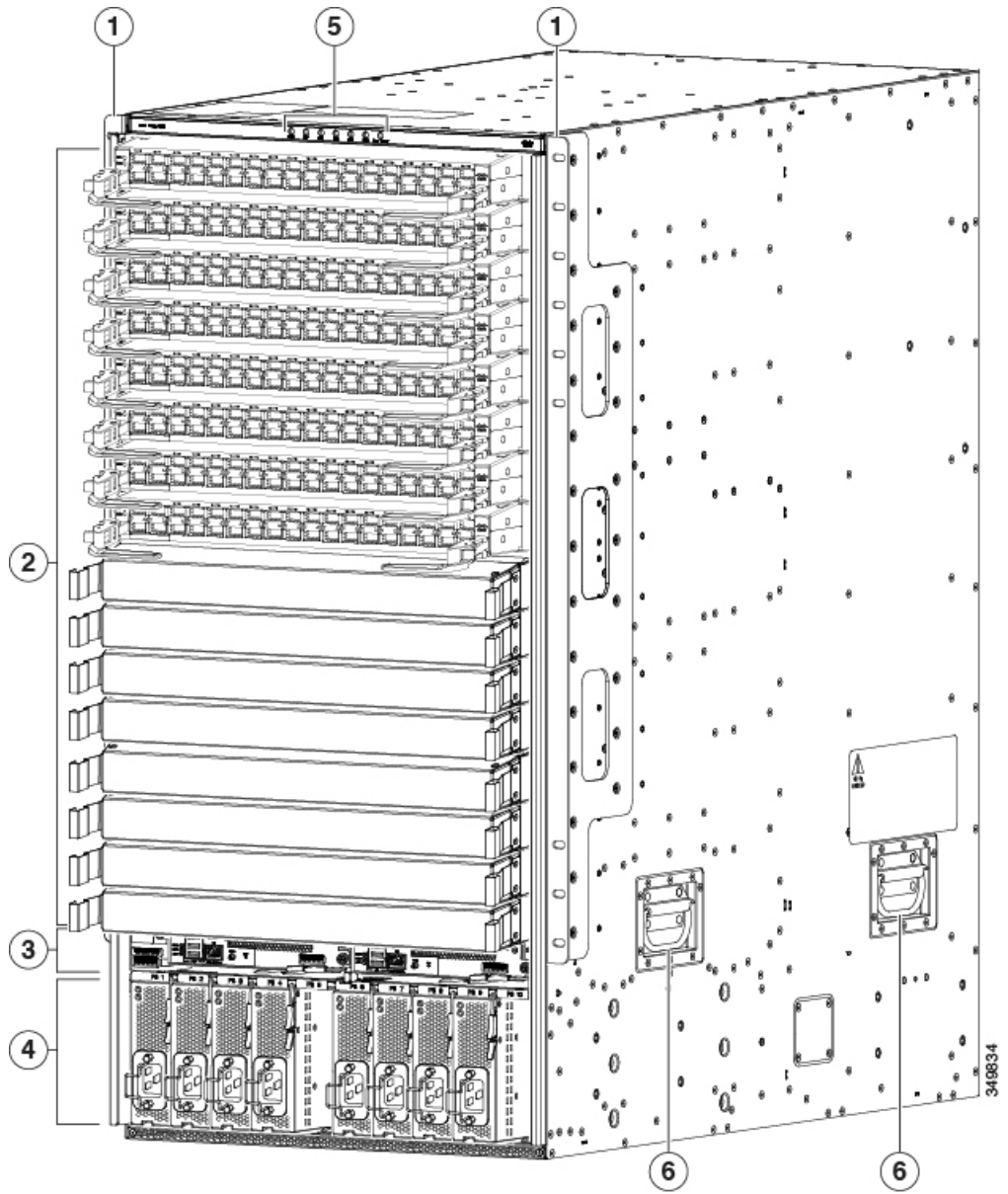


Note The switch can be powered by a mix of AC, DC, HVAC/HVDC power sources.



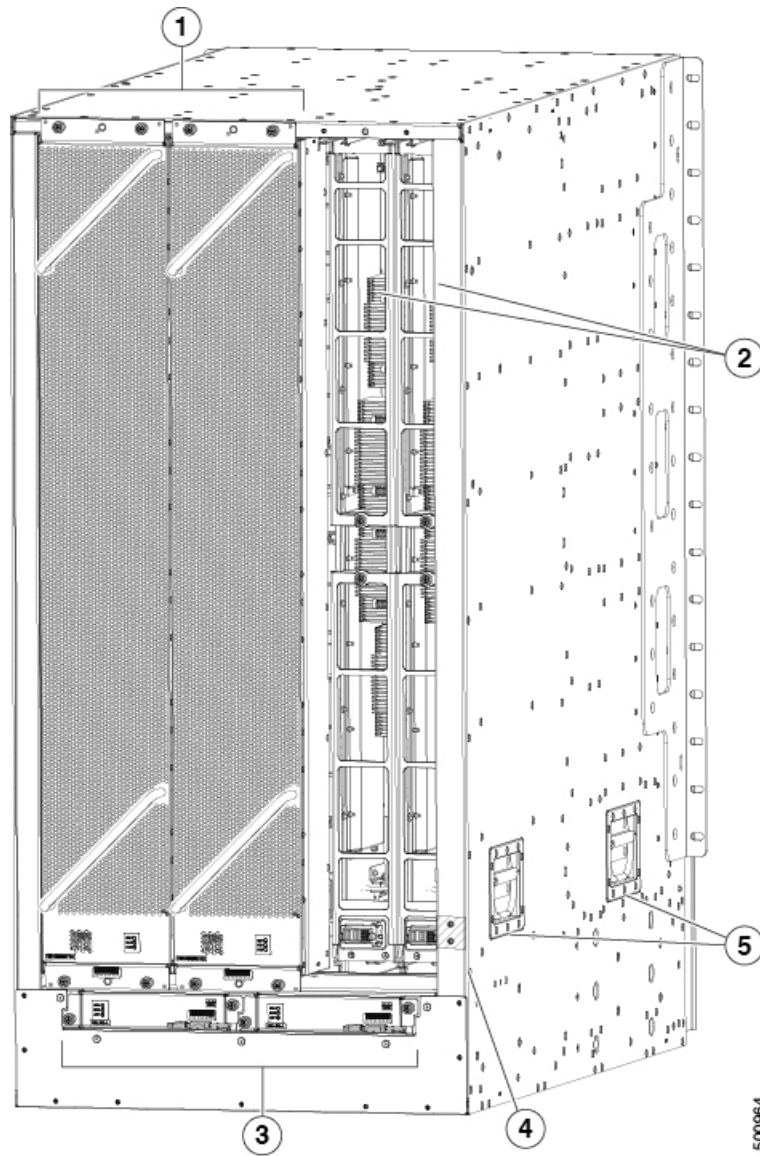
Note All chassis slots are numbered from left to right or from top to bottom.

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



1	2 vertical mounting brackets used to mount the chassis onto a rack	4	3-kW AC, Universal AC/DC, or DC power supplies (AC power supplies shown)
2	I/O modules (up to 16)	5	Chassis LEDs
3	Supervisor modules (1 or 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).



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1	Fan trays (3—right fan tray not shown in order to display the fabric modules located behind the fan trays)	4	Grounding pad
2	Fabric modules (up to 6 with up to 2 behind each fan tray)	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 (2)		



CHAPTER 2

Preparing the Site

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- [Humidity Requirements, on page 7](#)
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- [Dust and Particulate Requirements, on page 8](#)
- [Minimizing Electromagnetic and Radio Frequency Interference, on page 8](#)
- [Shock and Vibration Requirements, on page 9](#)
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Temperature Requirements

The switch requires an operating temperature of 32 to 104 degrees Fahrenheit (0 to 40 degrees Celsius). If the switch is not operating, the temperature must be between –40 to 158 degrees Fahrenheit (–40 to 70 degrees Celsius).

Humidity Requirements

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, use a dehumidifier to maintain the humidity within an acceptable range.

Altitude Requirements

Altitude rating is 10,000 ft (3048 m). For China, it is 6,562 ft (2000 m).

Dust and Particulate Requirements

Exhaust fans cool power supplies and system fans 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. Dust and particles can act as insulators and interfere with the mechanical components in the switch. A clean operating environment can greatly reduce the negative effects of dust and other particles.

In addition to keeping your environment free of dust and particles, 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. 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 as transmitted radio waves. The Federal Communications Commission (FCC) publishes specific regulations to limit the amount of EMI and RFI that are 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 to 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 need to consult experts in radio frequency interference (RFI).

The wiring is unlikely to emit radio interference if you use a 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 that is caused by lightning or other high-energy phenomena can easily couple enough energy into unshielded conductors to destroy electronic switches. You will 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 that is supplied by the power sources. Overvoltage, undervoltage, and transients (or spikes) can erase data from 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.

When you properly install the chassis in a grounded rack, the switch is grounded because it has a metal-to-metal connection to the rack. Alternatively, you can ground the chassis by using a customer-supplied grounding cable that meets your local and national installation requirements. For U.S. installations, we recommend 6-AWG wire. Connect your grounding cable to the chassis with a grounding lug (provided in the switch accessory kit) and to the facility ground.

**Note**

You automatically ground AC power supplies when you connect them to AC power sources. For DC power supplies, you must connect a grounding wire when wiring the power supply to the DC power source.

**Note**

An electrical conducting path shall exist between the product chassis and the metal surface of the enclosure or rack in which it is mounted or to a grounding conductor. Electrical continuity shall be provided by using thread-forming type mounting screws that remove any paint or non-conductive coatings and establish a metal-to-metal contact. Any paint or other non-conductive coatings shall be removed on the surfaces between the mounting hardware and the enclosure or rack. The surfaces shall be cleaned and an antioxidant applied before installation.

Planning for Power Requirements

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

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

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

Ensure that the circuit that is used for the switch is dedicated to the switch to minimize the possibility of circuit failure.

Calculate the power that is required for operations (available power) and redundancy (reserve power), then you can plan for the required number of input power receptacles. The power receptacles will be within reach of the switch location.

- Step 1** Determine the power requirement for the modules in the switch by summing the maximum wattage for each installed module, see the following table.

Component	Typical	Maximum
Supervisor modules	—	—
– Supervisor A (N9K-SUP-A)	69 W	80 W
– Supervisor A+ (N9K-SUP-A+)	69 W	80 W
– Supervisor B (N9K-SUP-B)	75 W	90 W
– Supervisor B+ (N9K-SUP-B+)	75 W	80 W
System Controller Module	—	—
– System Controller (N9K-SC-A)	14 W	25 W
Line cards that are supported by N9K-C9516-FM fabric modules	330 W	504 W
– 36-port 40-Gigabit QSFP+ line card (N9K-X9736PQ)	197 W	211 W
Line cards that are supported by N9K-C9516-FM-E2 fabric modules	439 W	900 W
– 32-port 100-Gigabit Ethernet QSFP28 line card (N9K-X9732C-EX)	430 W	720 W
– 36-port 100-Gigabit Ethernet QSFP28 line card (N9K-X9736C-FX)	607 W	900 W
– 36-port 40-Gigabit Ethernet QSFP28 line card (N9K-X9736Q-FX)	571 W	684 W
Fan Trays (N9K-C9516-FAN)	330 W	600 W

For example, to determine the maximum amount of power that your fully loaded switch consumes, add the maximum power consumption of two supervisor A modules ($2 \times 80 \text{ W} = 160 \text{ W}$), two system controllers ($2 \times 25 \text{ W} = 50 \text{ W}$), 10 36-port 40-Gigabit line cards ($10 \times 211 \text{ W} = 2110 \text{ W}$), six fabric modules ($6 \times 504 \text{ W} = 3024 \text{ W}$), and three fan trays ($3 \times 451 \text{ W} = 1353 \text{ W}$). The total is 6697 W.

- Step 2** Determine the number of power supplies required to power the modules that are installed in the switch by dividing the module power requirement amount (see Step 1) by the output wattage (3000 W) of the power supplies installed in the switch. Round up the fractional result to the nearest ones digit.

For example, if you are installing a switch with maximum consumption of 6694 W, you need three power supplies ($6694 \text{ W} / 3000 \text{ W} = 2.23$ [rounded up to three power supplies]) to operate the switch and its modules.

- Step 3** Determine the amount of power that is required from a power source.

The power supplies are rated to have at least 91-percent efficiency.

- To determine the input power (Watts) from the power source to the power supplies, divide the output power of each power supply (3000 W) by the efficiency of the power supply (0.91) and then multiply the result by the number of power supplies required to power the switch. For example, if the switch uses 3 power supplies, you can calculate the amount of power that is required from the power source as follows:

$$3000 \text{ W output} / 0.91 \text{ efficiency} \times 3 \text{ power supplies} = 9891 \text{ W}$$

- To determine the number of Amps (A) that are required to power the switch, divide the maximum Watts that is required for by the voltage that is used as shown in the following examples:

- For 9891 A at 200-volts AC (VAC), use the following formula:

$$(9891 \text{ W}) / (200 \text{ VAC}) = 49.5 \text{ A}$$

- For 9891 A at 277-volts AC (VAC), use the following formula:

$$(9891 \text{ W}) / (277 \text{ VAC}) = 35.7 \text{ A}$$

- For 9891 A at 380-volts DC (VDC), use the following formula:

$$(9891 \text{ W}) / (380 \text{ VDC}) = 26.0 \text{ A}$$

- To determine the required BTUs, multiply the Watts that is required for the power source by 3.41214163.

For example, for 9891 W, use the following formula:

$$(9891 \text{ W}) \times (3.41214163 \text{ BTU}) = 33,750$$

To size the circuit breaker for the required amperage, you must also divide the required amperage by the percentage. For example, if the switch requires an input amperage of 49.5 A and you are able to use up to 80 percent of the capacity of a circuit breaker, you use the following formula to calculate the minimum amperage that is required of the circuit breaker:

$$(49.5 \text{ A}) / (80\% \text{ or } 0.80) = 61.9 \text{ amps}$$

Step 4 Select one of the following power modes to determine the number of additional power supplies required for reserve power:

Configured Power Redundancy Mode	Power Supply	Instructions and Guidelines	Input Source or Grid Redundancy	n+n Power Supply Redundancy	n+1 Power Supply Redundancy
n+1 redundancy	N9K-PUV2-3000W-B	<p>Instructions:</p> <p>Add at least 1 more power supply to the number of power supplies determined in step 2.</p> <p>Connect one input to one power source (A) and the other input to another power source (B).</p> <p>Guidelines:</p> <p>Recommended if the number of power supplies from step 2 is 6 or higher.</p>	Yes	No	Yes

Configured Power Redundancy Mode	Power Supply	Instructions and Guidelines	Input Source or Grid Redundancy	n+n Power Supply Redundancy	n+1 Power Supply Redundancy
combined	N9K-PUV2-3000W-B	<p>Instructions:</p> <p>Install the number of power supplies as determined in step 2.</p> <p>Connect one input to one power source (A) and the other input to another power source (B).</p> <p>Guidelines:</p> <p>Recommended if the number of power supplies from step 2 is 6 or higher.</p>	Yes	No	No
n+n redundancy	N9K-PAC-3000W-B	<p>Instructions:</p> <p>Add twice the number of power supplies as determined in step 2.</p>	Yes	Yes	Yes
	N9K-PDC-3000W-B	<p>Instructions:</p> <p>Connect one half of the power supplies to one power source (A) and connect another half of the power supplies to another power source (B).</p>			
	N9K-PUV-3000W-B	<p>Guidelines:</p> <p>Recommended if the number of power supplies from step 2 is 5 or less.</p>			
	N9K-PUV2-3000W-B	<p>Instructions:</p> <p>Add twice the number of power supplies as determined in step 2.</p>			
n+n redundancy	N9K-PAC-3000W-B	<p>Guidelines:</p> <p>Recommended if the number of power supplies from step 2 is 5 or less.</p>	No	Yes	Yes
	N9K-PDC-3000W-B	<p>Instructions:</p> <p>Add twice the number of power supplies as determined in step 2.</p>			
	N9K-PUV-3000W-B	<p>Guidelines:</p> <p>Recommended if the number of power supplies from step 2 is 5 or less.</p>			
	N9K-PUV2-3000W-B	<p>Instructions:</p> <p>Add at least 1 more power supply to the number of power supplies determined in step 2.</p>			
n+1 redundancy	N9K-PAC-3000W-B	<p>Guidelines:</p> <p>Recommended if the number of power supplies from step 2 is 1 or higher.</p>	No	No	Yes
	N9K-PDC-3000W-B	<p>Instructions:</p> <p>Add at least 1 more power supply to the number of power supplies determined in step 2.</p>			
	N9K-PUV-3000W-B	<p>Guidelines:</p> <p>Recommended if the number of power supplies from step 2 is 1 or higher.</p>			
	N9K-PUV2-3000W-B	<p>Instructions:</p> <p>Install the number of power supplies as determined in step 2.</p>			
combined	N9K-PAC-3000W-B	<p>Guidelines:</p> <p>Recommended if the number of power supplies from step 2 is 1 or higher.</p>	No	No	No
	N9K-PDC-3000W-B	<p>Instructions:</p> <p>Install the number of power supplies as determined in step 2.</p>			
	N9K-PUV-3000W-B	<p>Guidelines:</p> <p>Recommended if the number of power supplies from step 2 is 1 or higher.</p>			
	N9K-PUV2-3000W-B	<p>Instructions:</p> <p>Install the number of power supplies as determined in step 2.</p>			

Step 5 Be sure that the power source circuits are dedicated to the switch and not to other electrical equipment.

For combined mode or $n+1$ redundancy mode, you need only one dedicated circuit. For $n+n$ 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 (combined mode or $n+1$ redundancy mode) 2 ($n+n$ redundancy mode)	16 A at 200 to 240 VAC
3-kW Universal AC/DC power supply (N9K-PUV-3000W-B and N9K-PUV2-3000W-B)	1 (combined mode or $n+1$ redundancy mode) 2 ($n+n$ redundancy mode)	AC power: 200 to 277 VAC DC power: 240 to 380 VDC
3-kW DC power supply (N9K-PDC-3000W-B)	1 (combined mode or $n+1$ redundancy mode) 2 ($n+n$ redundancy mode)	45A at -40 to -75 VDC (-48 VDC nominal US) (-60 VDC nominal international)

Step 6 Plan the placement of the input power receptacles within reach of the power cables that are 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
3-kW AC power supplies	8 to 12 feet (2.5 to 3.5 m)
3-kW Universal AC/DC power supplies	14 feet (4.27 m)
3-kW DC power supplies	You provide four 6-gauge wires (recommended) and cuts that wire to the required length. We provide four 6-gauge lugs to connect those wires to the DC power supply.

Note The switch can be powered by a mix of AC, DC, HVAC/HVDC power sources.

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 install the switch in a cabinet that is located in a hot-aisle and cold-aisle environment, 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 21-RU (36.7 inches or 93.4 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 rails (for proper mounting of the bottom-support brackets or other mounting hardware).
- 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 and module handles).
 - 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).

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

- Power receptacles must be located within reach of the power cords that are used with the switch.
 - Power cords for the 3-kW AC power supplies are 8 to 12 feet (2.5 to 4.3 m) long.
 - Power cords for the 3-kW Universal AC power supplies are 14 feet (4.27 m) long.



Note The power cables for the 3-kW DC power supply are provided by and sized you.

- Clearance is required for cables that connect to as many as 288 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.

Also, you must have power receptacles that are located within reach of the power cords that are used with the switch.

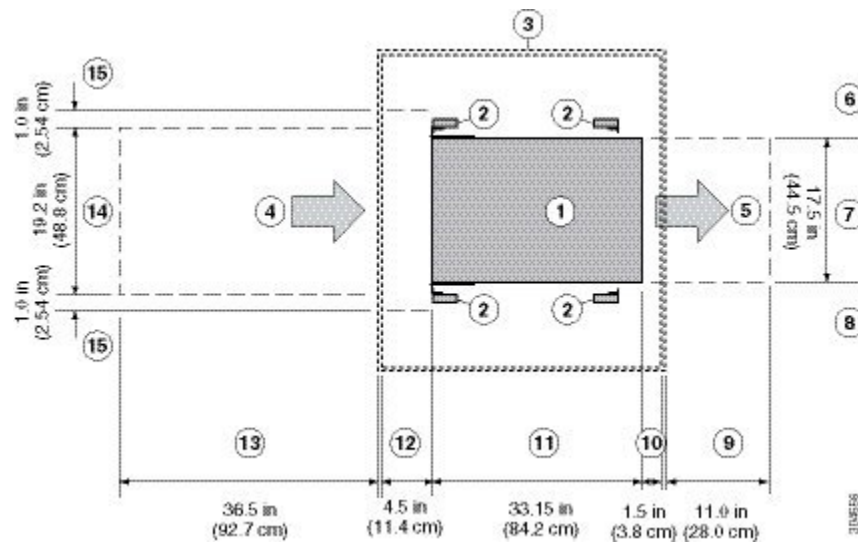


Warning Statement 1048—Rack Stabilization

The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before installation or servicing. Failure to stabilize the rack can cause bodily injury.

Clearance Requirements

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



1	Chassis	9	Rear service clearance required to replace fan trays and fan modules.
2	Vertical rack-mount posts and rails	10	Minimum clearance required for module handles (up to 6 inches [15.24 cm] recommended for optimal airflow) when using cabinet doors
3	Cabinet (optional)	11	Chassis depth
4	Air intake from the cold aisle for all modules and power supplies	12	Recommended clearance for cable management and ejector handles on line cards (6 inches [15.24 cm] recommended for optimal airflow) when using cabinet doors
5	Air exhaust to the hot aisle for all modules and power supplies	13	Clearance required for installing the chassis and replacing line cards
6	No left-side clearance required (no airflow on the left side).	14	Width of the chassis plus vertical mounting brackets on each side
7	Chassis width	15	Side clearance, that is required for older line card handle rotation (not required for the current line cards which have handles that rotate differently).
8	No right-side clearance required (no airflow on the right side).		



CHAPTER 3

Installing a Chassis

- [Installing a Rack or Cabinet, on page 17](#)
- [Inspecting the New Switch, on page 18](#)
- [Installing the Bottom-Support Rails, on page 19](#)
- [Installing a Chassis in a Rack or Cabinet, on page 22](#)
- [Grounding the Chassis, on page 27](#)
- [Starting Up the Switch, on page 28](#)

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 that are listed in [Rack and Cabinet Requirements, on page 13](#).



Warning **Statement 1048**—Rack Stabilization

The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before installation or servicing. Failure to stabilize the rack can cause bodily injury.



Warning **Statement 1018**—Supply Circuit

To reduce risk of electric shock and fire, take care when connecting units to the supply circuit so that wiring is not overloaded.

-
- Step 1** Bolt the rack to the subfloor before moving the chassis onto it.
- Step 2** If the rack has bonded construction, connect it to the earth ground. This action enables you to ground the switch and its components and to ground your electrostatic discharge (ESD) wrist strap. This action prevents discharge damage when you handle ungrounded components during installation.
- Step 3** If you need access to the source power at the rack, include one of the following:

- For AC power, include an AC circuit that meets the power specifications of the switch, see [Power Requirements for Switch Modules, on page 87](#). This circuit must include receptacles that match your local and national requirements and match the needs of the power cable that is used with the power supply unit.
- For DC power, include a DC circuit that meets the power specifications of the switch see [Power Requirements for Switch Modules, on page 87](#)). This circuit must include a circuit breaker so that you can safely connect the power cables to the power supply.

Inspecting the New Switch

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



Caution When you handle the chassis or its components, you must follow ESD protocol 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 that was used for the system. If you 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 your ordered items. The shipment includes boxes for the following:

- System chassis, which includes the following installed components:
 - Supervisor modules (1 or 2) of the following types (must be the same type):
 - Supervisor A (N9K-SUP-A)
 - Supervisor A+ (N9K-SUP-A+)
 - Supervisor B (N9K-SUP-B) (required for -R line cards and fabric modules)
 - Supervisor B+ (N9K-SUP-B+) (required for -R, -R2 line cards and -R, -R2 fabric modules)
 - System controllers (2) (N9K-SC-A)
 - Line cards (1 to 16 line cards) as described in the Overview in Chapter 1.
 - Fabric modules—See the Overview in Chapter 1 for quantity and type. The switch must have only one type of fabric module that supports the installed line cards.

The fabric modules must be installed in specific slots as follows (installing fabric modules in other slots can cause a module mismatch condition):

- For three modules, they must be in slots FM 2, FM 4, and FM 6.

- For four modules, they must be in slots FM 2, FM 3, FM 4, and FM 6.
- For five modules, they must be in slots FM 2, FM 3, FM 4, FM 5, and FM 6.
- For six modules, they are in slots FM 1, FM 2, FM 3, FM 4, FM 5, and FM 6.
- Fan trays (3)
- Power supplies (1 to 10)
 - 3-kW AC power supply (N9K-PAC-3000W-B)
 - 3-kW Universal AC/DC power supply (N9K-PUV-3000W-B)
 - 3.15-kW Dual Input Universal AC/DC power supply (N9K-PUV2-3000W-B)
 - 3-kW DC power supply (N9K-PDC-3000W-B)
- Rack Mount kit
 - Rack mount kit for the Cisco Nexus 9516 (N9K-C9500-RMK) chassis
 - Bottom-support rails (2)
 - M6 mounting screws (20)
 - 10-32 mounting screws (20)
 - 12-24 mounting screws (20)
 - Switch accessory kit (N9K-ACC-KIT)

Step 2 Check the contents of each box for damage.

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

- Invoice number of the shipper, see the packing slip.
- Model and serial number of the missing or damaged unit
- Description of the problem and how it affects the installation.
- Photos of the damage to external packaging, internal packaging, and product

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

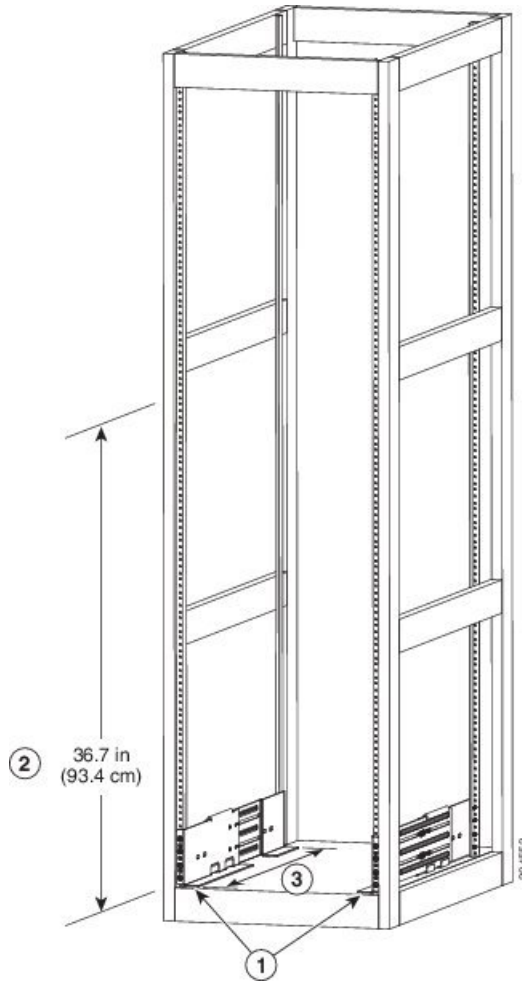
Before you can install the bottom support rails for the chassis, you must do the following:

- 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 the 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 [Inspecting the New Switch](#).

Step 1

Position one of the two adjustable bottom-support rails at the lowest possible RU in the rack or cabinet. 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 that there is at least 21 RU (36.7 inches [93.4 cm]) of vertical space above the rails to install the chassis, see the following figure.

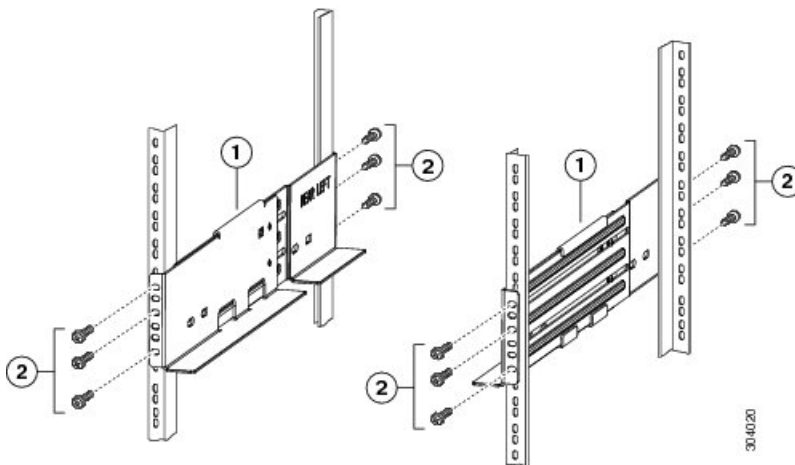
You can expand the rail so that its mounting brackets are spaced between 24 to 32 inches (61.0 to 81.3 cm).



1	Position 2 bottom-support rails at the lowest RU on the rack.	3	Distance between front and rear vertical rails must be 24 to 32 inches (61.0 to 81.3 cm).
2	Allow at least 21 RU (36.7 inches [93.4 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.



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)
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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

To move a chassis to a rack, it is necessary to slide the chassis onto a mechanical lift. Use a mechanical lift to position the chassis in front of its place on the rack. Slide the chassis from the lift to the rack. Then bolt the chassis to the rack. You can make the chassis easier to move if you remove the power supplies, fan trays, and fabric modules. Modules are sealed to minimize the chance of damage by electrostatic discharge (ESD). You can remove modules from the chassis to make the chassis easier to move.

Before you begin

- You have fully installed a rack or cabinet (see [Installing a Rack or Cabinet](#)).



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.

- You have installed the bottom-support rails to the lowest possible RU in the rack. And there is at least 21 RU (36.7 inches [93.4 cm]) of space above the rails to install the chassis.
- Data center ground is accessible where you are installing the chassis.
- If there are other devices in the rack, ensure that the heavier devices are installed below the location that you are going to install the chassis.
- You have unpacked and inspected the chassis shipment for completeness and damage (see [Inspecting the New Switch](#))
- You have the following tools and equipment:
 - Mechanical lift capable of lifting the weight of the chassis and the modules, fan trays, and power supplies installed in it. Fully loaded, the switch weighs up to 442 lb (200 kg). To determine the full weight of your chassis with its modules installed (or the weight if you remove the protected modules), see [Weights for the Chassis, Modules, Fan Trays, and Power Supplies, on page 86](#) .



Caution Use a mechanical lift to lift anything weighing over 120 pounds (55 kg).

- Number 1 Phillips-head torque screwdriver
- Eight 12-24 x 3/4-inch or M6 x 19 mm Phillips screws from the bottom-support rails kit



Note Have at least three persons to move the chassis, which can weigh up to 568 lb (258 kg), onto and off the mechanical lift and 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 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 remove the module.
- Fan trays—Unscrew the four captive screws, and use the two handles on the fan tray to remove the module.
- Fabric modules—For each fabric module, press both eject buttons on the front, rotate both levers away from the front of the module, and use the levers to remove the module.

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 four people 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

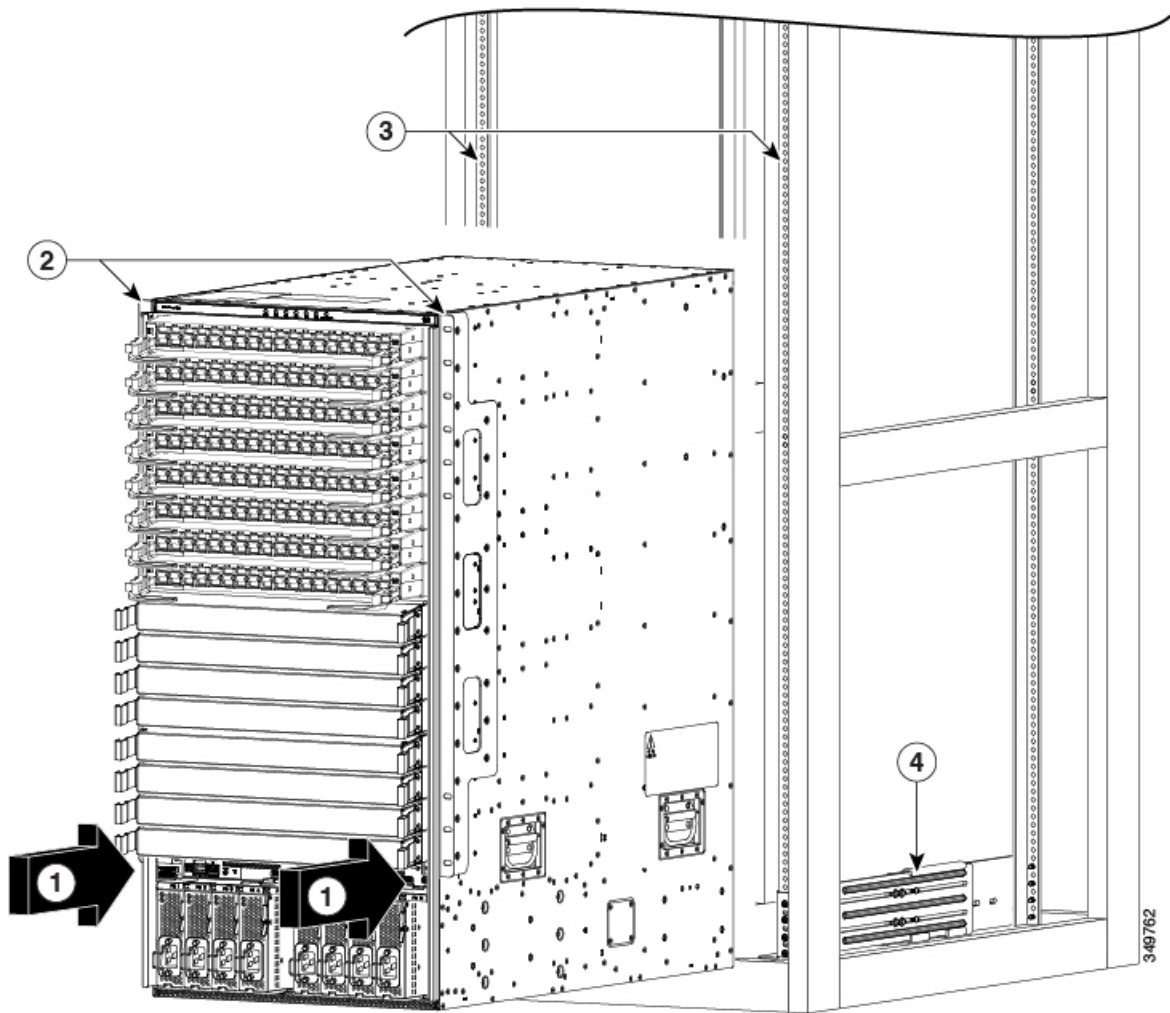
To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on modules (such as power supplies, fans, or cards); these types of handles are not designed to support the weight of the unit.

Step 3 Use the mechanical lift to position the chassis in front of the four-post rack or cabinet. Elevate the chassis to the level of the bottom-support rails or no more than 1/4 inch (0.6 cm) above the bracket.

Step 4 Position the chassis with the rear (the side with the open power supply slots) ready to go into the rack or cabinet. If necessary, you can use the two handles on either side of the chassis to move the chassis on the lift.

Step 5 Use two people to push the chassis halfway onto the rack or cabinet. Have one person to guide the chassis down the bottom-support rails while making sure that the chassis does not get caught on any edges of the bottom support brackets.

Push only the lower front sides of the chassis—do not push any modules and do not use any module handles to move the chassis.



1	Push the sides of the lower half of the front side of the chassis (do not push or lift any of the modules or module handles).	3	Rack vertical mounting rails.
2	Chassis mounting brackets.	4	Bottom-support rails

Step 6 If the mechanical lift is raised above the bottom-support rails, gently lower the lift to the level of the brackets or no more than 1/4 inch (0.6 cm) below the rails.

This action keeps the chassis level on the rails and helps prevent the chassis from getting caught on the inside edges of the bottom-support rails.

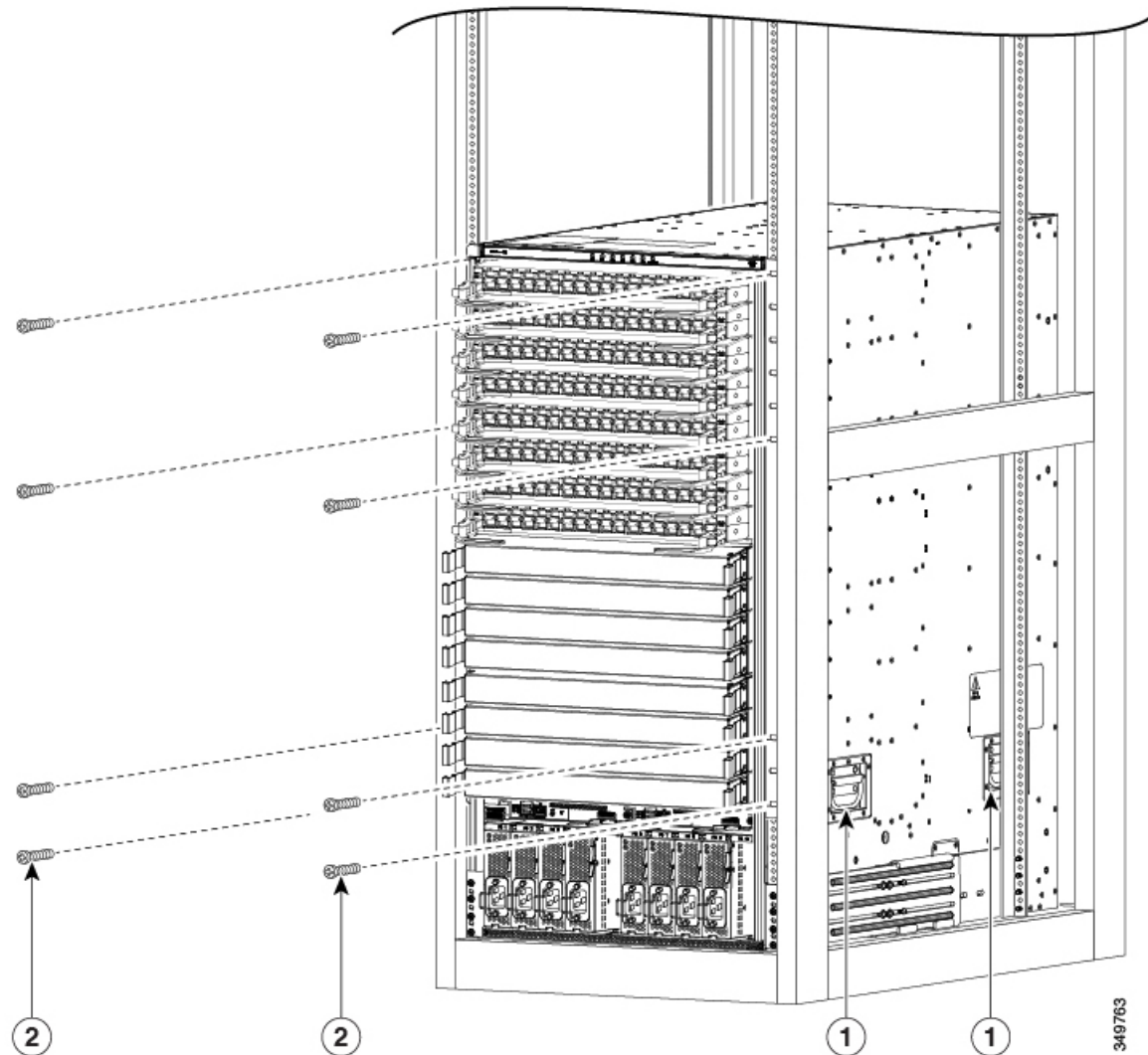
Step 7 Use two people to push the chassis all the way onto the rack or cabinet.

You have pushed the chassis all the way when its two vertical mounting brackets come in contact with the vertical rails on the rack or cabinet.

Step 8 Align the mounting bracket on the chassis to the vertical mounting rails on the rack, and attach the chassis to the rack.

Align the screw holes in the chassis mounting brackets to the screw holes in the vertical mounting rails on the rack or cabinet. Use a Phillips screwdriver to screw in four M6 x 19-mm or 12-24 x 3/4-inch screws in each of the two chassis mounting brackets (use a total of eight screws for two mounting brackets).

Tip To adjust the placement of the chassis on the bottom-support rails, use the chassis handles.



1	Handles used to adjust the chassis placement.	2	Four M6 x 19 mm or 10-24 x 3/4 in. Phillips screws that are used to attach each side bracket to a front mounting rail (use a total of eight screws).
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Step 9 To reinstall the fabric modules, see [Installing a Fabric Module, on page 67](#)

Step 10 To reinstall the fan trays, see [t_n95xx_install_fan_tray.xml](#)

What to do next

After the chassis is secured to the rack, you can ground the switch (see [Grounding the Chassis, on page 27](#)).

Grounding the Chassis

The switch chassis is automatically grounded when you properly install the switch in a grounded rack with metal-to-metal connections between the switch and rack.



Note An electrical conducting path shall exist between the product chassis and the metal surface of the enclosure or rack in which it is mounted or to a grounding conductor. Electrical continuity shall be provided by using thread-forming type mounting screws that remove any paint or non-conductive coatings and establish a metal-to-metal contact. Any paint or other non-conductive coatings shall be removed on the surfaces between the mounting hardware and the enclosure or rack. The surfaces shall be cleaned and an antioxidant applied before installation.

You can also ground the chassis, which is required if the rack is not grounded, by attaching a customer-supplied grounding cable. Attach the cable to the chassis grounding pad and the facility ground.



Warning Statement 1024—Ground Conductor

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



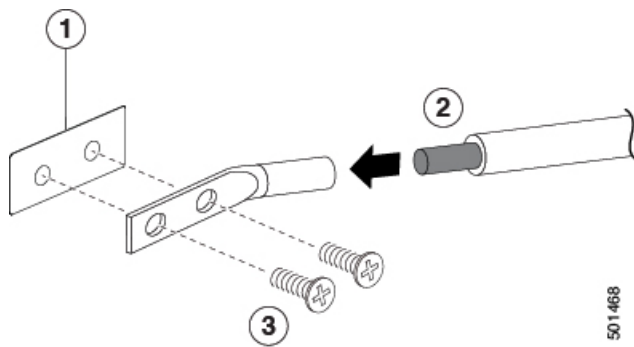
Warning Statement 1046—Installing or Replacing the Unit

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

Before you begin

Before you can ground the chassis, you must have a connection to the earth ground for the data center building.

-
- 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. We recommend 6-AWG wire for the U.S. installations.
- Step 2** Insert the stripped end of the grounding wire into the open end of the grounding lug. Use a crimping tool to crimp the lug to the wire, see 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.



1	Chassis grounding pad	3	2 M4 screws are used to secure the grounding lug to the chassis
2	Grounding cable, with 0.75 in. (19 mm) of insulation that is stripped from one end, which is 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 the previous figure. Tighten the screws to 11 to 15 in-lb (1.24 to 1.69 N·m) of torque.

Step 4 Prepare the other end of the grounding wire and connect it to the facility ground.

Starting Up the Switch

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

- The switch has enough power supplies to output the amount of wattage that is required for all the modules that are installed in the switch. Depending on the power mode that you use for the switch, consider the following:
 - For combined power mode (no power redundancy), there must be enough power supplies to power all the modules in the chassis. No extra power supplies are needed for redundancy.
 - For $n+1$ redundancy mode, there must be enough power supplies to power all 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 that are needed is the number that is used for combined power mode plus one ($n+1$) for redundancy.
 - For $n+n$ redundancy mode, there must be two equal sets of power supplies. Each of which can power all the modules in the chassis and each set is connected to a separate power source. If one power source goes down, the power supplies connected to the other power source can power the switch. The maximum number of power supplies is the number of power supplies that are required for combined power plus the same number of power supplies ($n+n$) for redundancy.



Note DC power supplies have two power feeds, each with a positive (+) wire and a negative (-) wire. For simpler routing of power cables, you connect both feeds to the same power source. Alternatively, you can connect each feed to a separate power source but that makes the routing of power cables more complicated.



Note This Equipment is designed to boot up in less than 30 minutes, dependent on its neighboring devices being fully up and running.

- When using two power sources, it is easiest to manage the routing of power cables separately. Route the power cables for one power source along the left side of the chassis. Route the power cables for the other power source along the right side of the chassis. The power cables on the left side connect to power supplies in the far left power supply slots. The power cables on the right side connect to power supplies in the far right power supply slots. If you are not filling all the power supply slots, fill the slots on the sides for now and leave the middle slots open. Cover each open slot with a power supply slot blank to preserve the designed airflow, until you add more power supplies.

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



Warning **Statement 1004**—Installation Instructions

Read the installation instructions before using, installing or connecting the system to the power source.



Warning **Statement 1018**—Supply Circuit

To reduce risk of electric shock and fire, take care when connecting units to the supply circuit so that wiring is not overloaded.

Connecting a 3-kW AC Power Supply to an AC Power Source

-
- Step 1** For each 3-kW AC 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.

Connecting a 3-kW Universal AC/DC Power Supply to an AC Power Source

The 3-kW Universal AC/DC power supply can be connected to either a 200-to-277-V AC circuit equipped with a Saf-D-Grid receptacle. This procedure is for connecting the power supply to an AC power source.

Before you begin

The power switch on the power supply must be turned off (power switch set to 0).

-
- | | |
|---------------|--|
| Step 1 | Verify that the power switch on the power supply is turned off (0). |
| Step 2 | Connect the Saf-D-Grid connector on the AC power cable to the Saf-D-Grid receptacle for the AC power source. |
| Step 3 | Connect the Saf-D-Grid connector on the other end of the power cable to the Saf-D-Grid receptacle on the power supply. |
| Step 4 | Turn on the power supply by pressing its power switch to on (1). |
| Step 5 | Verify that the Output Power LED turns on and becomes green. |
-

What to do next

After you finish connecting the power supplies to the power source and the power supplies are operating, you connect the switch to the network.

Connecting a 3-kW Universal AC/DC Power Supply to a DC Power Source

The 3-kW Universal AC/DC power supply can be connected to a 240-to-380-V DC circuit equipped with positive, negative, and ground terminals. This procedure is for connecting the power supply to a DC power source.

Before you begin

- The DC power source must be turned off at its circuit breaker.
- The power switch on the power supply must be turned off (power switch set to 0).

-
- | | |
|---------------|---|
| Step 1 | Verify that the circuit breaker for the DC power source is turned off. |
| Step 2 | Verify that the power switch on the power supply is turned off (0). |
| Step 3 | Connect the ground terminal ring on the power cable to the ground terminal on the DC power source. Secure it in place with a nut tightened to the appropriate torque setting for the terminal post. |
| Step 4 | Connect the negative terminal ring on the power cable to the negative (-) terminal on the DC power source. Secure it in place with a nut tightened to the appropriate torque setting for the terminal post. |
| Step 5 | Connect the positive terminal ring on the power cable to the positive (+) terminal on the DC power source. Secure it in place with a nut tightened to the appropriate torque setting for the terminal post. |
| Step 6 | Connect the Saf-D-Grid connector on the other end of the power cable to the Saf-D-Grid receptacle on the power supply. |
| Step 7 | Turn on the circuit breaker for the DC power source circuit. |
| Step 8 | Turn on the power supply by pressing its power switch to on (1). |

Step 9 Verify that the Output Power LED turns on and becomes green.

What to do next

After you finish connecting the power supplies to the power source and the power supplies are operating, you connect the switch to the network.

Connecting a 3-kW DC Power Supply to a DC Power Source

For no power redundancy or $n+1$ power redundancy, you connect the power supplies in the switch to the same power grid. For $n+n$ power redundancy, you connect half of the power supplies to one power grid and the other half of power supplies to another power grid. Grid A power supplies are on the left side of the switch and grid B power supplies are on the right side of the switch).

Before you begin

- The power supplies must be installed in the chassis.
- The power supplies must be close enough to be connected to the DC power source using the customer-provided power cables.
- Four 6-AWG lugs that are provided with the switch.
- Customer-provided equipment and tools must include the following:
 - Four power cables (6-AWG cables recommended).



Note Use colored cables to designate positive and negative polarity. You need two cables that are colored for positive polarity and two cables that are colored for negative polarity.

- Wire stripping tool
- Crimping tool
- Torque screwdriver and wrench

Step 1 Turn off the switch and circuit breaker as follows:

- a) Turn the power switch on the power supply to standby (labeled 0 on the power supply).
- b) Turn off the circuit breaker for each of the two power inputs coming from the DC power source.

Warning Statement 1003—DC Power Disconnection

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

Step 2 Connect the four customer-provided power cables to the power supply and power source as follows:

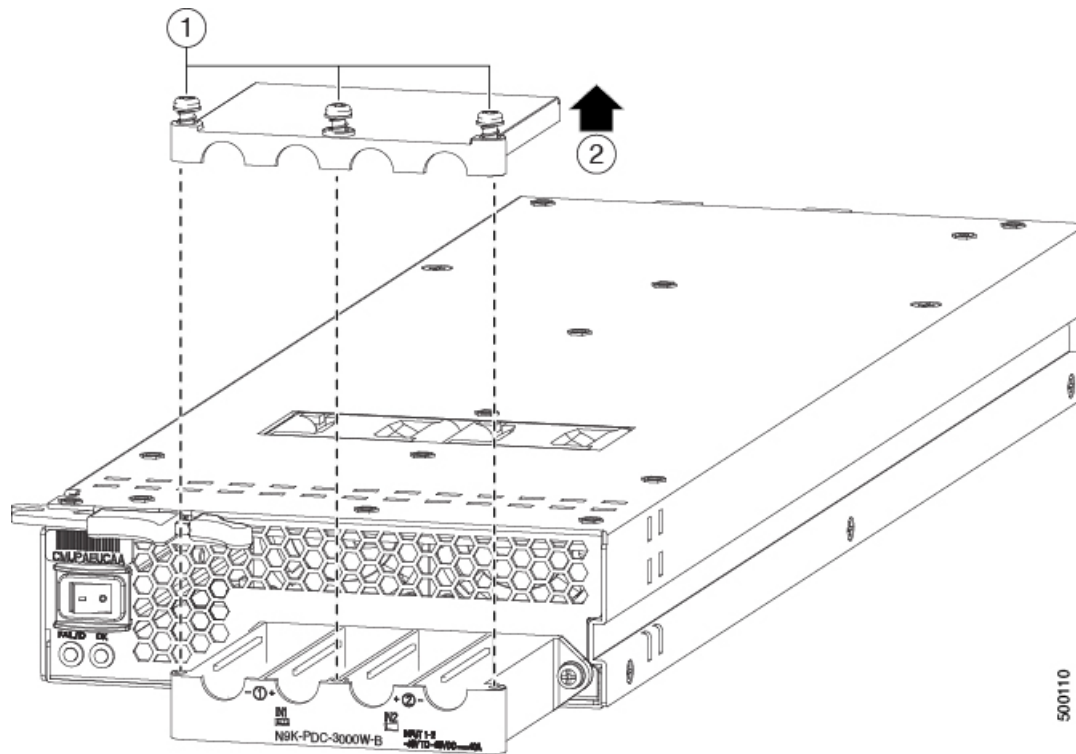
- a) Use a wire stripper to remove 0.75 inches (19 cm) of insulation from the end of each of four power cables.

Use colored cables to designate positive and negative polarity. You need two cables that are colored for positive polarity and two cables that are colored for negative polarity.

- b) Use a crimping tool to attach each of four lugs (provided with the switch for each power supply) to the stripped end of each cable.

Test each crimped lug by trying to pull it off its cable.

- c) Use a torque screwdriver to unscrew the three screws that are on the cover of the terminal box. the cover is located on the front of the power supply and lifts off the cover as shown in the following figure.



1	Unscrew three screws on the safety cover.	2	Remove the cover.
---	---	---	-------------------

Note The terminal box has four slots for four power terminals (ordered as negative [-], positive [+], positive [+], and negative [-]). Each terminal has two nuts that you use to fasten a power cable to the terminal.

- d) Remove the two nuts from each terminal post in each slot of the terminal box.
- e) Place each of the lugs for the two positive cables on the two middle terminal posts and fasten each lug using two nuts. Then tightened to 40 in-lb (4.5 N·m) of torque.
- f) Place each of the lugs for the two negative cables on the two side terminal posts and fasten each lug with two nuts. Then tightened to 40 in-lb (4.5 N·m) of torque.
- g) Replace the safety cover on the terminal box and fasten it in place using its three screws.
- h) Connect the other ends of the power cables to the two DC power circuits.

Be sure that the positive and negative cables that are attached to one side of the power supply are attached to the same DC power source circuit. The negative cable is attached to a negative terminal and the positive cable is attached to a positive terminal).

Step 3

Power up the power supply as follows:

- a) Turn on the power source circuit breaker for both input lines.

Verify that the Input 1 (IN1) and Input 2 (IN2) LEDs light up on the power supply.

- b) Turn the power switch on the power supply to ON (labeled 1 on the power supply).

The LEDs flash and then the OK LED turns on (green) in addition to the Input LEDs.

What to do next

You are ready to connect the switch to the network.



CHAPTER 4

Connecting the Switch to the ACI Fabric

- [ACI Fabric Topology, on page 35](#)
- [Preparing to Connect to Other Devices, on page 36](#)
- [Connecting Leaf Switches to APICs, on page 37](#)
- [Connecting Leaf Switches to Spine Switches, on page 39](#)
- [Installing a Gigabit Ethernet module \(GEM\), on page 40](#)
- [Migration of Nodes From a First Generation Switch to a Second Generation Switch, on page 40](#)
- [Setting Up an Optional Console Interface, on page 42](#)
- [Setting Up an Optional Management Connection, on page 43](#)
- [Optic Transceiver Removal Using the Optics Extraction Tool , on page 43](#)
- [Maintaining Transceivers and Optical Cables, on page 45](#)

ACI Fabric Topology

The ACI fabric topology includes the following major components:

- Application Centric Infrastructure Controller (APIC) appliance (cluster of APICs)
- Leaf switches (for switch compatibility, please see the [data sheets](#)).
- Spine switches (for switch compatibility, please see the [data sheets](#)).

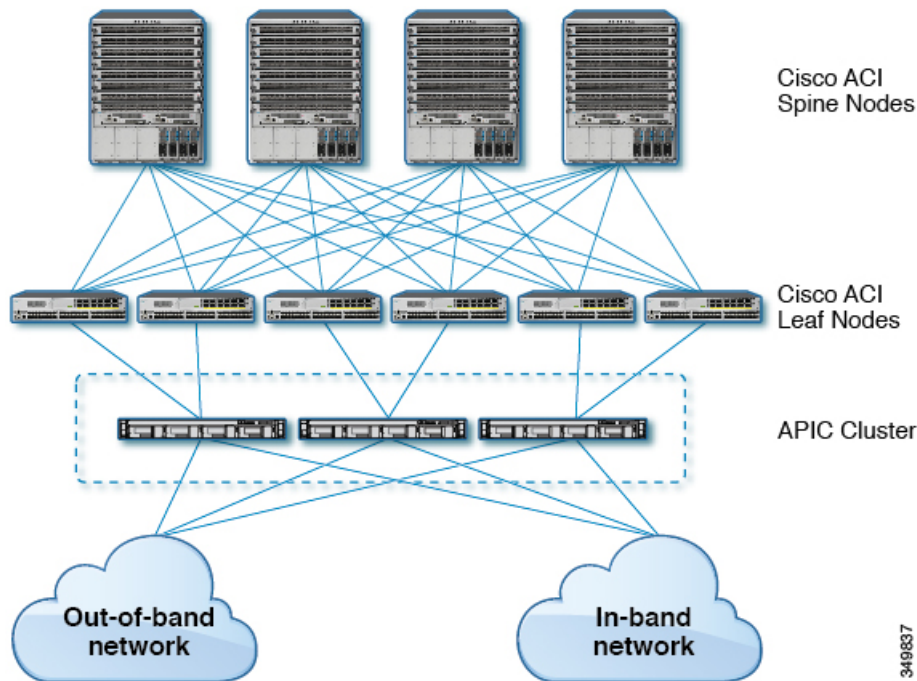
For additional information, please see the [Cisco APIC Installation, Upgrade, and Downgrade Guide](#).



Note To prevent sub-optimal forwarding between endpoints, connect every leaf switch in the fabric to every spine switch in the same fabric.

As shown in the following figure, each APIC is connected to one or two leaf switches and each leaf switch should be connected to every spine switch in the same fabric.

Figure 1: Connections Between APIC Clusters, Leaf Nodes, and Spine Nodes



Preparing to Connect to Other Devices

When preparing to connect the fabric devices, consider the following for each type of interface, and gather all of the required equipment before making the connections:

- Cabling type required for each interface type
- Distance limitations for each signal type
- Additional interface equipment required



Note When running power and data cables in overhead or subfloor cable trays, we strongly recommend that you locate power cables and other potential noise sources as far away as practical from network cabling that terminates on Cisco equipment. In situations where long parallel cable runs cannot be separated by at least 3.3 feet (1 meter), we recommend that you shield any potential noise sources by housing them in a grounded metallic conduit.

The optical transceivers that are not already assembled to their cables come separate from their cables. To prevent these transceivers and their cables from being damaged, we recommend that you keep the transceivers disconnected from their cables when installing them in ports and then insert the optical cable into the transceiver. When removing transceivers from ports, remove their cables before removing the transceivers.

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 when you install transceivers and provides an ESD port to which you

can connect your wrist strap. If you cannot find an ESD port, connect the wrist strap to an earth ground (such as the grounding connection for the chassis).

- Do not remove or insert a transceiver more often than 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) increases with contamination and should be kept below 0.35 dB.
 - Clean these parts before installing them 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.

Connecting Leaf Switches to APICs

You must downlink one or two (recommended for redundancy) Cisco Nexus 9300 platform ACI-mode leaf switches to each Application Policy Infrastructure Controller (APIC) in your ACI fabric. The type of virtual interface card (VIC) installed on the APIC determines the types of interface cables that you can use to connect the leaf switches to the APICs.

- The **VIC 1225T** module supports copper connectors, copper cables, and switches with copper downlink ports (such as: Cisco Nexus 93108TC-FX switch).
- The **VIC 1225** module supports optical transceivers, optical cables, and switches with optical downlink ports (such as: Cisco Nexus 93600CD-GX switch).
- The **VIC 1455** module supports optical transceivers, optical cables, and switches with optical downlink ports (such as: Cisco Nexus 93600CD-GX switch).



Note Breakout ports cannot be used for Cisco APIC connectivity.

Before you begin

The APIC and leaf switches in the fabric must be fully installed in their racks and grounded.

Step 1

Connect an interface cable to one of the two to four ports on the virtual interface card (VIC) installed on the APIC. If the cable is not already assembled to its transceivers, insert the transceiver into the VIC port and then connect the optical interface cable to the transceiver.

- For a **VIC 1225T** 10GBASE-T copper module, use 10GBASE-T cables with RJ-45 connectors.

- For a **VIC 1225** optical module, use one of the following sets of transceivers and cables:
 - Cisco 10GBASE-LR transceivers (SFP-10G-LR) supporting a link length of up to 6.1 miles (10 km)
 - Cisco 10GBASE-SR transceivers (SFP-10G-SR) supporting the following link lengths:
 - Using 2000 MHz MMF (OM3) for up to 984 feet (300 m)
 - Using 4700 MHz MMF (OM4) for up to 1312 feet (400 m)
 - Cisco SFP+ Active Optical Cables (SFP-10G-AOC x M [where $x=1, 3, 5, 7$ for lengths in meters])
 - Cisco SFP+ Twinax Cables (SFP-H10GB-CU x M [where $x=7$ for lengths in meters])
- For a **VIC 1455** SFP28 module, 10-Gigabit only, use one of the following sets of transceivers and cables:
 - Cisco 10GBASE-LR transceivers (SFP-10G-LR) supporting a link length of up to 6.1 miles (10 km)
 - Cisco 10GBASE-SR transceivers (SFP-10G-SR) supporting the following link lengths:
 - Using 2000 MHz MMF (OM3) for up to 984 feet (300 m)
 - Using 4700 MHz MMF (OM4) for up to 1312 feet (400 m)
 - Cisco SFP+ Active Optical Cables (SFP-10G-AOC x M [where $x=1, 2, 3, 5, 7, \text{ or } 10$ for lengths in meters])
 - Cisco SFP+ Twinax Cables (SFP-H10GB-CU x M [where $x=1, 2, 3, 5, 7, \text{ or } 10$ for lengths in meters])

Note The VIC 1455 has 4 ports, port-1, port-2, port-3, and port-4 from left to right.

- All ports must have the same speed, either 10-Gigabit or 25-Gigabit.
- Port-1 and port-2 is one pair, corresponding to eth2-1 on APIC and port-3 and port-4 is another pair, corresponding to eth2-2 on APIC. Only one connection is allowed for each pair. For example, you can connect one cable to either port-1 or port-2, and connect another cable to either port-3 or port-4 (**please do not connect two cables on any pair**).

To determine which transceivers, adapters, and cables support this switch, see the [Cisco Transceiver Modules Compatibility Information](#) document.

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

Step 2 Connect the other end of the interface cable to a downlink port on a leaf switch.

- For a Cisco 10GBASE-LR or -SR transceiver and cable, insert the transceiver into a downlink optical port on a leaf switch before connecting the cable to the transceiver.
- For Cisco SFP+ Active Optical Cables, insert the transceiver on the cable into a downlink optical port on a leaf switch.
- For a 10GBASE-T copper cable, insert the RJ-45 connector on the cable into a downlink BASE-T port on a leaf switch.

Note To determine which transceivers, adapters, and cables support this switch, see the [Cisco Transceiver Modules Compatibility Information](#) document.

Connecting Leaf Switches to Spine Switches

For optimal forwarding between endpoints, you must connect each leaf switch to every spine switch in the same ACI fabric.

To determine which transceivers, adapters, and cables support this switch, see the [Cisco Transceiver Modules Compatibility Information](#) document.

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



Warning **Statement 1055**—Class 1/1M Laser

Invisible laser radiation is present. Do not expose to users of telescopic optics. This applies to Class 1/1M laser products.



Warning **Statement 1056**—Unterminated Fiber Cable

Invisible laser radiation may be emitted from the end of the unterminated fiber cable or connector. Do not view directly with optical instruments. Viewing the laser output with certain optical instruments, for example, eye loupes, magnifiers, and microscopes, within a distance of 100 mm, may pose an eye hazard.

Before you begin

- The leaf and spine switches in the fabric (such as: N9K-C9364C, N9K-C9332C, N9K-C9316D-GX, and N9K-C9332D-GX2B) must be fully installed in their racks and grounded.
- If there are modular switches in the fabric, their ACI-mode line cards must already be installed. The line cards can be of the following types:
 - 32-port 100-Gigabit (such as: N9K-X9732C-EX)
 - 36-port 100-Gigabit (such as: N9K-X9736C-FX)
 - 16-port 400-Gigabit (such as: N9K-X9716D-GX)



Note You cannot include NX-OS line cards in the same chassis when running in ACI mode.



Note Multiple uplinks from a leaf switch to a spine switch is supported. A symmetrical topology is recommended so that all devices have equal access to resources.

-
- Step 1** For the transceivers with removable cables, make sure that the transceivers are separated from their interface cables.
 - Step 2** Insert the appropriate transceiver into an active uplink port on the leaf switch.
 - Step 3** Insert the same type of transceiver in the spine switch port on the line card.
 - Step 4** For transceivers with removable cables, insert the interface cable into the open end of each of those transceivers.
 - Step 5** Repeat Steps 1 through 4 for each spine switch in the ACI fabric.
The leaf switch is connected to each spine switch in the ACI fabric.
 - Step 6** Repeat Steps 1 through 5 for each leaf switch in the ACI fabric.
Each leaf switch in the ACI fabric is connected to each spine switch in the network,
-

The fabric automatically implements Equal Cost Multi-Pathing (ECMP) and enables all links. You do not need to configure the links.

Installing a Gigabit Ethernet module (GEM)

- Step 1** Clear the switch's current configuration by using the `setup-clean-config` command.
 - Step 2** Power off the switch by disconnecting the power.
 - Step 3** Replace the current GEM card with the new GEM card.
 - Step 4** Power on the switch.
-

Migration of Nodes From a First Generation Switch to a Second Generation Switch

You have first generation Cisco Nexus 9000 series switches that may or may not be comprising a virtual port channel (vPC). You are migrating to second generation Cisco Nexus 9000 series switches using the same cables.

First generation Cisco Nexus 9000 series switches include those switches that do not contain -EX, -FX, or -GX in the product ID.

Second generation Cisco Nexus 9000 series switches include those switches that have the -EX, -FX, -GX, or later suffix in the product ID.

To migrate the first generation switches to second generation switches, you must perform the steps in this procedure.

To determine which transceivers, adapters, and cables support this switch, see the [Cisco Transceiver Modules Compatibility Information](#) document.

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

Before you begin

- Move any Cisco Application Policy Infrastructure Controllers (APICs) that are connected to the first generation switches that you are migrating to any other switches in the fabric and wait for the Cisco APIC cluster to become "Fully Fit."
- The following migration paths are supported:
 1. Migrating from first generation Cisco Application Centric Infrastructure (ACI) switches to second generation Cisco ACI switches that are running the same software release.
 2. Migrating from first generation Cisco ACI switches to second generation Cisco ACI switches that are running different software releases.

The second migration path is required where the existing switches are not supported on the new release that is required for the new switches. For example, if you want to migrate from the first generation Cisco ACI switches, such as Cisco Nexus 9300 (with the -E suffix or without any suffixes in the product ID) that are no longer supported starting on Cisco ACI switch 15.0(1) or later releases, to some of the new switches that are supported only from 15.0(1) or later.

When the first generation switches are comprising a vPC, complete the following mandatory prerequisite steps before you proceed with the second migration path:

- a. Due to potential traffic loss, it is recommended that that you perform the vPC migration during a maintenance window.
- b. Before you perform this procedure, the Auto Firmware Update policy must be disabled.
- c. Upgrade the Cisco APIC cluster to the 4.2(7v) release if the cluster is running an older release. Also upgrade the first generation switches to the 14.2(7v) release. Wait for the fabric to converge.
- d. Upgrade the Cisco APIC cluster to 5.2(7f) release and wait for the cluster to become "Fully Fit."
- e. Ensure that the new second generation switches are preloaded and running the equivalent release as the Cisco APICs, that is 15.2(7f) release. Other than source and target version software releases 4.2(7v)/14.2(7v) and 5.2(7f)/15.2(7f), no other software releases are supported for this migration procedure.



Note

- The number of ports and port types of the second generation switches must match the first generation switch that you are replacing. If the number does not match, then you must change the configuration to accommodate the new ports or port types. This is also applicable if you migrate the hardware while retaining the same software version.
- To migrate first generation non-vPC leaf switches or first generation spine switches to second generation switches, follow [Step 1, on page 42](#) through [Step 6, on page 42](#) in the procedure outlined below. vPC-related information is not applicable for this migration.

If you must migrate a first generation non-vPC leaf switch or a first generation spine switch to a second generation switch, the requirement of the source and target software release 4.2(7v)/14.2(7v) and 5.2(7f)/15.2(7f) is not required. Ensure that the Cisco ACI fabric is running the required software release that supports the second generation switch PID.

-
- Step 1** From the Cisco APIC GUI, perform the **Remove From Controller** operation for the operational secondary vPC switch node.
- The Cisco APIC clean reboots the switch. Wait for about 10 minutes for this operation to finish. This action prompts all traffic to use the other first generation switch for data traffic.
- Note** There will be a loss of traffic for a few seconds for the operational secondary vPC when you perform the **Remove From Controller** operation.
- Step 2** Disconnect the cabling from the first generation switch that you just removed.
- Step 3** Uninstall the first generation switch by reversing the order of the steps in the "Installing the Switch Chassis" section of the switch-specific *Hardware Installation Guide*.
- Step 4** Install the second generation switch by following the steps in the "Installing the Switch Chassis" section of the switch-specific *Hardware Installation Guide*.
- Step 5** Connect the loose cabling that you removed from the first generation switch to the same ports on the second generation switch.
- Step 6** Register the new second generation switch with the Cisco APIC.
- Register the new node with the same node name and node ID. This switch becomes part of the fabric. The Cisco APIC pushes the policies to the new switch and keeps down the vPC legs because there is a mismatch of the generation of switches. At this point, the vPC primary continues to send the data traffic.
- Step 7** Before you proceed to [Step 8, on page 42](#), wait for 10 to 15 minutes for the new switch to download the configurations.
- Step 8** From the Cisco APIC GUI, perform the **Remove From Controller** operation for the vPC primary. The Cisco APIC clean reboots the switch.
- Wait for about 10 minutes for this operation to finish. The vPC leg on the second generation switch, which the Cisco APIC kept down earlier, comes up. This action prompts all traffic to move to the new second generation switch. The vPC ports on the new second generation switch can take a few minutes to come up, during which time there will be traffic drops. The duration of traffic drops varies by the scale and flows in the fabric.
- Step 9** Disconnect the cabling from the first generation switch.
- Step 10** Uninstall the first generation switch as you did in [Step 3, on page 42](#).
- Step 11** Install the second generation switch as you did in [Step 4, on page 42](#).
- Step 12** Connect the loose cabling as you did in [Step 5, on page 42](#).
- Step 13** Register the new second generation switch with the Cisco APIC.
- Register the new node with the same node name and node ID. This switch becomes part of the fabric. The Cisco APIC pushes policies to the new switch and the vPC legs comes up and starts passing traffic.
-

Setting Up an Optional Console Interface

You can optionally set up a console interface for performing the initial configuration of the switch. To do this, use the interface cable provided in the accessory kit to connect the switch to your console device. You can connect the console port on the switch to a modem. If you do not connect it to a modem, make the connection either before powering up the switch or after completing the boot process for the switch.

Before you begin

The console device must support VT100 terminal emulations and asynchronous transmissions.

-
- Step 1** Configure the terminal emulator program to match each of the following default port characteristics:
- 9600 baud
 - 8 data bits
 - 1 stop bit
 - No parity
- Step 2** Insert the RJ-45 connector on the interface cable found in the accessory kit into the RS-232 port on the switch and insert the DB-9 connector on the other end of the cable to the serial port on the console device.
-

What to do next

You can now perform the initial configuration for the switch (see the *Cisco ACI Getting Started Guide*).

Setting Up an Optional Management Connection

You can optionally set up an out-of-band management connection for monitoring and troubleshooting purposes. To do this, depending on your switch, you connect either the RJ-45 management port or the SFP management port on the switch to an external hub, switch, or router.

Before you begin

To prevent an IP address conflict, you must complete the initial configuration for the switch and establish an IP address before you create the management connection.

-
- Step 1** Connect the interface cable to a management port on the switch.
- Step 2** Connect the other end of the cable to an external hub, switch, or router.
-

Optic Transceiver Removal Using the Optics Extraction Tool

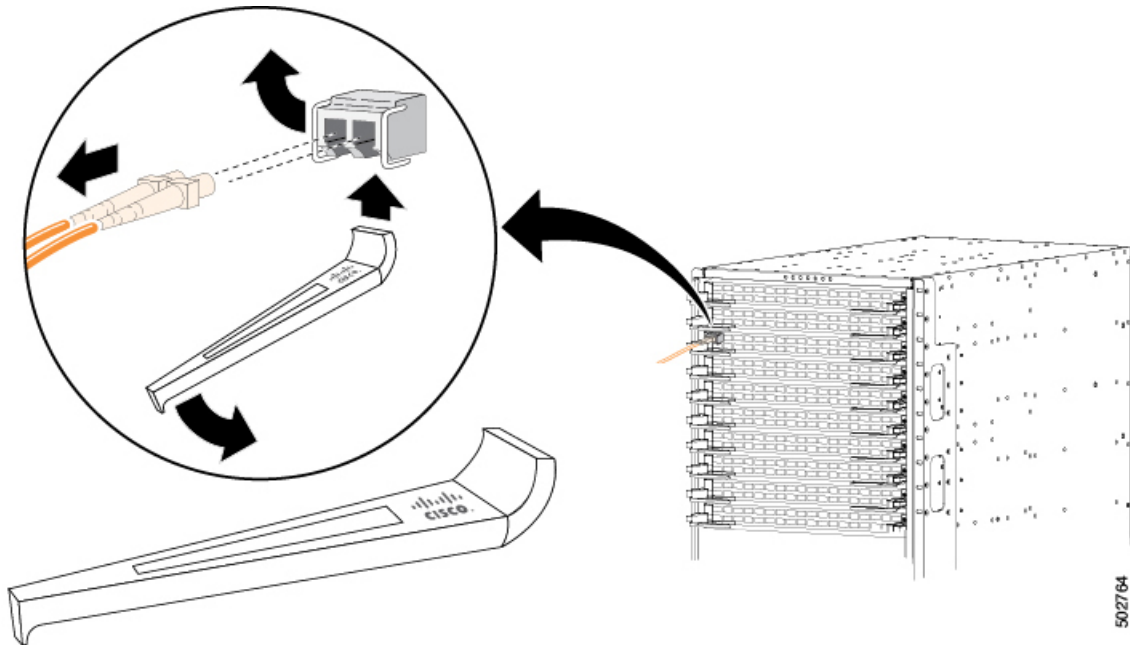
You use both ends of the optics extraction tool in this procedure. You use the wide end for releasing the bale latch, and the narrow end for removing the transceiver module.

Before you begin

Ensure that before you handle any switch components, you are wearing a grounded electrostatic discharge (ESD) strap. To ground the strap, attach it directly to earth ground or to a grounded rack or chassis. There must be a metal-to-metal connection to earth ground.

Step 1 Remove the fiber-optic cables from the transceiver module before removing the transceiver module.

Step 2 Use the wide side of the optics extraction tool to release the bale latch (see the following image).



Step 3 Use the narrow end of the optics extraction tool to carefully remove the transceiver module (see the following

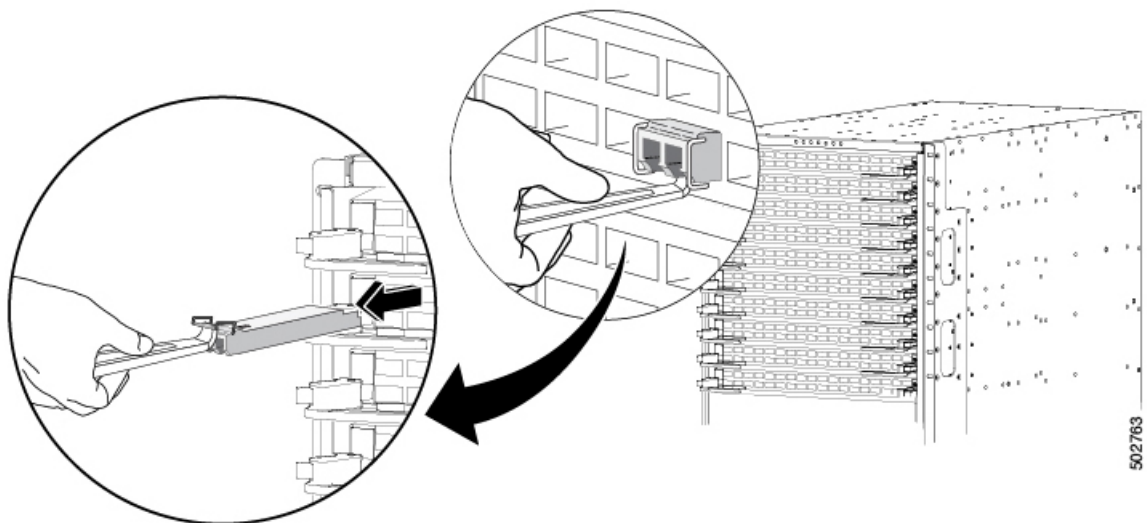


image).

Step 4 Place the transceiver module in an antistatic bag or other protective environment.

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. Contamination increases attenuation (loss of light) 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 the fiber-optic connection cleaning procedures for your site.
- 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

Replacing or Installing Modules, Fan Trays, and Power Supplies

- [Preventing Electrostatic Damage, on page 47](#)
- [Installing or Replacing a Supervisor Module, on page 47](#)
- [Installing or Replacing a System Controller Module, on page 52](#)
- [Installing or Replacing a Line Card, on page 54](#)
- [Installing and Removing a Blank Line Card, on page 57](#)
- [Replacing a Fan Tray, on page 59](#)
- [Replacing a Fabric Module, on page 62](#)
- [Installing or Replacing Power Supplies, on page 71](#)

Preventing Electrostatic Damage

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

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.
 - 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 that are installed in the chassis.

When you remove the active supervisor, the switch automatically makes the other supervisor active. But, all modules in the switch are reset because the switchover is stateless. If the switch has two installed supervisor

modules, the standby supervisor module is hot-swappable during replacement. It is recommended to move the spine to Graceful Insertion and Removal (GIR) mode, or maintenance mode for the above activities.



Note If there are two supervisors that are installed in the chassis, both must be the same type as shown in the following table:

Active Supervisor	Standby Supervisor	Is Combination Allowed?
Supervisor A	Supervisor A	Yes
Supervisor B	Supervisor B	Yes
Supervisor A+	Supervisor A+	Yes
Supervisor B+	Supervisor B+	Yes



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

- 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.

Steps required for ACI Release 5.2 and later:

1. Login to the spine's active SUP by root account, issue "rm -rf /bootflash/.rpmstore; chmod 666 /bootflash/aci_image_file_name".
2. Connect console cable to second (standby) SUP, get ready for press ctrl - c after step-4.
3. From APIC GUI - System settings - isis routing policy, Make sure isis re-distributed route metric is set to 32.
4. From APIC GUI - fabric - fabric membership, decommission target spine from fabric, which will reboot in 5 minutes.
5. Watch standby console for reboot, then repeat ctrl - c until it enters boot loader.

6. Issue cli from loader "dir", If ".rpmstore" directory found underneath /bootflash, then issue "cmdline init_system", otherwise, continue.
7. If the matching ACI image is found in bootflash, issue "boot bootflash:aci_image_file_name", then go to step 9, otherwise, continue.
8. From standby SUP console/loader, issue "eobc", after boot up, issue below clis from console.

```
cp /nfsroot/bootflash/aci_image_file_name /bootflash;  
chmod 666 /bootflash/aci_image_file_name"
```
9. From standby sup console, issue "setup-bootvar aci_image_file_name".
10. Commission the fabric back via APIC GUI, fabric - fabric membership, it will start forwarding in at least 10 minutes.

Step 1 Open the packaging for the new supervisor module. Inspect the module for damage. Verify that the module is the same type as the other supervisor module installed in the chassis.

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. Unscrew its captive screw and pull 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:

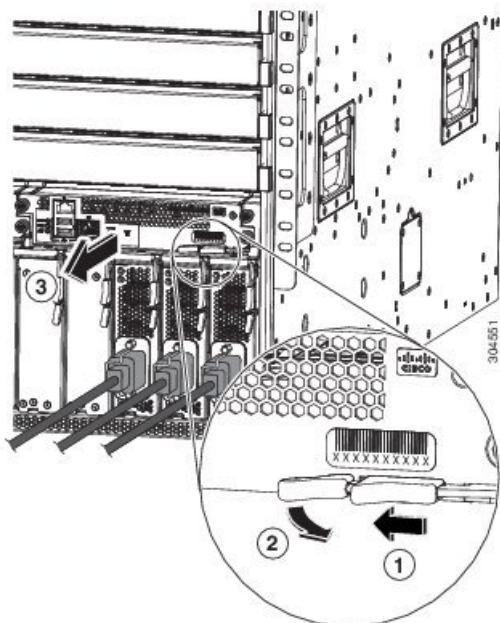
a) Disconnect and label the following cables from the module:

- Console cable
- Ethernet Management cable

b) If there are any external drives that are 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.



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, and pull the module out of the chassis. Set it on an antistatic surface or inside an antistatic bag.

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

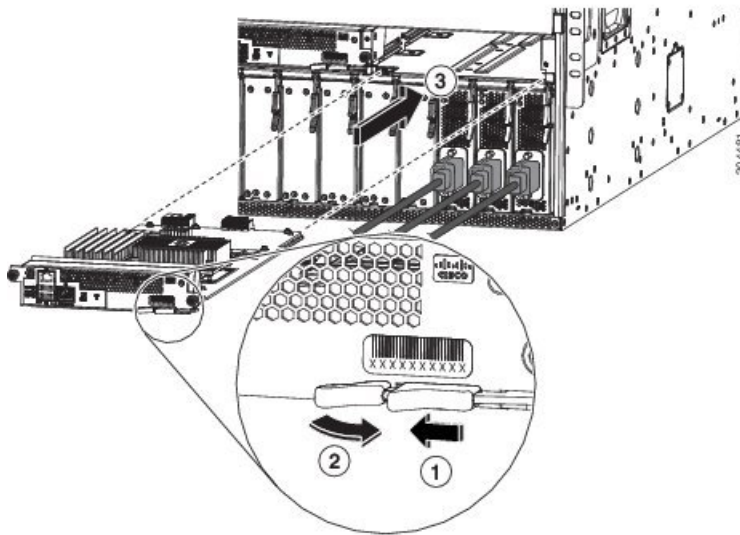
a) Pull the middle section of the ejector handle toward the end of the handle and rotate the handle away from the front of the module.

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.



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 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.

Upgrading a Supervisor Module

You can upgrade supervisor modules by using the hot swap method. The upgrade path for your active supervisor module can be found in the following table:

Active Supervisor	Allowed Upgrade
Supervisor A	Supervisor A+
Supervisor A	Supervisor B+

Active Supervisor	Allowed Upgrade
Supervisor B	Supervisor B+

Step 1 Insert the new supervisor module in the empty slot.

Step 2 Bring up the new supervisor module:

- a) If the newly inserted supervisor module becomes stuck in the loader prompt, use the `reload module <x> force-dnld` command on the active supervisor module. This action brings up the new supervisor module.
- b) If the newly inserted supervisor module has an older BIOS (<5.20), and is unable to boot, you will have to upgrade the BIOS. Use the `flwr tftp|usb<x>://<ip>/img_name1` command, from the newly inserted supervisor module loader prompt. Then use the `reload module <x> force-dnld` command from the active supervisor module to bring up the new supervisor module.

Step 3 Once the new supervisor module has been brought up in `ha-stby` mode, do a copy `r s`. Then issue a system switchover.

Installing or Replacing a System Controller Module

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



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

- 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. Unscrew its captive screw and pull 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:

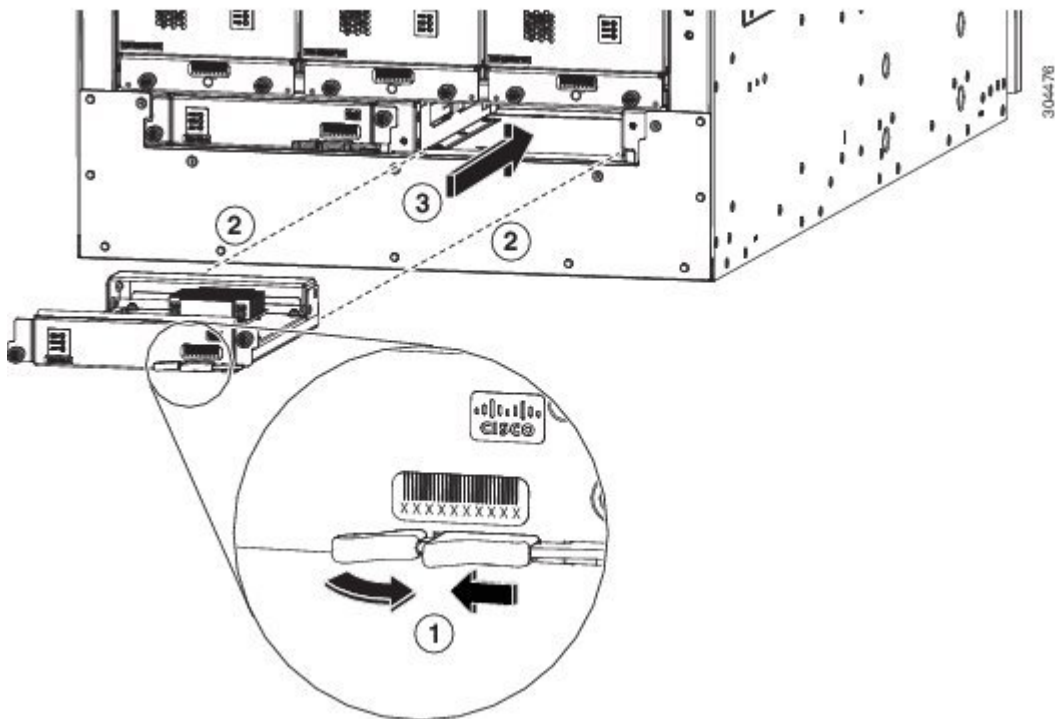
- a) Unscrew the two captive screws (one on each side of the module) until the screws are no longer in contact with the chassis.
- b) Slide and hold the middle handle on the ejector lever toward the end of the lever.
- c) Rotate the ejector lever away from the front of the module.

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. Set 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.



1	Slide the middle handle on the ejector lever to the end of the lever and rotate the lever away from the module.	3	Slide the module all the way into the chassis.
2	Align the back of the module to the open slot in the chassis.		

- 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 a Line Card

The switch can operate with one or more line cards that are installed in the chassis. If there is at least one line card that is installed and operating in the chassis, you can replace another line card or install a new line card in an empty line card 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

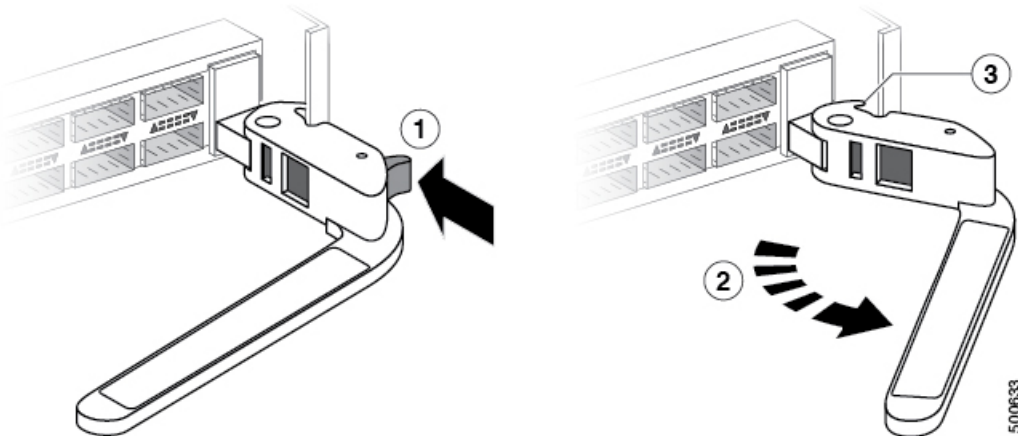
- Wear an electrostatic discharge (ESD) wrist strap or other ESD protective device while handling modules.
- Prepare an antistatic surface or packing materials for each module that you remove from the chassis.

- Step 1** Open the packaging for the new line card 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. Unscrew its two captive screws and pull 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:

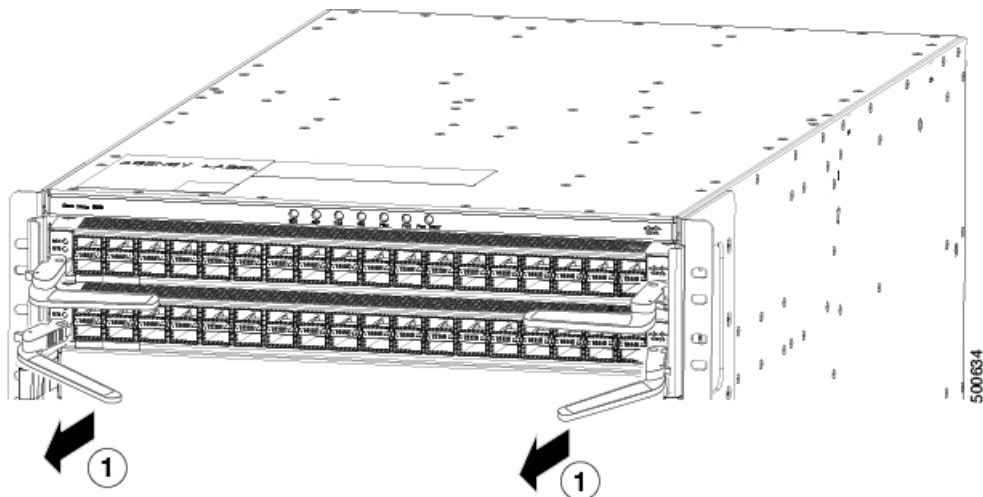
- a) Disconnect and label each of the interface cables from the module.
- b) Push and hold the release button on both ejector levers and then rotate both levers 45 degrees from the module as shown in the following figure.



1	Fully press and hold the release button on each ejector lever.	3	When the lever is fully rotated away from the module, the knob at the other end of the lever can no longer hold the module in the slot.
2	Fully rotate both ejector levers away from the module.		

Caution To prevent damage to the ejector lever, you must press and hold the release button on each ejector lever before rotating the lever 45 degrees from the module.

- c) Pull both levers to slide the line card out of its slot in the chassis as shown in the following figure.

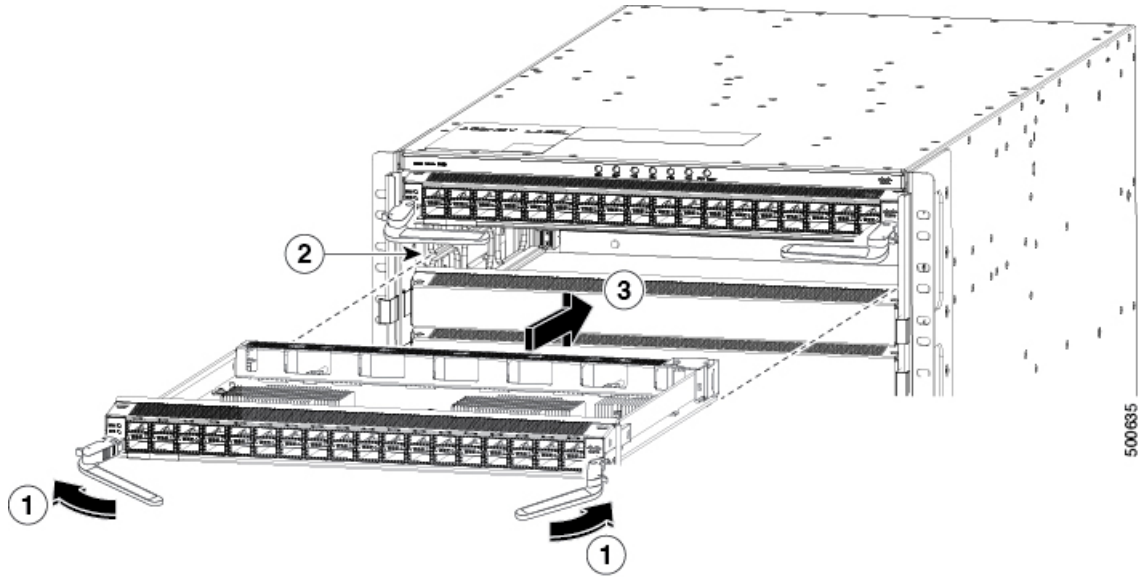


1	Pull both levers to remove the line card from the chassis.		
---	--	--	--

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

Step 4 To install the new line card, follow these steps:

- a) Press and hold the release button on both ejector levers. Rotate the end of each lever away from the chassis as shown in the following figure.



1	Press the release button on each lever and rotate the lever away from the line card.	3	Gently push the line card into the slot until it stops with the front of the line card nearly at the front of the chassis.
2	Align the back of the module to the open slot with the bottom of the line card sliding into guides on each side of the slot.		

- b) Hold the front of the line card with one hand and place your other hand under the line card to support its weight.
- c) Align the back of the line card to the guides in the open line card slot. Gently slide the module into the slot until it stops.
The line card stops when its front is about 0.25 inches (0.6 cm) outside the front of the chassis.
- d) Rotate the ends of the two levers toward the front of the chassis until the levers click and they secure the line card to the chassis.
As you rotate the levers, the line card seats itself onto the fabric modules inside the chassis. And the front of the line card moves all the way to the front of the chassis.
- e) Attach each interface cable to the appropriate port on the line card. Use the label on each cable to determine which port each cable attaches to.
- f) Verify that the line card LEDs turn on and appear as follows:
 - The Status (STS or STA) LED turns on and becomes green.

- For each connected port, the port LED turns on and becomes green or amber.

Installing and Removing a Blank Line Card

When a line card slot is not in use, a blank line card must fill the empty slot to allow the switch to conform to electromagnetic interference (EMI) emissions requirements and to allow proper airflow across the line cards.



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.



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.

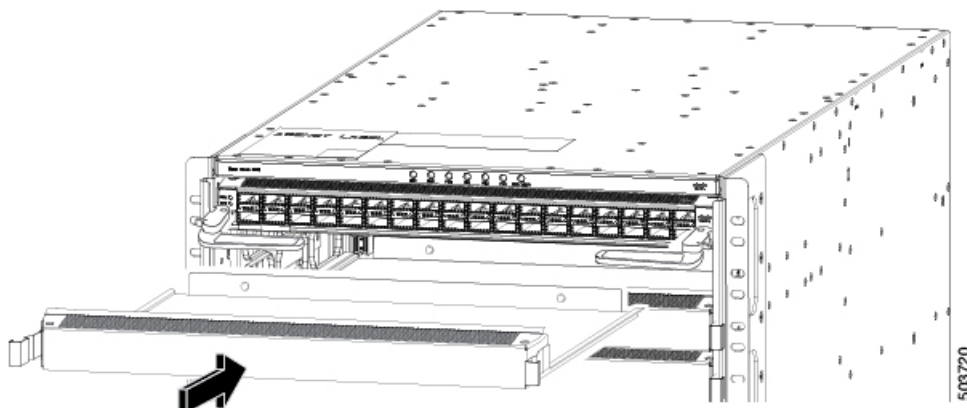
Step 1

This procedure shows how to insert a blank line card in a line card slot:

- a) Hold the front of the blank line card with one hand and place your other hand under the blank line card.
- b) Align the back of the blank line card to the guides in the open line card slot and slide the blank line card all the way into the slot. The two latches on the sides of the blank line card should be locked onto the brackets on the side of the chassis.

Note To prevent jamming the blank line card between the upper and the lower edges of the slot make certain that the blank line card is positioned correctly, as shown in the following illustration.

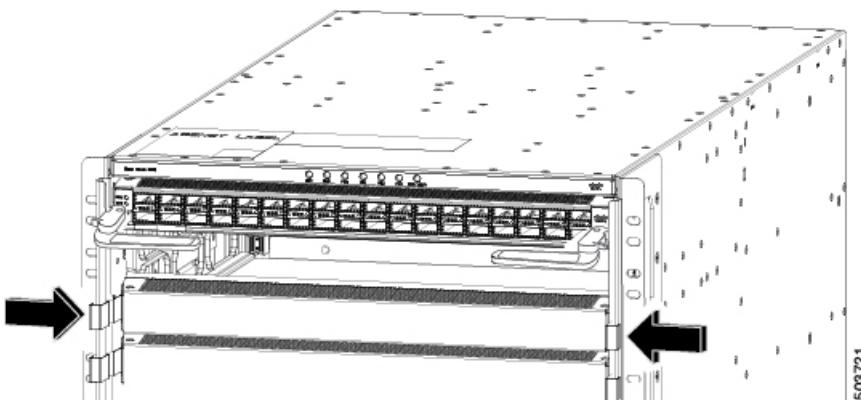
Note The latches are stiff and may require extra force to fully engage with the brackets on the sides of the chassis.



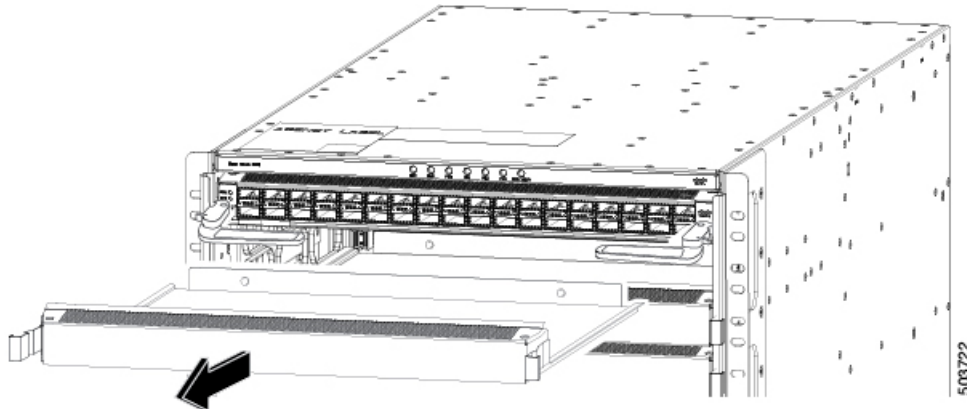
Step 2 This procedure shows how to remove a blank line card in a line card slot:

- a) Press the two latches on the sides of a blank line card using forefingers so that the blank line card is unlocked from the brackets on the side of the chassis. Slightly pull out the blank line card.

Note The latches are stiff and may require extra force to fully disengage with the brackets on the sides of the chassis.



- b) Hold the blank line card using both the hands and pull the blank line card completely out of the chassis slot.



Replacing a Fan Tray

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

The switch uses three fan trays. 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. If the switch senses an overtemperature condition when multiple fan trays are removed, the shutdown can occur in less than two minutes.



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. The switch shuts down within two minutes.

Before you begin

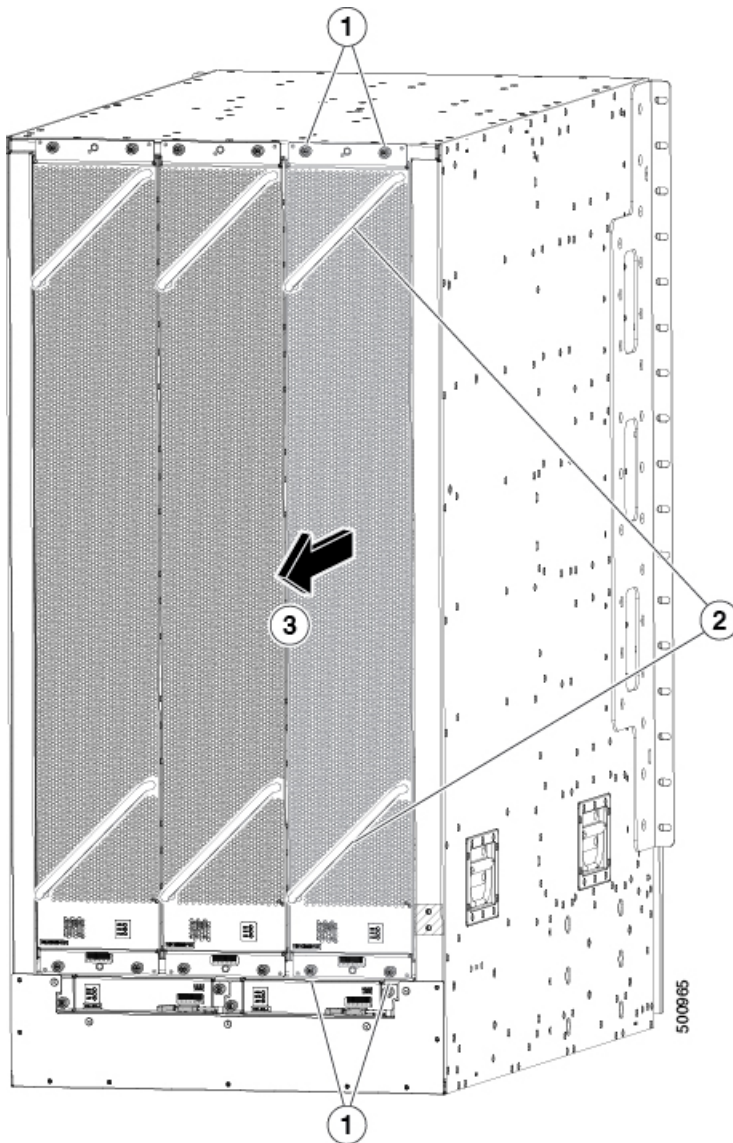
- Wear an electrostatic discharge (ESD) wrist strap or other ESD protective device while handling modules.
- Prepare an antistatic surface or packing materials for each module that you remove from the chassis.

Step 1 Open the packaging for the new 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 2 Unscrew the four captive screws on the front of the fan tray until each screw is free of the chassis. See the following figure.

Removing a Fan Tray



1	Unscrew 4 captive screws (2 at the top of the module and 2 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 2 fan tray handles with both hands.		

Step 3 Hold both handles on the front of the fan tray with both of your hands and pull the fan tray out of the slot.

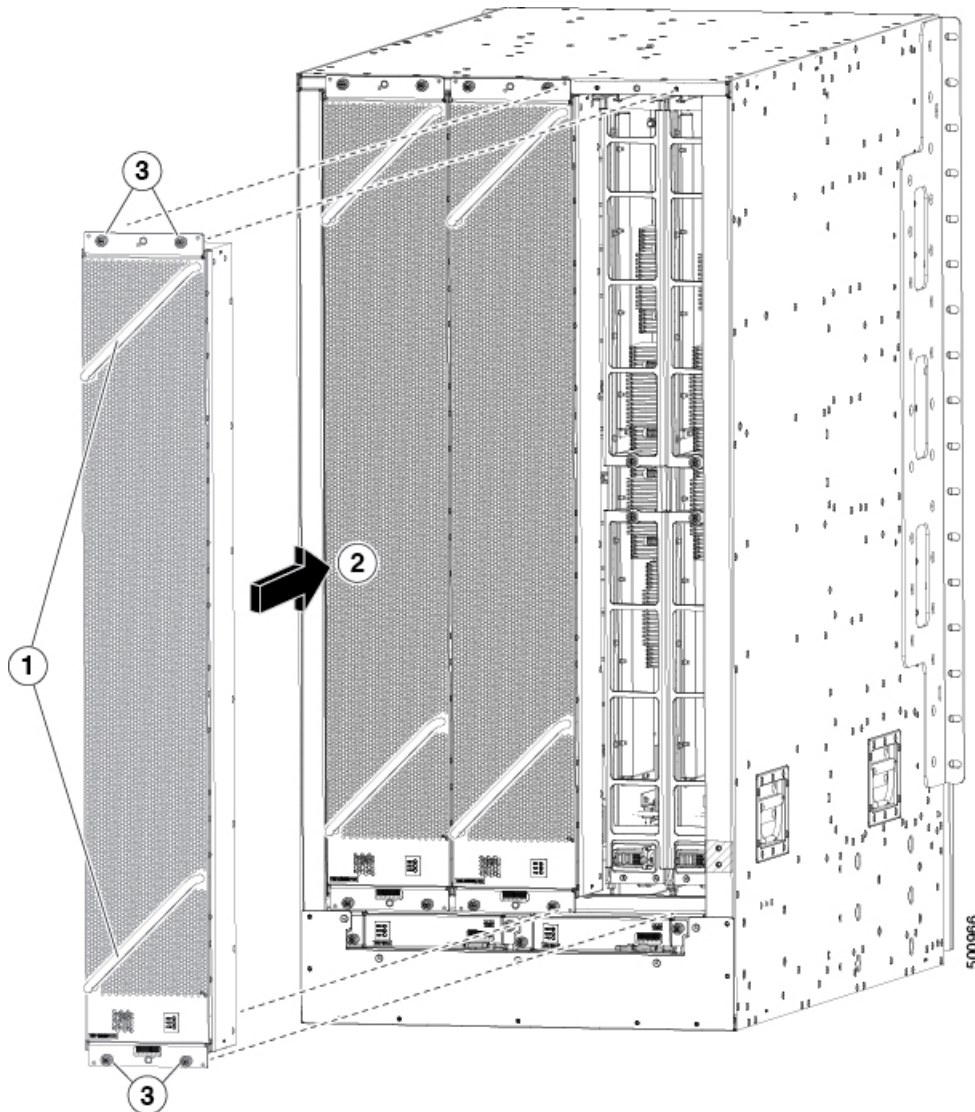
Step 4 Set the fan tray on antistatic material or inside an antistatic bag.

Installing a Fan Tray

Before you begin

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



1	Hold the 2 fan tray handles with both hands.	3	Screw in 4 captive screws and tighten each screw to 8 in-lb (0.9 N·m) of torque.
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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 align to holes in the chassis. The 2 sets of rails on the top of the fan tray align to 2 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 three to six fabric modules depending on the requirements of the line cards that are installed in the chassis.



- Note** If you are downgrading the operating system, you must ensure both of the following:
- The new version of software supports the fabric modules and line cards, which are installed in the same switch.
 - The fabric modules that are installed in the switch, support the line cards that are installed in the same switch.

The fabric modules must be installed in specific slots as follows (installing fabric modules in other slots can cause a module mismatch condition):

- For three modules, they must be in slots FM 2, FM 4, and FM 6.
- For four modules, they must be in slots FM2, FM 3, FM 4, and FM 6.
- For five modules, they must be in Slots FM 2, FM 3, FM 4, FM 5, and FM 6.
- For six modules, they are in slots FM 1, FM 2, FM 3, FM 4, FM 5, and FM 6

You can replace a fabric module while other fabric modules are operating by removing the fan tray in front of the fabric module. Remove the fabric module, then install the new fabric module, and replace the fan tray over the installed 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 reinstall that fan tray within three minutes. This action avoids the possibility of having the switch overheat and shut down.

**Caution**

If you remove more than one fan tray at a time, the switch shuts down if you do not reinstall the extra missing fan trays within two minutes. The shutdown can occur earlier if the switch over heats.

Removing a Fabric Module

Before you begin

- 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.
- Remove the fan tray that covers the fabric module that you are removing.

Step 1

If you are replacing a fabric module, open the packaging for the new module and inspect it for damage.

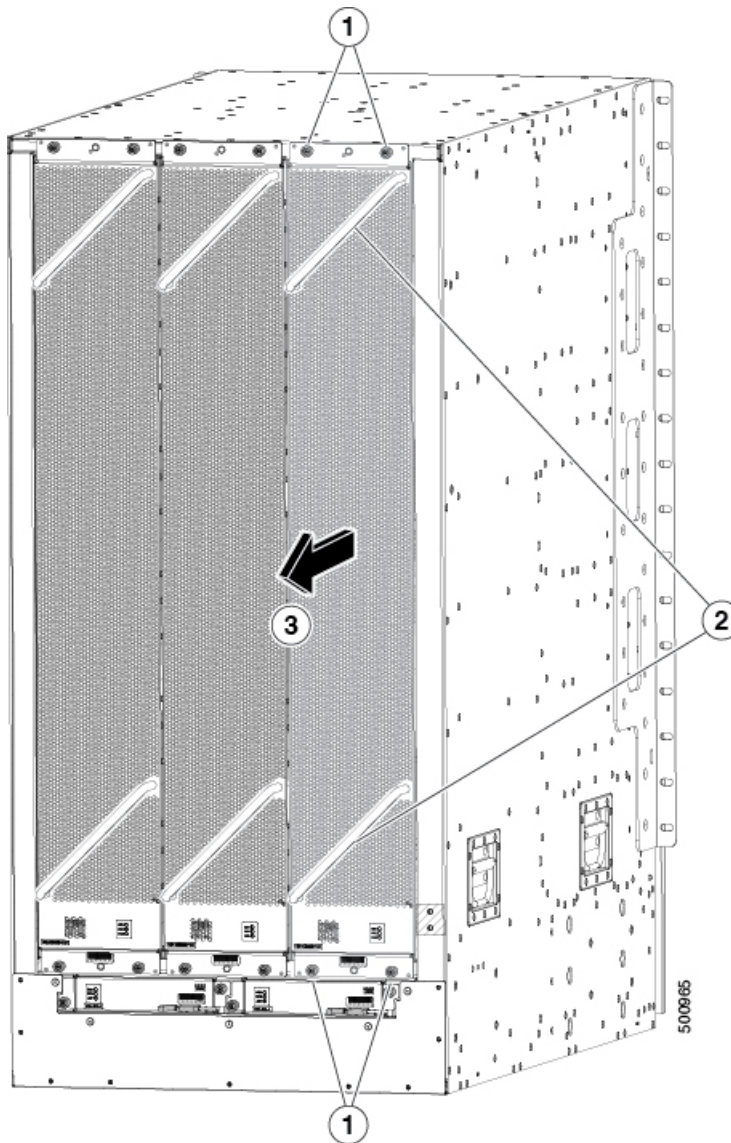
If the module is damaged, alert the Technical Assistance Center (TAC) and stop this replacement process until you have an undamaged module to install.

Step 2

Remove the fan tray that covers the fabric module by following these steps:

- a) Unscrew the four captive screws on the front of the fan tray until each screw is free of the chassis. See Callout 1 in the following figure.

Removing a Fabric Module



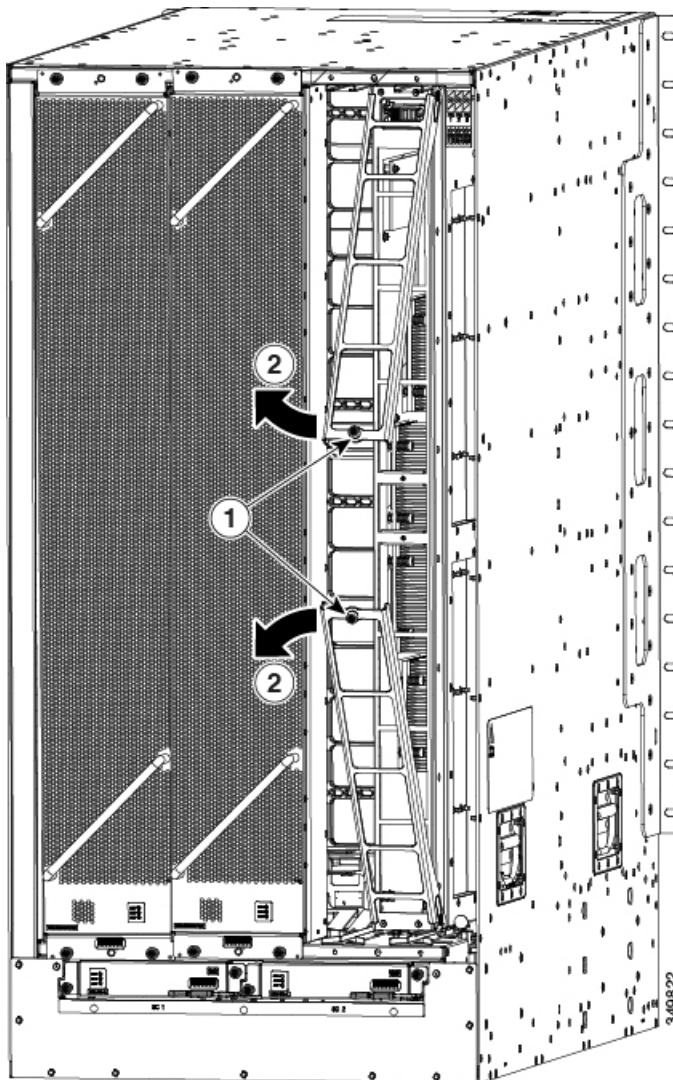
1	Unscrew 4 captive screws (2 at the top of the module and 2 at the bottom of the module).	3	Pull on the fan tray to slide it out of the chassis. Set the fan tray on an antistatic surface.
2	Hold the 2 fan tray handles with both hands.		

- b) Hold both handles on the front of the fan tray with both of your hands and pull the fan tray out of the slot.
- c) Set the fan tray on antistatic material or inside an antistatic bag.

Step 3 To prevent a loss of packets during operations, shut down the fabric module as follows:

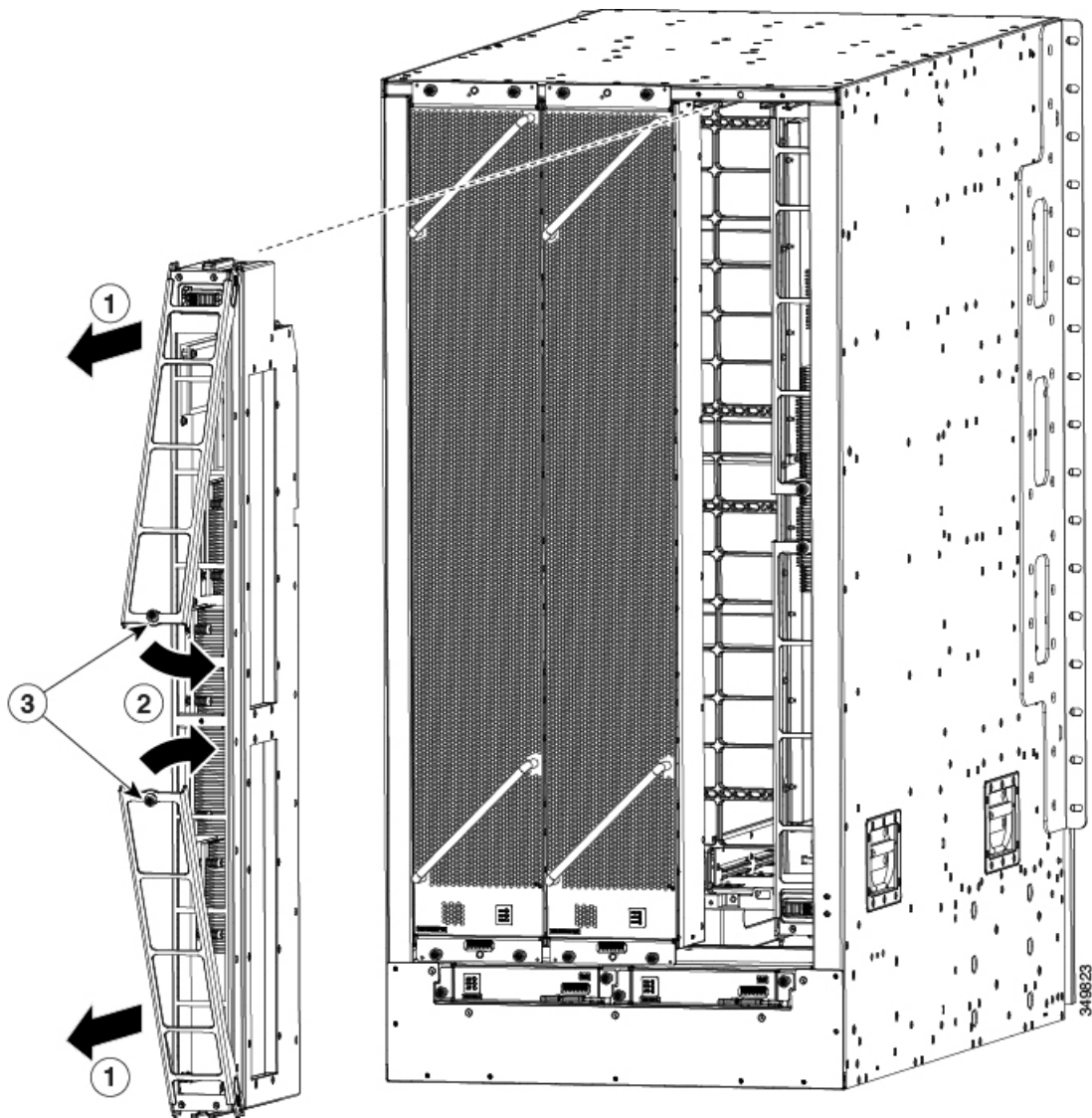
Step 4 Remove the fabric module that you are replacing by following these steps:

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



1	Unscrew 2 captive screws (1 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.



1	Pull on both handles to remove the fabric module from the chassis.	3	Screw in the 2 captive screws (1 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.		

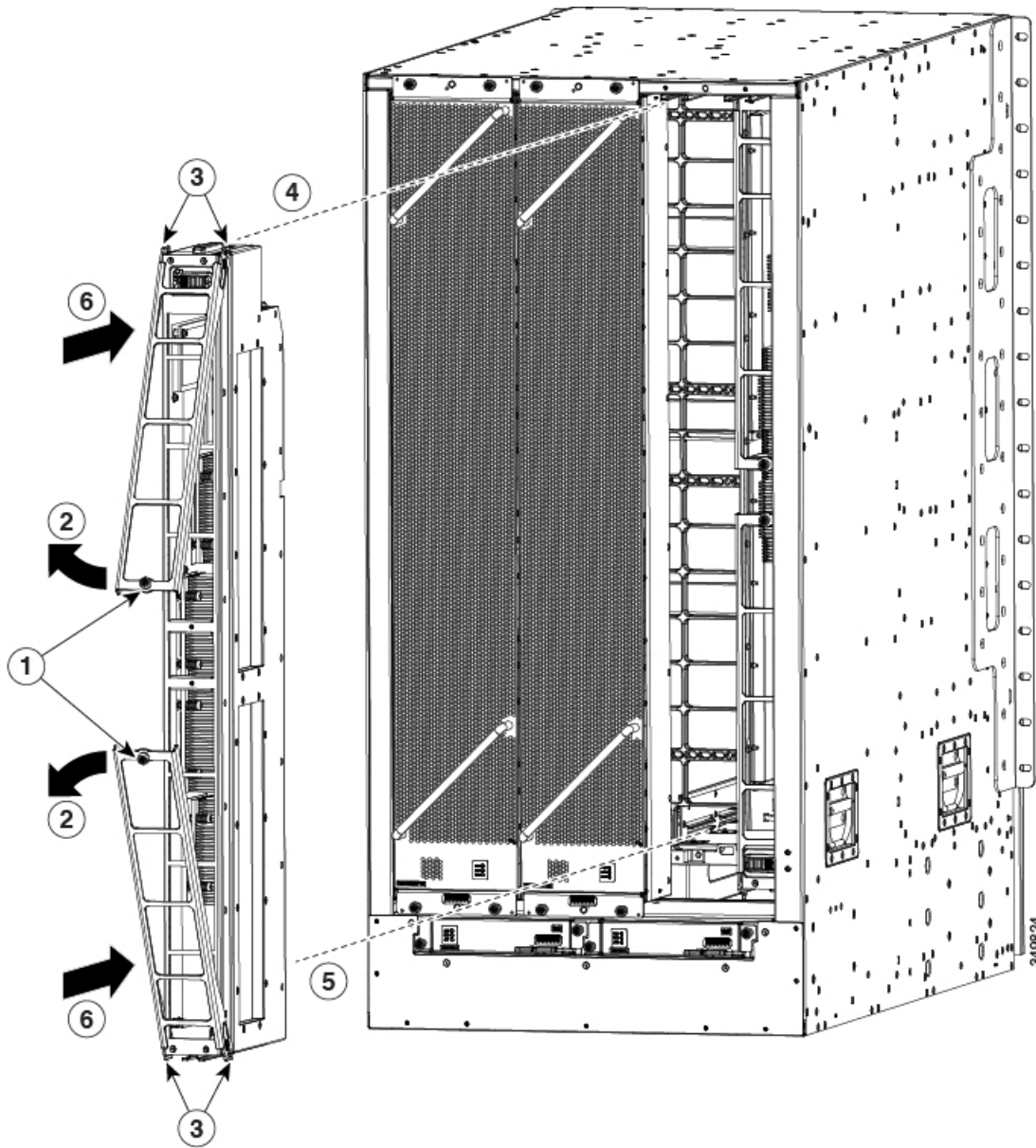
- d) Rotate both handles back to the front of the module until they click in place. Fasten each handle to the module using the captive screw on the back of the handle. Tighten the screw to 8 in-lb (0.9 N·m) of torque. See Callouts 2 and 3 in the previous figure.
- e) Place one hand under the fabric module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

Installing a Fabric Module

Before you begin

- 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.
- Be sure that you are replacing a fabric module with the same type of fabric module. All the fabric modules that are installed in the switch must be the same type.

-
- 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 rotate into the module so that the module can slide fully into the slot. See Callout 3 of the following figure.



1	Unscrew 2 captive screws (1 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. Make sure that the guide bar on the bottom of the module goes into the module guide at the bottom of the slot.

Be sure that you are installing the fabric module in a supported fabric module slot. The supported fabric module slots differ depending on the number of fabric modules that are installed in the switch as follows:

- For three modules, they must be in slots FM 2, FM 4, and FM 6
- For four modules, they must be in slots FM2, FM 3, FM 4, and FM 6
- For five modules, they must be in Slots FM 2, FM 3, FM 4, FM 5, and FM 6.
- For six modules, they are in slots FM 1, FM 2, FM 3, FM 4, FM 5, and FM 6

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 as follows:

a) On the menu bar of the APIC GUI, choose FABRIC > INVENTORY.

Note If you have already navigated to the fabric module, go to step 7c.

b) In the Navigation pane, navigate to the fabric module as follows:

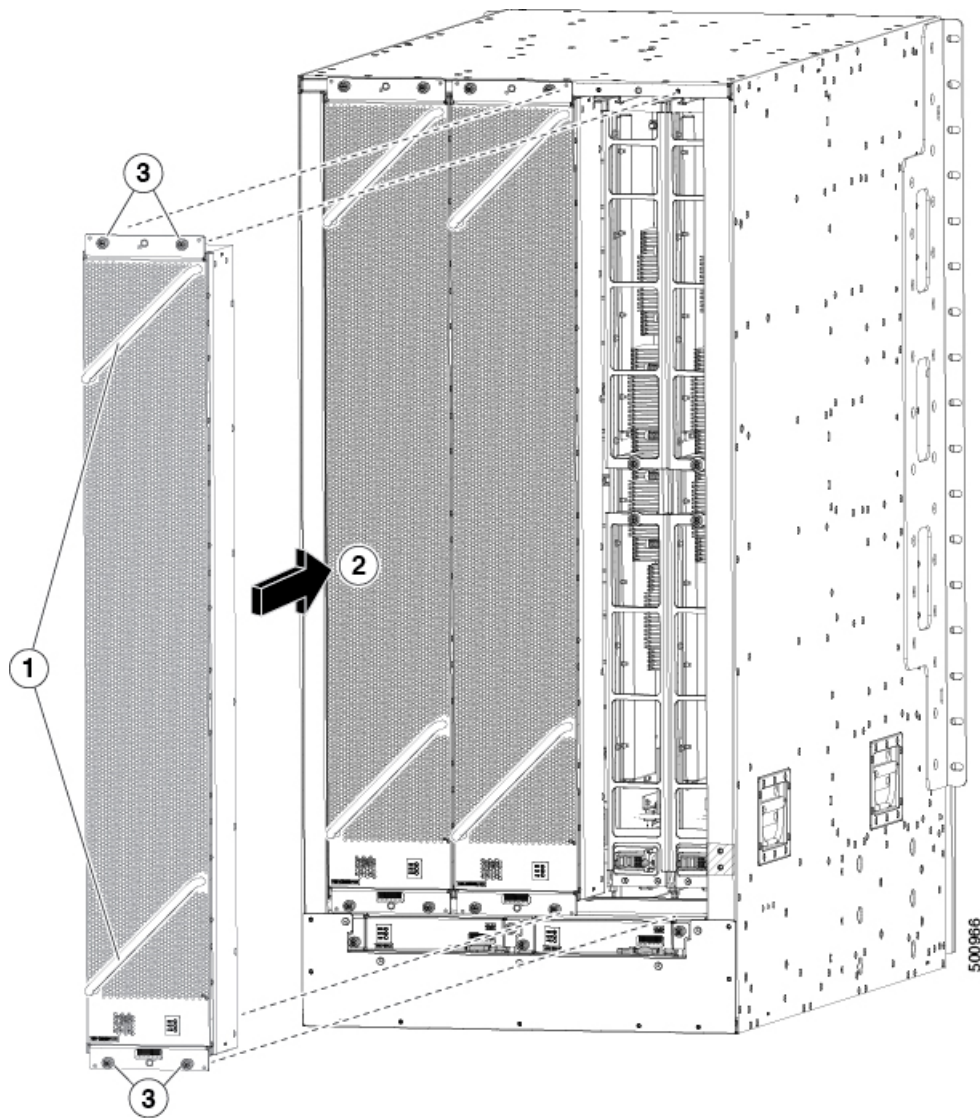
1. Expand the appropriate Pod.
2. Expand the appropriate spine.
3. Expand Chassis.
4. Expand Fabric Modules.
5. Choose the appropriate fabric slot.

c) On the upper right corner of the Properties screen, choose Actions > Enable.

d) Verify that the Fabric LED for the slot that you specified turns on.

Step 8 Reinstall the fan module over the replaced fabric module by following these steps:

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



1	Hold the 2 fan tray handles with both hands.	3	Screw in 4 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 align to holes in the chassis. The 2 sets of rails on the top of the fan tray align to 2 sets of tracks on the top of the open slot. Slide the fan tray all the way into the slot.		

- b) Position the fan tray with its rear (the side with the electrical connectors) at the opening for the fan tray slot in the chassis.
- c) 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.
- d) 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.

- e) 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.
- f) Verify that the fan tray and fabric module STATUS LEDs (on the fan tray) turn on and become green.

Installing or Replacing Power Supplies

The number of 3-kW and 3.15-kW power supplies that you install depends on the power requirements of the switch. It also depends on the power mode that you are using. To determine the power requirements of the switch, see the [Power Requirements for Switch Modules](#) section.

If you are using only one power source for the combined mode or $n+1$ 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 the $n+n$ redundancy mode, you must connect the power supplies in to one power source and the power supplies in slots 6 through 10 to the other power source. With $n+n$ redundancy mode, divide the power supplies evenly between the first half of the slots and the last half of the slots. 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.

You can install or replace any of the following Cisco Nexus 9500 Series power supplies in this switch:

- 3-kW AC Power Supply
- 3-kW Universal AC/DC Power Supply
- 3.15-kW Dual Input Universal AC/DC Power Supply
- 3-kW DC Power Supply

Installing or Replacing a 3-kW AC Power Supply

Before you begin

- The AC power source must be installed within reach of the power cables.
- The AC power source meets the power specifications that the switch requires.

- There are one or two AC power sources available. If using $n+n$ 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.

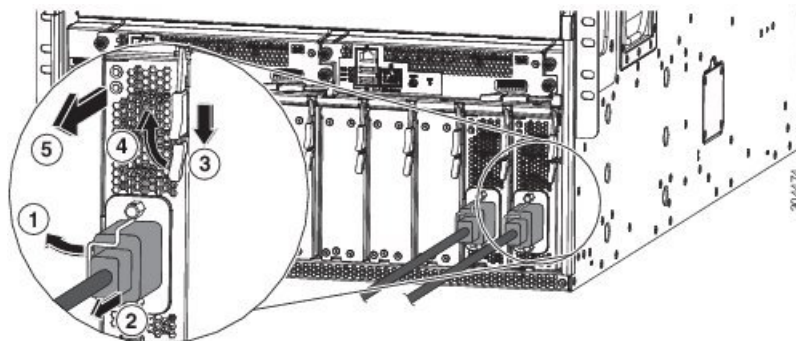
If the module is damaged, contact the Technical Assistance Center (TAC).

Step 2 If you are installing the module in an empty slot, remove the blank filler plate that is already in that slot. Unscrew its captive screws and pull it out of the slot. If you are using the combined power mode or $n+1$ redundancy, you can use any power supply slot in the chassis. If you are using $n+n$ redundancy mode, you must be sure that you are inserting the power supply in a slot that is used for the desired power supply (the power supplies in slots 1 through 5 must be connected to one power source and the power supplies in slots 6 through 10 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:

- Disconnect the power cable from the power supply and verify that the output and input LEDs turn off.
- 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.



1	Rotate the cable retention clip away from 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.		

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

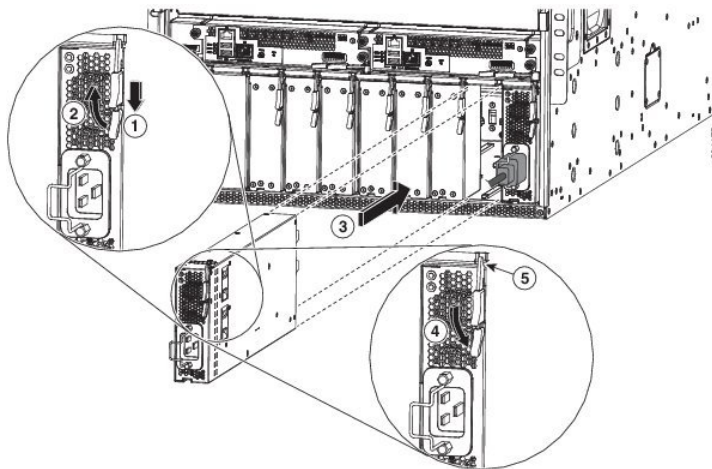
Step 4 To install the new power supply, follow these steps:

- 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. That way 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 is 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. Do this while pushing the power supply all the way into the chassis. See the following figure.



1	Slide and hold the middle handle on the ejector lever toward the end of the lever.	4	Rotate the lever toward the front of the module.
2	Fully rotate the release lever away from the front of the module.	5	Make sure that the other end of the lever grabs the front of the chassis to push the module onto the connectors inside the slot.
3	Slide the power supply into the open power supply slot in the chassis until it stops. The front of the module is about 0.25 inches (0.6 cm) in front of the chassis.		

- 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 will 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 will be even with the surface of the chassis.
- 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 $n+1$ redundancy mode, you can connect the power cable to as few or as many power sources/grids as you like.
 - If you are using the $n+n$ 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 5 must be connected to one power source and the power cables in slots 6 through 10 must be connected to another power source.

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

Installing or Replacing a 3-kW Universal AC/DC Power Supply

Before you begin

- The power source must be installed within reach of the power cables.
- The power source must meet the power specifications that the switch requires.
- There are one or two power sources available. If using $n+n$ 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 Universal AC/DC 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. Unscrew its captive screw and pull it out of the slot. If you are using the combined power mode or $n+1$ redundancy, you can use any power supply slot in the chassis. If you are using $n+n$ redundancy mode, you must be sure that you are inserting the power supply in a slot that is used for the desired power supply (the power supplies in slots 1 through 5 must be connected to one power source and the power supplies in slots 6 through 10 must be connected to the other power source). Go to Step 4.

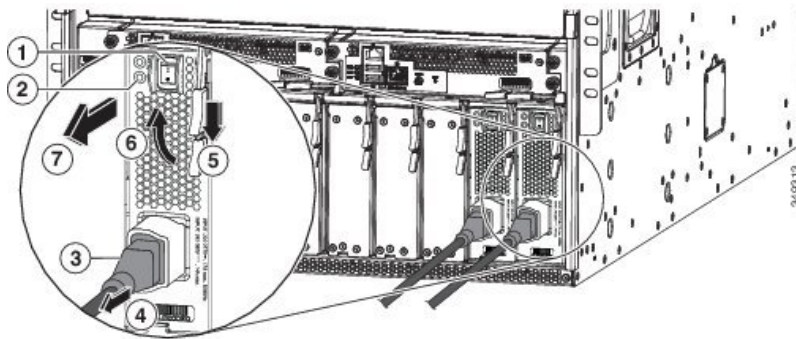
Step 3 If you are replacing a power supply that is currently in the chassis, remove the existing module from the chassis by following these steps:

a) Turn off the power to the power supply that you are replacing as follows:

1. Shut off the power supply by setting its power switch to 0.
2. If the power supply is connected to a DC circuit, shut off the circuit at the circuit breaker.
3. Verify that the OK LED has turned off (indicates that there is no power going to the power supply).

Note If the FAULT LED is on and the color is amber, that indicates that the power source connection has been broken.

4. Remove the power cable plug from the power supply receptacle.



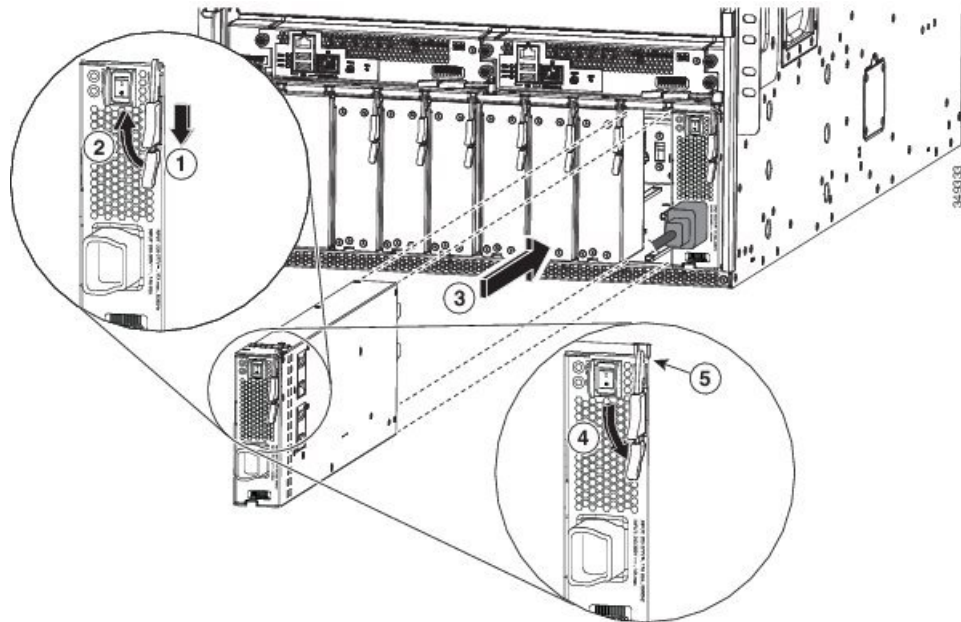
1	Turn off the power supply (and circuit breaker for a DC circuit).	4	Rotate the release lever toward the front of the power supply.
2	Verify that the OK LED turns off.	6	Rotate the release lever away from the power supply.
3	Press and hold the release button on the plug.	7	Pull the power supply out of the chassis.
4	Pull the power cable plug out of the power supply receptacle.		

- b) Slide the middle of the ejector lever down to the end of the lever and rotate the lever away from the chassis. The power supply unlocks from the chassis and moves out slightly.
- 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) If you are using a DC power source, ensure that the circuit is turned off at the circuit breaker.
- b) Hold the front of the power supply 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 into the slot until the front of the module stops about 0.25 inches (0.6 cm) in front of the module.
- e) Slide the handle on the middle of the power supply release lever toward the end of the module 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.



1	Slide and hold the middle handle next to the outer handle.	4	Rotate the lever toward the front of the module.
2	Fully rotate the release lever away from the front of the module.	5	Make sure that the other end of the lever grabs the front of the chassis to push the module onto the connectors inside the slot.
3	Slide the power supply into the open power supply slot in the chassis until it stops. The front of the module is about 0.25 inches (0.6 cm) in front of the chassis.		

- f) Carefully rotate the ejector lever toward the front of the power supply and be sure that the other end of the lever grabs the chassis. This pushes the module onto its connectors inside the slot.

The lever will 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 will be even with the surface of the chassis.

- g) Attach the power cable to the power receptacle on the power supply.

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

- If you are using the combined power mode or the $n+1$ redundancy mode, you can 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 $n+n$ 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 5 must be connected to one power source and the power cables in slots 6 through 10 must be connected to another power source.

- i) If you connected the power supply to a DC power source do the following:

1. Turn on the circuit breaker for the DC power source.
2. Turn on the power supply by setting the power switch to on (1).

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

Installing or Replacing a 3.15-kW Dual Input Universal AC/DC Power Supply

The HVAC/HVDC power supply (N9K-PUV2-3000W-B) has two redundant input power lines. It can provide power output at 3.15KW with either one or two input power lines operating. The HVAC/HVDC power supply provides $n+n$ or $n+x$ line redundancy mode in a single power supply for the Cisco Nexus 9500 Series switches.

The HVAC/HVDC power supply accepts 200–240VAC or 240/380VDC input power.

If you are not using power redundancy or are using $n+1$ power redundancy, you can connect all the power supplies in the chassis to the same power grid. If you are using $n+n$ power redundancy, connect one set of the power supply inputs to one power grid and the other set of the power supply inputs to another power grid. For example, connect grid A to the receptacles closest to the power switch on the power supplies, and connect grid B to the receptacles furthest from the power switch on the power supplies.



Note You can have a mix of AC power supplies and HVAC/HVDC power supplies in a chassis.

Before you begin

- The AC or DC power source must be turned off at its circuit breaker.
- The power switch on the power supply must be turned off (power switch set to 0).
- The AC power sources are rated as follows:
 - For North American installations—20A with 200-240V circuits.
 - For international installations—size the circuits by local and national standards.

Step 1 Open the packaging for the new 3-kW Universal AC/DC power supply and inspect the module for damage.

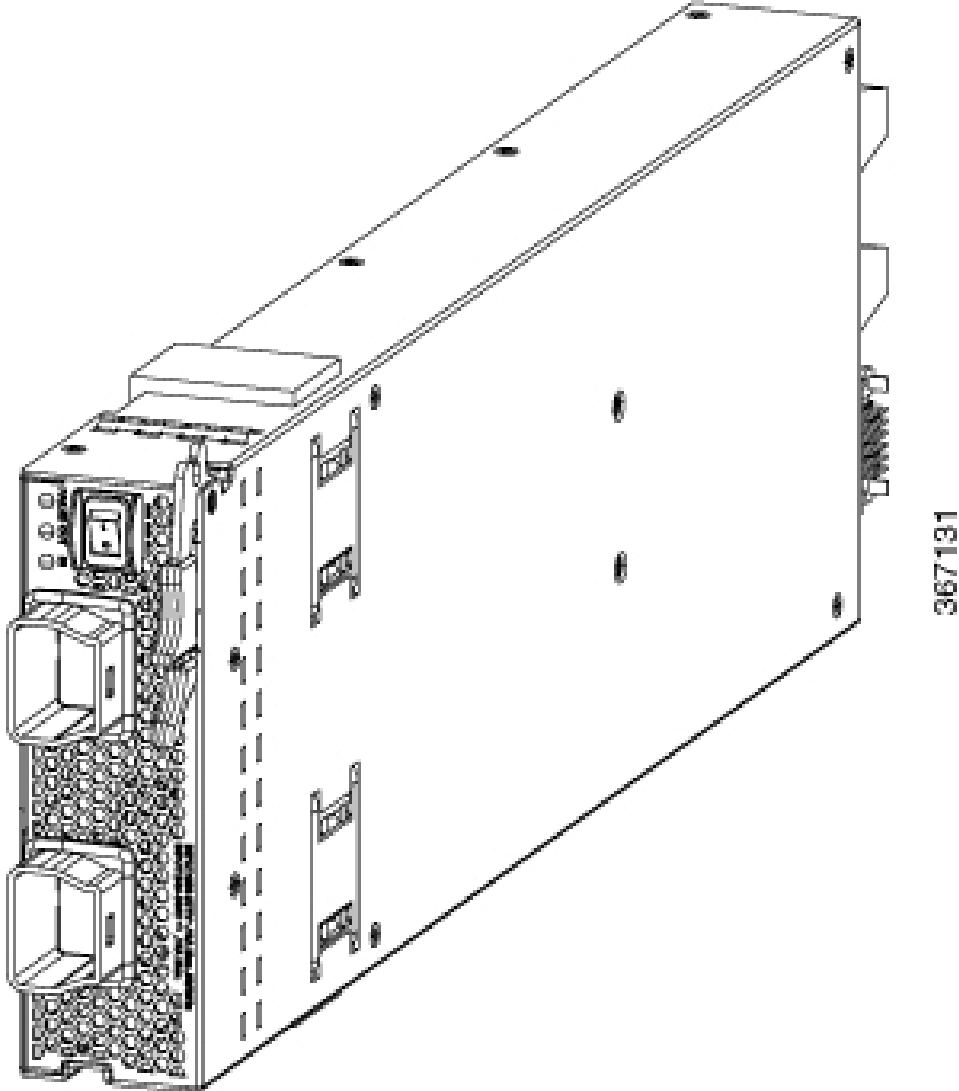
If the module is damaged, contact the Technical Assistance Center (TAC).

Step 2 For AC input, connect an AC power cable to the AC power source.

Step 3 For DC input, connect a Saf-D-Grid/Saf-D-Grid DC cable to a Saf-D-Grid receptacle, otherwise:

- a) Connect the ground terminal ring on the power cable to the ground terminal on the DC power source. Secure it in place with a nut tightened to the appropriate torque setting for the terminal post.
- b) Connect the negative terminal ring on the power cable to the negative (-) terminal on the DC power source. Secure it in place with a nut tightened to the appropriate torque setting for the terminal post.
- c) Connect the positive terminal ring on the power cable to the positive (+) terminal on the DC power source. Secure it in place with a nut tightened to the appropriate torque setting for the terminal post.

Step 4 Connect the Saf-D-Grid connector on the other end of the power cable to the Saf-D-Grid receptacle on the power supply.



Step 5 Turn on the circuit breaker for the DC power source circuit.

Step 6 Turn on the power supply by pressing its power switch to on.

Step 7 Verify that the OUT LED turns on and becomes green.

Note If you use both inputs, the IN LED is green. If you use only one input, the IN LED is blinking green.

Installing or Replacing a 3-kW DC Power Supply

Before you begin

- The power source must be installed within reach of the power cables.

- The power source must meet the power specifications that the switch requires.
- There are one or two power sources available. If using $n+n$ redundancy, there must be two power sources available. Otherwise, only one power source is required.
- Prepare an antistatic surface or antistatic bag for the power supply that you are removing.

Step 1 Open the packaging for the new 3-kW DC 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. Do this action by unscrewing its captive screw and pulling it out of the slot.

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) Turn off the power to the power supply that you are replacing as follows:

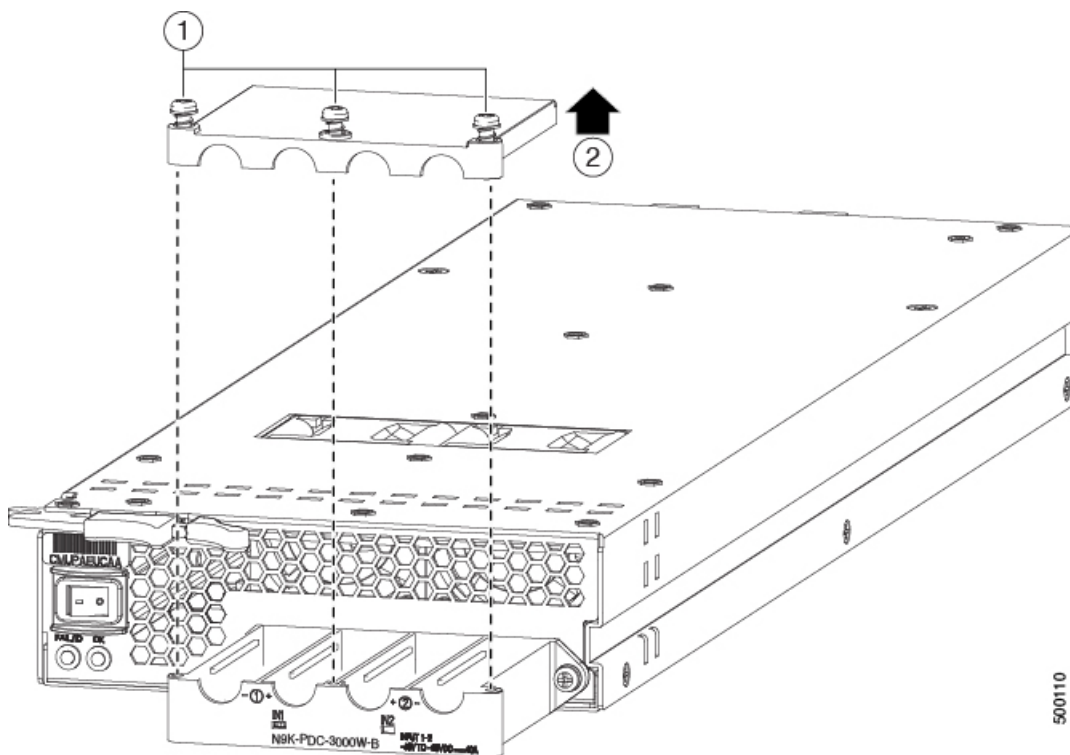
1. Shut off the power supply by setting its power switch to 0.
2. Shut off the power from the power source by turning off the circuit breaker for each of the two input lines to the power supply.

Verify that the LEDs on the power supply turn off.

b) Disconnect the power cables from the power supply as follows:

1. Remove the three screws on the safety cover for the terminal box that is located on the front of the power supply. Then pull the cover off the terminal box as shown in the following figure.

Note The terminal box has four slots for four power terminals (ordered as negative [-], positive [+], positive [+], and negative [-]). Each terminal has two nuts that you use to fasten a power cable to the terminal.



1	Remove 3 screws from the safety cover.	2	Remove the cover.
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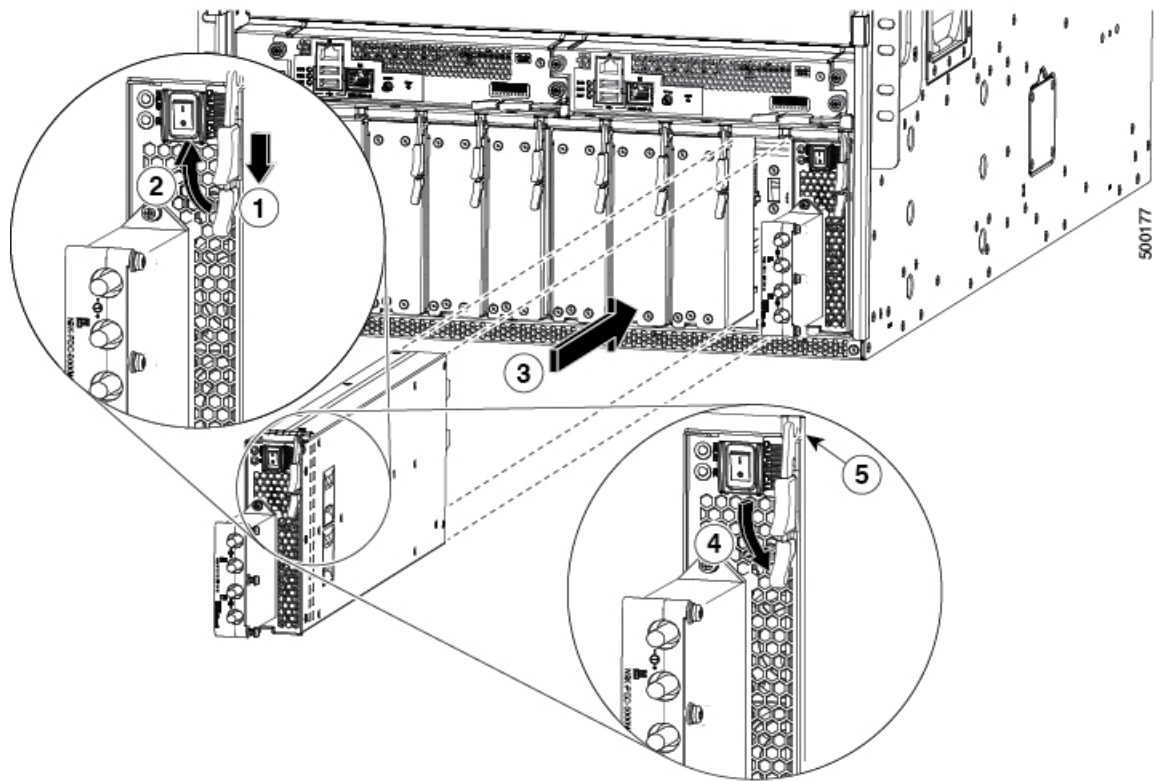
2. Unscrew the two nuts holding each of the four cables to the terminal box. Remove the cables and replace the nuts on the two posts in each of the slots.
 3. Replace the safety cover on the terminal box and secure it in place with three screws.
- c) Remove the power supply from the chassis as follows:
1. Slide the middle of the ejector lever toward the end of the lever and rotate the lever away from the chassis. The power supply unlocks from the chassis and moves out slightly.
 2. Use one of your hands to hold the front of the power supply and place your other hand under the power supply to support its weight.
 3. Pull the module out of the slot and place it on an antistatic surface or inside an antistatic bag.

Step 4 If you are not installing a replacement power supply, cover the empty power supply slot with a blank module.

Step 5 If you are installing a replacement power supply, install, connect, and power up the new power supply as follows:

- a) Install the power supply as follows:
1. Hold the front of the power supply with one hand and place your other hand under the module to support its weight.
 2. Turn the power supply 90 degrees so that the release lever is on the upper right front end of the module. Position and orient the other end of the module at the open power supply slot in the chassis.

- Slide the handle on the middle of the release lever toward the end of the lever and rotate the lever away from the front of the power supply. Push the power supply all the way into the slot. See the following figure.



1	Slide and hold the middle handle next to the outer handle.	4	Rotate the lever toward the front of the module.
2	Fully rotate the release lever away from the front of the module.	5	Make sure that the other end of the lever grabs the front of the chassis to push the module onto the connectors inside the slot.
3	Slide the power supply into the open power supply slot in the chassis until it stops. The front of the module is 0.25 inches (0.6 cm) in front of the chassis.		

- Slide the power supply gently into the slot until it stops with the front of the module even with the front of the chassis.

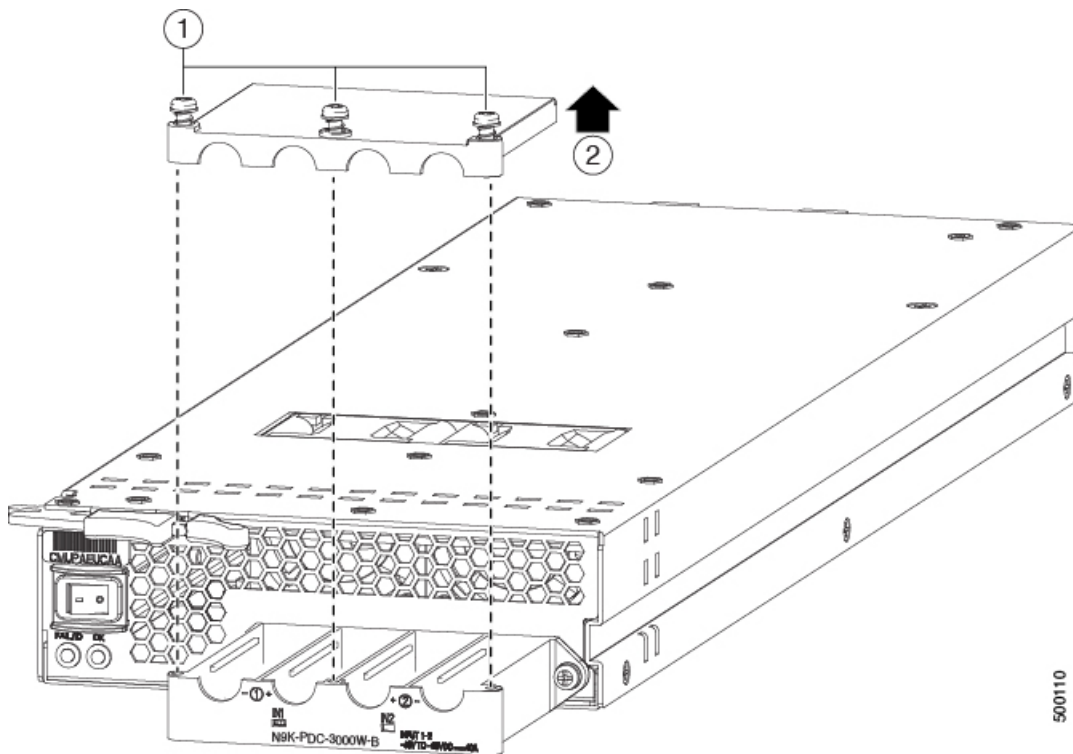
If the face of the module is about 0.25 inches (0.6 cm) in front of the module, slide the middle handle on the release lever toward the end of the lever and rotate the lever away from the power supply module. Then gently push the module all the way into the slot.

- 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 clicks 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 is even with the surface of the chassis.

b) Connect the power cables to the power supply as follows:

1. Verify that the circuit breakers for both input lines from the DC power source are turned off.
2. Use a torque screwdriver to unscrew three screws on the cover for the terminal box that is located on the front of the power supply. Then lift off the cover as shown in the following figure.



1	Remove 3 screws from the safety cover.	2	Remove the cover.
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Note The terminal box has four slots for four power terminals (ordered as negative [-], positive [+], positive [+], and negative [-]). Each terminal has two nuts that you use to fasten a power cable to the terminal.

3. Remove the two nuts from each terminal post in each slot of the terminal box.
4. Place each of the lugs for the two positive cables on the terminal posts for the positive slots (two middle slots) of the terminal box and fasten each lug using two nuts. Tightened the nuts to 40 in-lb (4.5 N·m) of torque.
5. Place each of the lugs for the two negative cables on the terminal posts for the negative slots (two side slots) of the terminal box and fasten each lug using two nuts. Tightened the nuts to 40 in-lb (4.5 N·m) of torque.
6. Replace the safety cover on the terminal box and fasten it in place using its three screws.

c) Power up the power supply as follows:

1. Turn on the power source circuit breaker for both input lines.

Verify that the Input 1 (IN1) and Input 2 (IN2) LEDs light up on the power supply.

2. Turn the power switch on the power supply to ON (labeled 1 on the power supply).
The LEDs flashes and then the OK LED turns on (green) in addition to the Input LEDs.
-

What to do next

You are ready to connect the switch to the network.



APPENDIX **A**

System Specifications

- [Environmental Specifications, on page 85](#)
- [Switch Dimensions, on page 85](#)
- [Weights for the Chassis, Modules, Fan Trays, and Power Supplies, on page 86](#)
- [Power Specifications, on page 87](#)

Environmental Specifications

Environment		Specification
Temperature	Ambient operating temperature	32 to 104°F (0 to 40°C)
	Ambient nonoperating	−40 to 158°F (−40 to 70°C)
Relative humidity	Nonoperating	5 to 95%
	Operating	5 to 90%
Altitude	Operating	0 to 13,123 feet (0 to 4,000 meters)

Switch Dimensions

Chassis or Module	Width	Depth	Height
Cisco Nexus 9516 chassis	17.5 inches (44.5 cm)	31.76 inches (80.67 cm) for chassis and handles	36.70 inches (93.41 cm) (21 RU)
Supervisor modules	Without mounting brackets: 7.0 inches (17.78 cm) With mounting brackets: 8.0 inches (20.32 cm)	Inside chassis: 20.67 inches (52.5 cm) Ejector levers outside chassis: 0.75 inches (1.9 cm)	1.75 inches (4.4 cm)

Chassis or Module	Width	Depth	Height
System controller modules	Without mounting brackets: 6.81 inches (17.3 cm) With mounting brackets: 7.81 inches (19.84 cm)	Inside chassis: 10.74 inches (27.28 cm) Ejector levers outside chassis: 0.75 inches (1.9 cm)	1.42 inches (3.61 cm)
Line cards	17.0 inches (43.18 cm)	Inside chassis: 16.5 inches (41.91 cm) Ejector levers outside chassis: 2.5 inches (6.35 cm)	1.75 inches (4.4 cm)
Fabric modules	2.46 inches (6.25 cm)	11.7 inches (29.72 cm)	30.4 inches (77.22 cm)
Fan trays	5.04 inches (12.81 cm)	3.87 inches (9.83 cm)	Without mounting brackets: 30.5 inches (77.47 cm) With mounting brackets: 32.08 inches (81.48 cm)
Power supply	5.25 inches (13.33 cm)	Inside chassis: 17.75 inches (44.96 cm) Ejector levers outside chassis: 0.75 inches (1.9 cm)	1.75 inches (4.4 cm)

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

Component	Weight per Unit
Cisco Nexus 9516 Chassis (N9K-C9516)	150.0 lb (68.2 kg)
Supervisor Modules	—
– Supervisor A module (N9K-SUP-A)	4.84 lb (2.2 kg)
– Supervisor A+ module (N9K-SUP-A+)	5.2 lb (2.37 kg)
– Supervisor B module (N9K-SUP-B)	6.0 lb (2.72 kg)
– Supervisor B+ module (N9K-SUP-B+)	5.3 lb (2.39 kg)
System Controller Modules (N9K-SC-A)	1.9 lb (0.9 kg)
Line cards that the N9K-C9516-FM fabric modules support	—

Component	Weight per Unit
– 36-port 40-Gigabit Ethernet QSFP+ ACI Spine line card (N9K-X9736PQ)	11.2 lb (5.08 kg)
Line cards that the N9K-C9516-FM-E2 fabric modules support	—
– 32-port 100-Gigabit Ethernet QSFP+ ACI Spine line card (N9K-X9732C-EX)	12.13 lb (5.5 kg)
– 36-port 100-Gigabit Ethernet QSFP28 ACI Spine line card (N9K-X9736C-FX)	14.6 lb (6.62 kg)
– 36-port 40-Gigabit Ethernet QSFP+ ACI Spine line card (N9K-X9736Q-FX)	14.6 lb (6.62 kg)
Fabric Modules	—
– 40-Gigabit N9K-C9516-FM fabric module	11.5 lb (5.2 kg)
– 100-Gigabit N9K-C9516-FM-E2 fabric module	20.3 lb (9.2 kg)
Fan Trays (N9K-C9516-FAN)	15.1 lb (6.84 kg)
Power Supplies	—
– 3-kW AC Power Supply (N9K-PAC-3000W-B)	6.2 lb (2.8 kg)
– 3-kW Universal AC/DC Power Supply (N9K-PUV-3000W-B)	5.9 lb (2.67 kg)
– 3.15-kW Dual Input Universal AC/DC Power Supply (N9K-PUV2-3000W-B)	5.9 lb (2.67 kg)
– 3-kW DC Power Supply (N9K-PDC-3000W-B)	6.4 lb (2.9 kg)

Power Specifications

Power specifications include the specifications for each type of power supply module.

Power Requirements for Switch Modules

Determine the number of power supplies required to operate all the modules in a switch by adding the maximum power amounts for each module in the switch. Then divide the sum by 3000 W. If there is a fractional amount in the result, add 1 to the result. For $n+1$ redundancy, add one more power supply. For $n+n$ redundancy, double the number of power supplies and provision for a second power source.

To determine the typical consumption, add the typical power amounts for each module in the switch.

Make sure that any new power supplies use the same type of power (AC or DC) as the rest of the power supplies in the switch. Do not use a mix of AC and DC power sources for a switch.

Maximum Power Available to the Switch

The maximum power available for operations depends on the input power from your power source. Also, 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 3: 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	12,000 W	9000 W	6000 W
	5	15,000 W	12,000 W	6000 W
	6	18,000 W	15,000 W	9000 W
	7	21,000 W	18,000 W	9000 W
	8	24,000 W	21,000 W	12,000 W
	9	27,000 W	24,000 W	12,000 W
	10	30,000 W	27,000 W	15,000 W

Power Supply Specifications

The following subtopics list the specifications for each power supply that this switch supports.

3000-W AC Power Supply Specifications

Property	Specification
Power	3000 W
Input Voltage	200 to 240 VAC
Frequency	50 to 60 Hz
Efficiency	90% or greater (20 to 100% load)
Redundancy Modes	Combined, $n+1$, and $n+n$
RoHS Compliance	Yes
Hot Swappable	Yes
Airflow Direction	Port-side intake airflow

3000-W Universal AC/DC Power Supply Specifications

Property	Specification
Power	3000 W

Property	Specification
Input Voltage	200 to 277 VAC or 240 to 380 VDC or
Frequency	47 to 63 Hz
Efficiency	90% or greater (20 to 100% load)
Redundancy Modes	Combined, $n+1$, and $n+n$
RoHS Compliance	Yes
Hot Swappable	Yes
Airflow Direction	Port-side intake airflow

3000-W Dual Input Universal AC/DC Power Supply Specifications

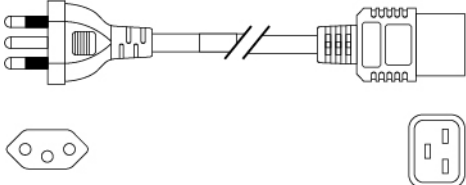
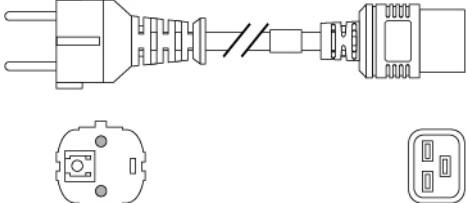
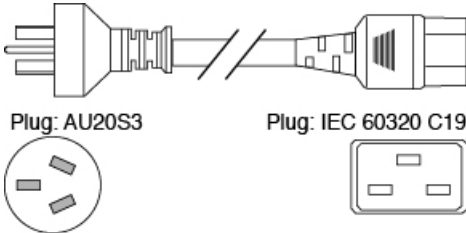
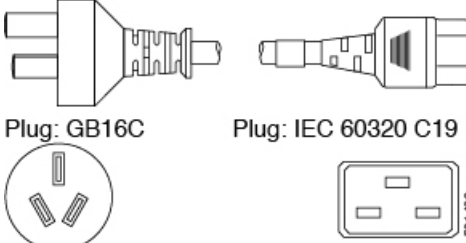
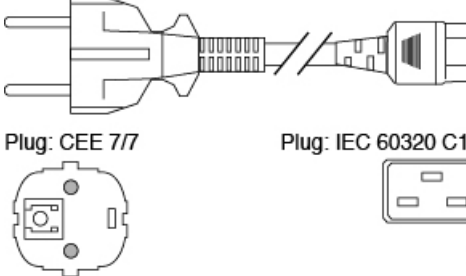
Property	Specification
Power	3150 W
Input Voltage	180 to 305 VAC or 192 to 400 VDC or
Frequency	50 to 60 Hz
Efficiency	90% or greater (20 to 100% load)
Redundancy Modes	Combined, $n+1$, and $n+n$
RoHS Compliance	Yes
Hot Swappable	Yes
Airflow Direction	Port-side intake airflow

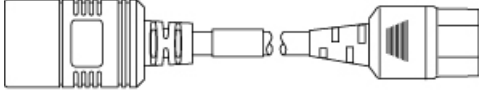

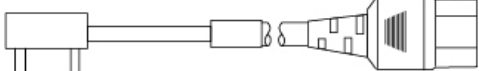





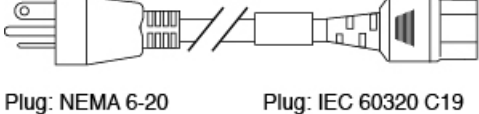

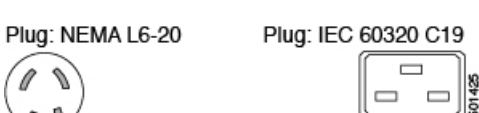

Power Cable Specifications

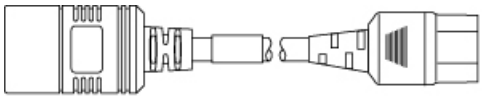


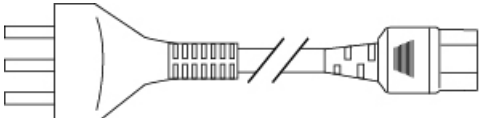

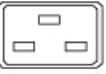

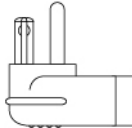




The following subtopics list the specifications for supported power cables.

3-kW AC Power Cable Specifications

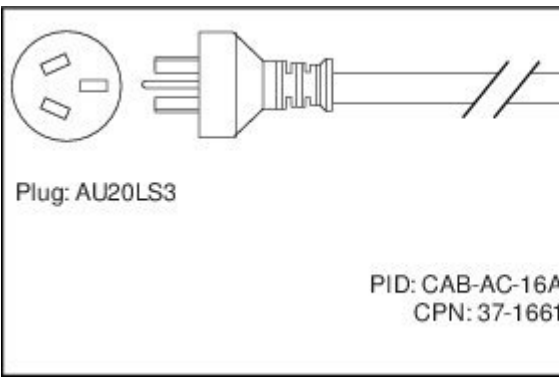
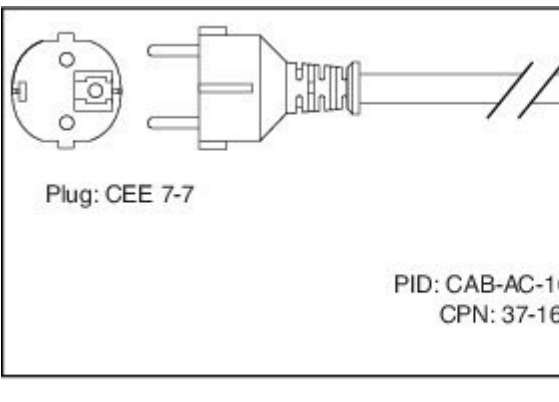
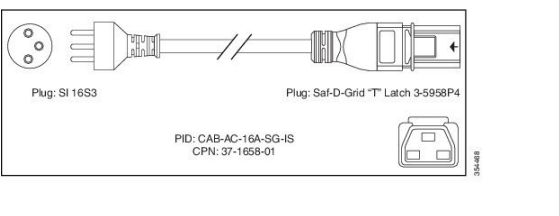
Locale	Power Cord Part Number	Cord Set Rating	Power Cord Illustration
Argentina	CAB-9K16A-ARG	16 A, 250 VAC	

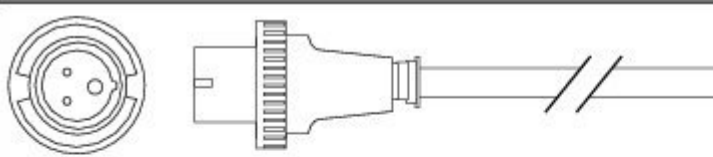
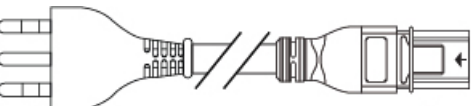


Locale	Power Cord Part Number	Cord Set Rating	Power Cord Illustration
Brazil	CAB-9K16A-BRZ	16 A, 250 VAC	 <p>307593</p>
Korea	CAB-9K16A-KOR	16 A, 250 VAC	 <p>307594</p>
South Africa	CAB-9K16A-SA	16 A, 250 VAC	TBD
Australia and New Zealand	CAB-AC-16A-AUS	16 A, 250 VAC	 <p>Plug: AU20S3 Plug: IEC 60320 C19</p> <p>301434</p>
Peoples Republic of China	CAB-AC-16A-CH	16 A, 250 VAC	 <p>Plug: GB16C Plug: IEC 60320 C19</p> <p>301426</p>
Continental Europe	CAB-AC-2500W-EU	16 A, 250 VAC	 <p>Plug: CEE 7/7 Plug: IEC 60320 C19</p> <p>301422</p>

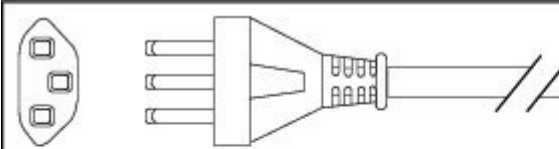




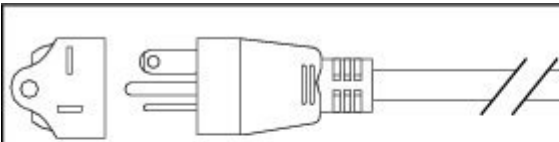
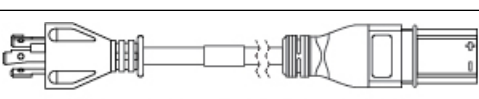

Locale	Power Cord Part Number	Cord Set Rating	Power Cord Illustration
India	CAB-C19-C20-IND	16 A, 250 VAC	 <p>Plug: IEC 60320 C20 Plug: IEC 60320 C19</p> 
India	PWR-CORD10-IND	16 A, 250 VAC	 <p>Plug: IS16A3 Plug: IEC 60320 C19</p> 
International	CAB-AC-2500W-INT	16 A, 250 VAC	 <p>Plug: IEC 309 Plug: IEC 60320 C19</p> 
Israel	CAB-AC-2500W-ISRL	16 A, 250 VAC	 <p>Plug: SI16S3 Plug: IEC 60320 C19</p> 
Japan and North America (nonlocking) 200-240 VAC operation	CAB-AC-2500W-US1	16 A, 250 VAC	 <p>Plug: NEMA 6-20 Plug: IEC 60320 C19</p> 
Japan and North America (locking) 200-240 VAC operation	CAB-AC-C6K-TWLK	16 A, 250 VAC	 <p>Plug: NEMA L6-20 Plug: IEC 60320 C19</p> 

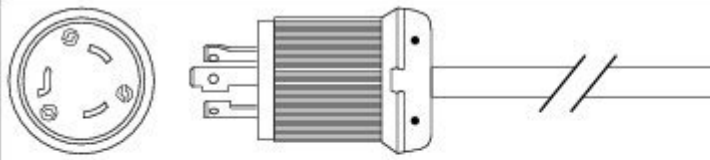
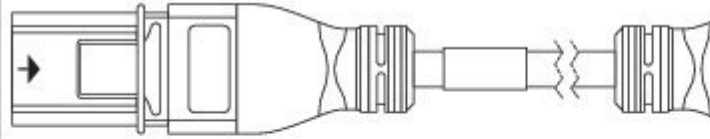

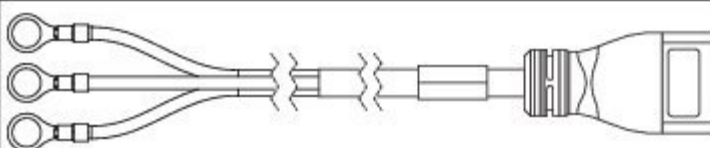



Locale	Power Cord Part Number	Cord Set Rating	Power Cord Illustration
Power distribution unit (PDU)	CAB-C19-CBN	16 A, 250 VAC	 <p>Plug: IEC 60320 C20 Plug: IEC 60320 C19</p>  
Switzerland	CAB-ACS-16	16 A, 250 VAC	 <p>Plug: SEV 5934-2 Type 23 Plug: IEC 60320 C19</p>  
Taiwan	CAB-AC-C19-TW	16 A, 250 VAC (IEC 60320 C19 to EL 218)	  
US	CAB-AC-STRT-C19US	16 A, 250 VAC (straight blade NEMA 6-20 plug)	  
All except Argentina, Brazil, and Japan	NO-PWR-CORD	No power cord is included with order.	N.A.

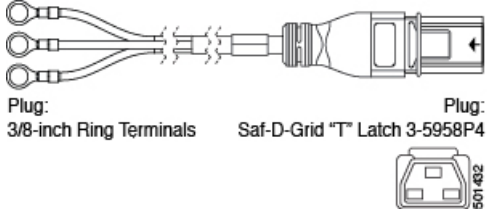
3-kW Universal AC/DC and 3-kW Dual Input Universal AC/DC Power Cable Specifications

Locale	Power Cord Part Number	Cord Set Rating	Power Cord Illustration
Australia and New Zealand	CAB-AC-16A-SG-AZ	16 A, 250 VAC (AU20LS3/Saf-D-Grid)	
	CAB-AC-16A-SG-EU	16A, 250 VAC	
Israel	CAB-AC-16A-SG-IS	16 A, 250 VAC	

Locale	Power Cord Part Number	Cord Set Rating	Power Cord Illustration
International/UK	CAB-AC-16A-SG-IN	16 A, 250 VAC	 <p data-bbox="971 472 1136 504">Plug: IEC60309</p> <p data-bbox="1334 575 1604 632">PID: CAB-AC-16A-SG-IN CPN: 37-1659-01</p>
Italy	CAB-AC-16A-SG-IT	16 A, 250 VAC	 <p data-bbox="906 892 1380 919">Plug: CEI 23-50 Saf-D-Grid "T" Latch 3-5958P4</p>  <p data-bbox="1328 867 1380 892">Plug:</p> <p data-bbox="1360 961 1380 1008">501808</p>
South Africa	CAB-AC-16A-SG-SA	16 A, 250 VAC	 <p data-bbox="987 1255 1071 1287">Plug: EL</p> <p data-bbox="1464 1255 1620 1287">Plug: Saf-D-Grid</p> <p data-bbox="1214 1346 1497 1402">PID: CAB-AC-16A-SG-SA CPN: 37-1647-01</p>

Locale	Power Cord Part Number	Cord Set Rating	Power Cord Illustration
Switzerland	CAB-AC-16A-SG-SW	16 A, 250 VAC	 <p data-bbox="980 474 1174 506">Plug: SEV 5934-2</p> <p data-bbox="1588 474 1624 506">Plug:</p> <p data-bbox="1338 569 1620 625">PID: CAB-AC-16A-SG-SW CPN: 37-1654-01</p>
North America	CAB-AC-20A-SG-C20	250 VAC 20 A	 <p data-bbox="943 783 1065 814">Plug: IEC C20</p> <p data-bbox="1094 783 1419 814">Plug: Saf-D-Grid "T" Latch 3-5958P4</p> 
North America	CAB-AC-20A-SG-US	16 A, 250 VAC	 <p data-bbox="943 1014 1065 1066">Plug: NEMA 5-20P</p> <p data-bbox="1117 1014 1419 1066">Saf-D-Grid "T" Latch 3-5958P4</p> 
North America (non locking) 200-240 VAC operation	CAB-AC-20A-SG-US2	250 VAC 20 A	 <p data-bbox="980 1350 1162 1381">Plug: NEMA 6-20</p> <p data-bbox="1588 1350 1624 1381">Plug:</p> <p data-bbox="1317 1444 1620 1501">PID: CAB-AC-20A-SG-US2 CPN: 37-1657-01</p>
North America	CAB-AC-20A-SG-US3	250 VAC 20 A	 <p data-bbox="992 1665 1357 1696">250 VAC 20A, twist lock, NEMA L6-20/Saf-D-Grid</p> 

Locale	Power Cord Part Number	Cord Set Rating	Power Cord Illustration
North America 277 VAC operation	CAB-AC-20A-SG-US4	277 VAC 20 A	 <p>Plug: NEMA L7-20P</p> <p>PID: CAB-AC-20A-SG-US4 CPN: 37-1645-1</p>
International, Saf-D-Grid/Saf-D-Grid	CAB-HV-25A-SG-IN1	400 VAC 20 A	 <p>Plug: Saf-D-Grid "T" Latch 3-5958P4</p>  <p>Plug: Saf-D-Grid</p> <p>PID: CAB-HV-25A-SG-IN1 CPN: 37-1642-01</p>
International, Ring Terminal source plug, Ring Terminal/Saf-D-Grid	CAB-HV-25A-SG-IN2	20A, 300 VAC/500 VDC	 <p>Plug: 3/8-inch Ring Terminals</p> <p>Plug: Saf-D-Grid "T" Latch</p> <p>PID: CAB-HV-25A-SG-IN2 CPN: 37-1640-01</p>
North America	CAB-HV-25A-SG-US1	277 VAC/ 240 VDC/ 380 VDC 25 A	 <p>Plug: Saf-D-Grid "T" Latch 3-5958P4</p> <p>Plug: Saf-D-Grid "T" Latch 3-5958P4</p>  

Locale	Power Cord Part Number	Cord Set Rating	Power Cord Illustration
North America	CAB-HV-25A-SG-US2	277 VAC/ 240 VDC/ 380 VDC 25 A	 <p>Plug: 3/8-inch Ring Terminals Saf-D-Grid "T" Latch 3-5958P4</p> <p>Plug: 501482</p>
All except Argentina, Brazil, and Japan	NO-PWR-CORD	No power cord included with order	N.A.

3-kW DC Power Supply Power Cord Specifications

Each 3-kW DC power supply requires four customer-supplied power cables (two negative cables and two positive cables). We recommend using six gauge cables. Cisco supplies 6-gauge lugs for connections to the power supply. You supply the connectors that are required to connect the cables to the DC power source.



APPENDIX **B**

LEDs

- [Chassis LEDs, on page 99](#)
- [System Controller LEDs, on page 100](#)
- [Supervisor Module LEDs, on page 100](#)
- [Fan Tray LEDs, on page 101](#)
- [Fabric Module LEDs, on page 102](#)
- [Line Card LEDs, on page 102](#)
- [Power Supply LEDs, on page 103](#)

Chassis LEDs

The chassis LEDs are located at the top of the front of the chassis. They indicate whether each module (supervisors, controllers, line cards, fabric modules, fan trays, and power supplies) is fully functional or have a fault condition. The following table describes the possible states for each of these LEDs.

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.
IOM	Green	Line cards (I/O modules) are all operational.
	Amber	Check Line Card LEDs, on page 102 for more information.
PSU	Green	Power supplies are all operational.
	Amber	Check the Power Supply LEDs for more information.

LED	Color	Status
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 the installed modules.
	Amber	Either of the following: <ul style="list-style-type: none"> • 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.

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 the major alarm threshold.
	Off	The module is not receiving power.
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.

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.

LED	Color	Status
STS	Green	This module is operational.
	Flashing amber	This module is booting up.
	Flashing red	Temperature exceeds the 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)	Flashing green	The module is transmitting or receiving.
	Off	The module is not transmitting or receiving.

Fan Tray LEDs

The fan tray LEDs are located on the lower right portion of the module. The following table describes the possible states for each of these LEDs.

Table 4: LEDs for Fan Tray N9K-C9516-FAN

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. Verify that the even numbered fabric slot (FM 2, FM 4, or FM 6) behind the fan tray has one of the following in order to power the fan tray: <ul style="list-style-type: none"> • Functioning fabric module (N9K-C9516-FM) • Fabric blank module with fan tray power connector (N9K-C9516-FM-Z)

LED	Color	Status
FAB	Green	The fabric modules behind this fan tray are operational.
	Amber	At least one fabric module behind this fan tray is not operating or there is not a fabric blank module with power connector (N9K-C9516-FM-Z) to provide power to the fan tray.
	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. The following table describes the possible states for each of these LEDs.

LED	Color	Status
BCN/top LED	Blue	The operator has activated this beacon (BCN) LED to identify this module in the chassis. Note When the operator activates the BCN/top LED, the BCN LED on the covering fan module also activates (lights).
	Off	This module is not being identified.
Status/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.

Line Card LEDs

The Beacon (BCN) and Status (STS) LEDs are located on the front, toward the left side of the module. The Link LED for each port is located either between the two rows of ports, or if there is a single row of ports, placed up/down between ports. Each of the Link LEDs is a triangle pointing to the port above or below the LED. The following table describes the possible states for each of these LEDs.

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.

LED	Color	Status
STS	Green	All diagnostics passed. This module is operational (normal initialization sequence).
	Flashing red	Indicates one of the following: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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 operator has disabled the port or is not initializing.
	Flashing orange	Beacon is enabled for the port. Or 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. The following table describes the possible states for each of these LEDs.

OK LED	FAIL or FAIL/ID LED	Status
Green	Off	Power supply is on and outputting power to the switch.
Flashing green	Off	Power supply is connected to an AC power source but not outputting power to the switch. The power supply may not be properly installed in the chassis.
Off	Off	Either all the installed power supplies are not receiving power or an uninstalled power supply is not receiving power.

OK LED	FAIL or FAIL/ID LED	Status
Off	Flashing amber	Power supply is operating but a warning condition has occurred—possibly one of the following conditions: <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Over voltage • Over current • Over temperature • Power supply fan failure



APPENDIX C

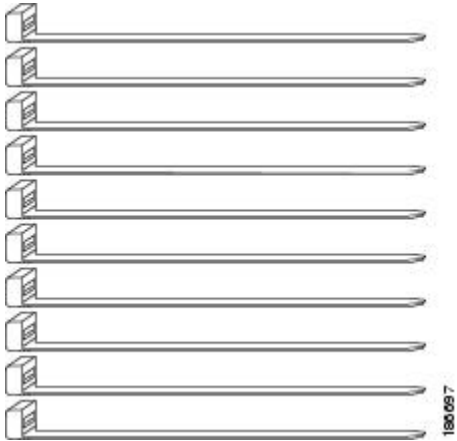
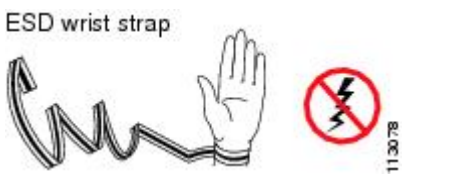
Additional Kits

- [Accessory Kit, on page 105](#)

Accessory Kit

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

Illustration	Description	Quantity
	3m-support rails kit 10-32 x 3/4 in. Phillips screws (20) and nuts (20) 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
	DB9F/RJ-45F PC terminal	1
	Ground lug kit <ul style="list-style-type: none"> • Two-hole lug (1) • M4 x 8-mm Phillips pan-head screws (2) 	1 kit

Illustration	Description	Quantity
	Cable tie, 8.5 inches (10)	1 set
	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
Not applicable	GR-1089 Installation and Caution Instructions	1



Note If you do not receive a part that is 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 may receive contents in your kit, such as documentation, hardware, and power cables.

The product shipment includes a power cord for each 3-kW AC or Universal AC/DC power supply. You supply a grounding cable (6 AWG recommended) for up to 45 A.

The shipped cables depend on your specification when placing an order. The available power cords are as follows:

- AC power supply cords
 - CAB-AC-16A-AUS—power cord, 250 VAC 16 A, C19, Australia
 - CAB-AC-16A-CH—power cord, 16 A, China
 - CAB-AC-2500W-EU—power cord, 250 VAC 16 A, Europe

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

- Universal AC/DC power supply cords
 - CAB-AC-20A-SG-C20—Jumper, 250 VAC 20 A, IEC C20/Saf-D-Grid, North America
 - CAB-HV-25A-SG-US1—power cord, 277 VAC/240 VDC/380 VDC 25 A, Saf-D-Grid/Saf-D-Grid, North America
 - CAB-HV-25A-SG-US2—power cord, 277 VAC/240 VDC/380 VDC 25 A, Ring Terminal/Saf-D-Grid, North America

