

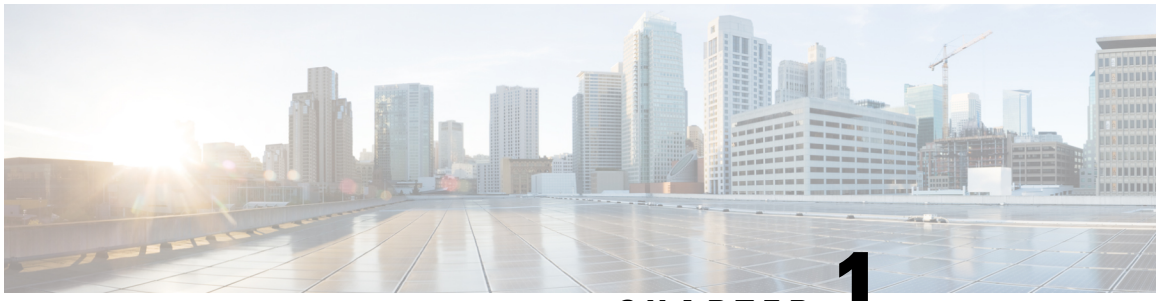
Cisco N93400LD-H1 ACI-Mode Switch Hardware Installation Guide

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CHAPTER 1

Overview

- Overview, on page 1

Overview

the Cisco N9K-C93400LD-H1 switch is a 1-rack unit (RU) top of rack (TOR) fixed-port switch designed for leaf-role, APIC deployment in data centers. This switch does not support spine role.

The software on this switch has 6.4T traffic-processing capability.

This switch includes the following ports:

- 48 x 50GE ZSFP downlink ports with full MACsec support
- 4 x 400G QSFP-DD uplink ports wth full MACsec support
- Management port RJ45
- Console port
- USB port
- Time of Day (TOD) port

Port Considerations

These are the port considerations:

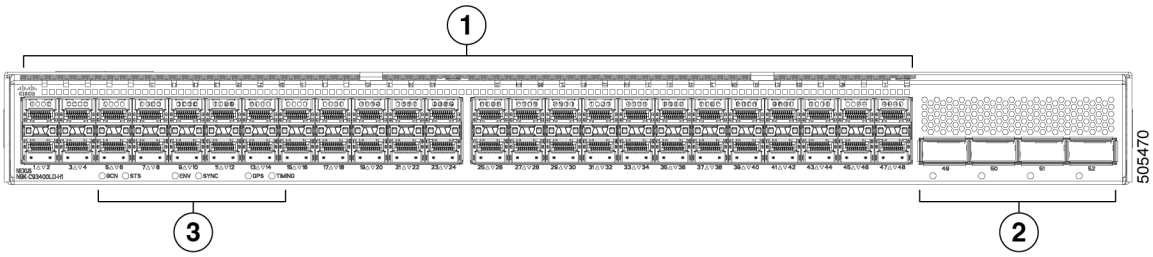
- This switch supports 50G, 25G, or 10G speeds
- 48 x 50G/25G/10G and 4 x 400G/100G

This switch includes these user-replaceable components:

- Fan modules (five) with these airflow choices:
  - Port-side intake airflow with burgundy coloring (NXA-SFAN-35CFM-PI)
  - Port-side exhaust airflow with blue coloring (NXA-SFAN-35CFM-PE)
- Power supply modules (two—one for operations and one for redundancy [1+1]) with these choices (a mix of AC and DC power sources is only supported for hot swapping purposes, with a time limit of 15 minutes, but do not mix airflow directions):

- 1400-W AC power supply with port-side intake airflow (burgundy coloring) (NXA-PAC-1400W-PI)
- 1400-W AC power supply with port-side exhaust airflow (blue coloring) (NXA-PAC-1400W-PE)
- 2000-W DC power supply with port-side intake airflow (burgundy coloring) (NXA-PDC-2KW-PI)
- 2000-W DC power supply with port-side exhaust airflow (blue coloring) (NXA-PDC-2KW-PE)
- 2000-W HVDC power supply with port-side intake airflow (burgundy coloring) (NXA-PHV-2KW-PI)

The figure shows the switch features on the port side of the chassis.



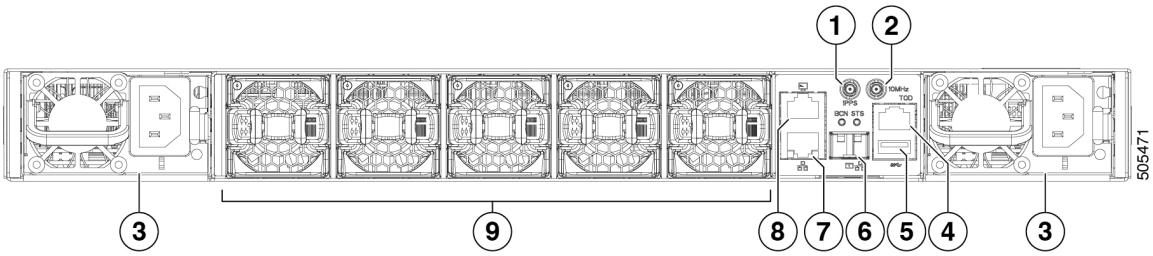
1	48 50-GE ZSFP downlink ports (ports 1-48)	2	4 400-G QSFP-DD uplink ports (ports 49-52)
3	LEDs (BCN, STS, ENV, SYNC, GPS, TIMING)		

Note

- The fan 4 + 1 redundancy is *not* supported with PE fans when the ZRP optics are used.
- The GPS and TIMING LEDs are *not* supported and will not be lit.

To determine which transceivers, adapters, and cables are support this switch, see the Cisco Transceiver Modules Compatibility Information document.

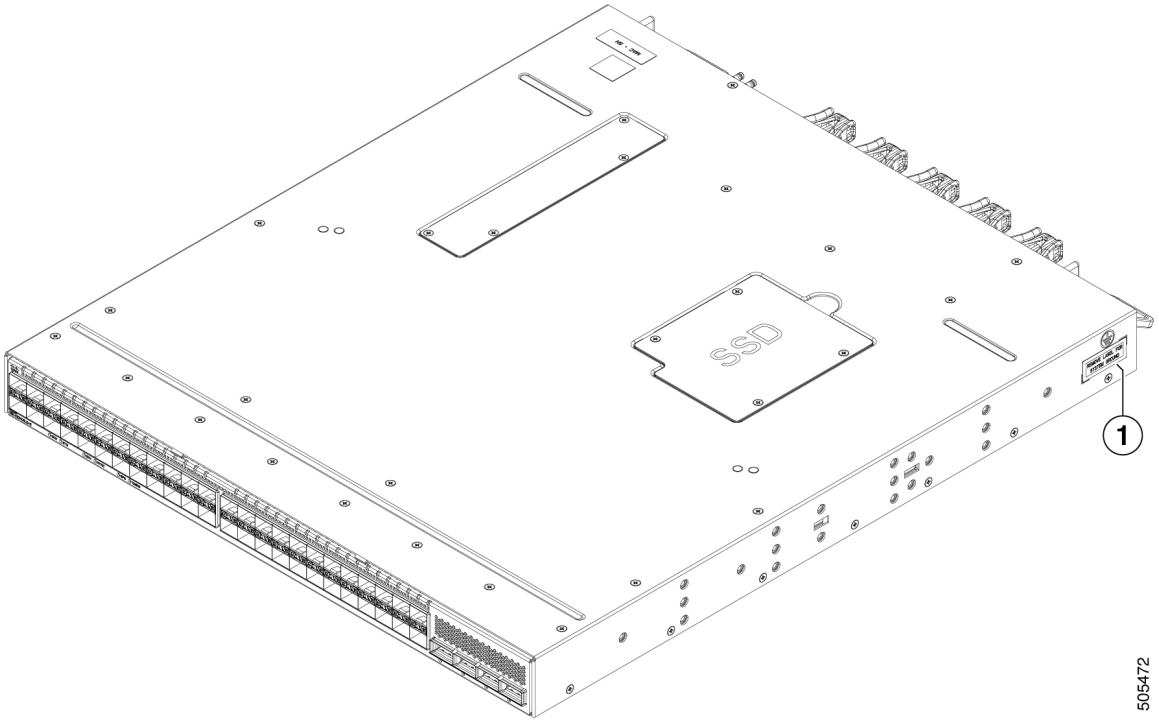
This figure shows the switch features on the power supply side of the chassis.



1	DIN connector (1 PPS)	2	DIN connector (10 MHz)
3	Power supply modules (1 or 2) (AC power supplies shown) with slots numbered 1 (right) and 2 (left)	4	Time of Day (ToD) port
5	USB port	6	Management port (SFP)
7	Management port (RJ45)	8	Console port

9	Fan modules (5) with slots numbered 1 (left) to 5 (right)		

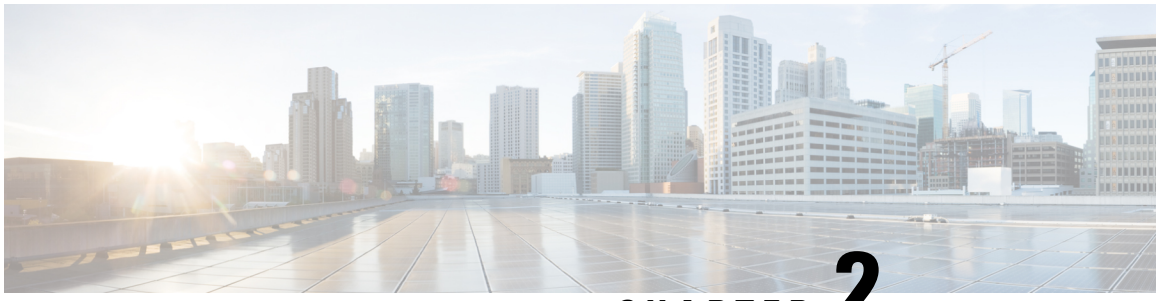
This figure shows the switch features on the side of the chassis.



1	Grounding pad		

The fan and power supply modules are field replaceable. You can replace one fan module or one power supply module during operations so long as the other modules are installed and operating. If you have only one power supply installed, you can install the replacement power supply in the open slot before removing the original power supply.

Caution If the switch has port-side intake airflow (burgundy coloring for fan modules), you must locate the ports in the cold aisle. If the switch has port-side exhaust airflow (blue coloring for fan modules), you must locate the ports in the hot aisle. If you locate the air intake in a hot aisle, the switch can overheat and shut down.



CHAPTER 2

Preparing the Site

- Temperature Requirements, on page 5
- Humidity Requirements, on page 5
- Altitude Requirements, on page 6
- Dust and Particulate Requirements, on page 6
- Minimizing Electromagnetic and Radio Frequency Interference, on page 6
- Shock and Vibration Requirements, on page 7
- Preventing Electrostatic Discharge Damage, on page 7
- Grounding Requirements, on page 7
- Planning for Power Requirements, on page 8
- Airflow Requirements, on page 8
- Rack and Cabinet Requirements, on page 9
- Clearance Requirements, on page 9
- Network Equipment-Building System (NEBS) Statements, on page 10

Temperature Requirements

The operating temperature of the switch is 32 to 104 degrees Fahrenheit (0 to 40 degrees Celsius) at sea level. For every 300 meters (1000 feet) above sea level, the maximum temperature is reduced by 1 degree Celsius. The non-operating temperature of the switch is -40 to 158 degrees Fahrenheit (-40 to 70 degrees Celsius).

Humidity Requirements

High humidity can cause moisture to enter the switch. Moisture can cause corrosion of internal components and degradation of properties such as electrical resistance, thermal conductivity, physical strength, and size. The switch is rated to withstand from 5- to 95-percent (nonoperating) and 5- to 90-percent (operating) relative humidity.

Climate-controlled buldings usually maintain an acceptable level of humidity for the switch equipment. 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. System fans cool switches by drawing in air and exhausting air out through various openings in the chassis. Fans also introduce 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. Keep a clean operating environment to reduce the negative effects of dust and other particles.

In addition to keeping your environment free of dust and particles, use these precautions to avoid contamination of your switch:

- Do not smoke near the switch.
- Do not eat 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, use 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 these 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, 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. Copper cables should not be longer than maximum distances for the media type.

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. Consult experts in electrical surge suppression and shielding if you have 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.

Preventing Electrostatic Discharge Damage

Many switch components can be damaged by static electricity. Not exercising the proper electrostatic discharge (ESD) precautions can result in intermittent or complete component failures. To minimize the potential for ESD damage, always use an ESD-preventive anti-static wrist strap (or ankle strap) and ensure that it makes adequate skin contact.

Note Check the resistance value of the ESD-preventive strap periodically. The measurement should be 1–10 megohms. Before you perform any of the procedures in this guide, attach an ESD-preventive strap to your wrist and connect the leash to the chassis.

Grounding Requirements

The switch is sensitive to variations in voltage that is supplied by the power sources. Overvoltage, undervoltage, and transients (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.

Connect the grounding pad on the switch either directly to the earth-ground connection or to a fully bonded and grounded rack.

When the chassis is properly installed in a grounded rack, the switch is grounded because it has a metal-to-metal (no paint, stain, dirt, or anything else on it) contact to the rack. See Note to ensure proper conductivity between rack and switch is maintained.

Alternatively, 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 Create an electrical conducting path between the product chassis and the metal surface of the enclosure, or rack in which it is mounted, or to a grounding conductor. Provide electrical continuity by using thread-forming type mounting screws that remove any paint or non-conductive coatings and establish a metal-to-metal contact. Remove any paint or other non-conductive coatings on the surfaces between the mounting hardware and the enclosure or rack. Clean the surfaces and apply an antioxidant before installation.

Planning for Power Requirements

The switch includes two power supplies (1-to-1 redundancy with current sharing) in one of these combinations:

- Two 1400-W AC power supplies
- Two 2000-W DC power supplies
- Two 2000-W HVDC power supplies

Note For 1+1 redundancy, you must use two power sources and connect each power supply to a separate power source.

Note Some of the power supply modules have rating capabilities that exceed the switch requirements. When calculating your power requirements, use the switch requirements to determine the amount of power that is required for the power supplies.

Note In any power redundancy mode, the total power is shared across the populated Power Supply Units (PSUs). Multiple PSUs are always load-sharing regardless of the mode used. If a PSU has an active input power, the PSU provides a fraction of the total power to the system. This ensures that all active power supplies contribute to the power load, sharing it proportionally to maintain power redundancy.

To minimize the possibility of circuit failure, verify that each power-source circuit that is used by the switch is dedicated to the switch.

Airflow Requirements

The switch is positioned with its ports in either the front or the rear of the rack, depending on your cabling and maintenance requirements. To identify the airflow options for your switch, see the user-replaceable components in the *Overview* section of this document. Position the fan and power supply modules to move the coolant air from the cold aisle to the hot aisle in one of these ways:

- Port-side exhaust airflow—Cool air enters the chassis through the fan and power supply modules in the cold aisle and exhausts through the port end of the chassis in the hot aisle.
- Port-side intake airflow—Cool air enters the chassis through the port end in the cold aisle and exhausts through the fan and power supply modules in the hot aisle.
- Single-direction airflow—The direction of the installed fan modules determines the airflow.

Identify the airflow direction of each fan and power supply module by its coloring.

- Red coloring indicates port-side intake airflow.



Note To prevent the switch from overheating and shutting down, position the air intake for the switch in a cold aisle. The fan and power supply modules must have the same direction of airflow. To change the airflow direction for the switch, shutdown the switch before changing the modules.

Rack and Cabinet Requirements

Install these 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

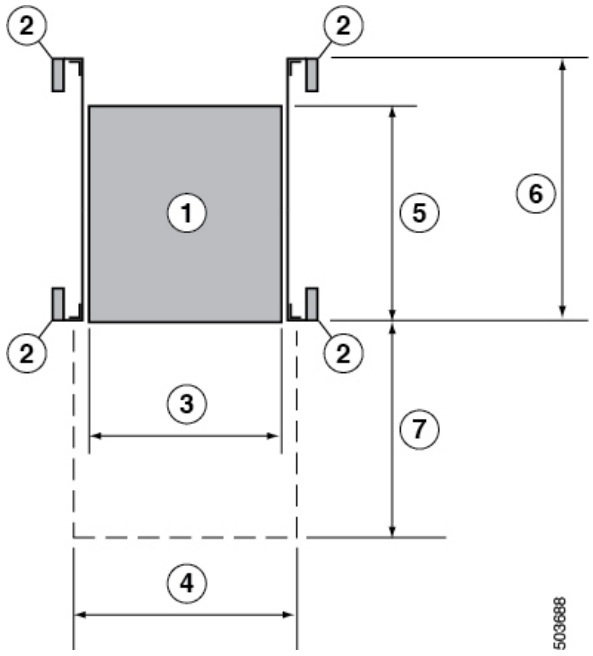
Work with your cabinet vendors to determine which of their cabinets meet these requirements or see the Cisco Technical Assistance Center (TAC) for recommendations:

- 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 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).

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

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 switch. 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 in a four-post rack, see the figure.



1	Chassis	5	Depth of the chassis 19.69 (50 cm)
2	Vertical rack-mount posts and rails	6	Maximum extension of the bottom-support rails 36.0 in (91.4 cm)
3	Chassis width 17.3 in (43.9 cm)	7	Depth of the front clearance area (equal to the depth of the chassis). 19.69 in (50 cm)
4	Width of the front clearance area (equal to the width of the chassis with two rack-mount brackets that are attached to it). 19.0 in (48.3 cm)		Chassis Height: 1.72 inches (4.4 cm) (1 RU)

Note Both the front and rear of the chassis must be open to both aisles for airflow.

Network Equipment-Building System (NEBS) Statements

NEBS describes the environment of a typical United States Regional Bell Operating Company (RBOC) central office. NEBS is the most common set of safety, spatial, and environmental design standards applied to telecommunications equipment in the United States. It is not a legal or regulatory requirement, but rather an industry requirement.

These NEBS statements apply to the Cisco N93400LD-H1 switch.:



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.



Warning **Statement 1255—**Laser Compliance Statement

Pluggable optical modules comply with IEC 60825-1 Ed. 3 and 21 CFR 1040.10 and 1040.11 with or without exception for conformance with IEC 60825-1 Ed. 3 as described in Laser Notice No. 56, dated May 8, 2019.



Note **Statement 7001—**ESD Mitigation

This equipment may be ESD sensitive. Always use an ESD ankle or wrist strap before handling equipment. Connect the equipment end of the ESD strap to an unfinished surface of the equipment chassis or to the ESD jack on the equipment if provided.



Warning **Statement 7003**—Shielded Cable Shielded Cable Requirements for Intrabuilding Lightning Surge

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

The following port(s) are considered intrabuilding ports on this equipment:

RJ-45 Management Ethernet Port



Note **Statement 7004—**Special Accessories Required to Comply with GR-1089 Emission and Immunity Requirements

To comply with the emission and immunity requirements of GR-1089, shielded cables are required for the following ports:

Copper RJ-45 Ethernet Management port



Warning **Statement 7005**—Intrabuilding Lightning Surge and AC Power Fault

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

This statement applies to the intrabuilding ports listed below:

RJ-45 Ethernet Management port



Warning **Statement 7008—**Equipment Using Agreed Primary Protection

This product is intended to be protected by a surge protector that meets the applicable criteria of GR-974-CORE or GR-1361-CORE. Failure to use this appropriate surge protector could result in susceptibility to lightning surges or create a potential hazard due to power faults.



Note **Statement 7011—**Surge Protection Device Requirements for GR-1089 Antenna Ports

Protect equipment antenna ports, that are classified as Type 6 according to GR-1089-CORE, with lightning surge protectors that are rated at a minimum of 600 V peak surge of 1.2/50 uS duration.



Warning **Statement 7012—**Equipment Interfacing with AC Power Ports

Connect this equipment to AC mains that are provided with a surge protective device (SPD) at the service equipment that complies with NFPA 70, the National Electrical Code (NEC).



Note **Statement 7013—**Equipment Grounding Systems—Common Bonding Network (CBN)

This equipment is suitable for installations using the CBN.



Note **Statement 7014—**Installation Location Outside Plant (OSP)

This equipment is suitable for installation in OSP locations.

Note **Statement 7015—**Equipment Bonding and Grounding

When you use thread-forming screws to bond equipment to its mounting metalwork, remove any paint and nonconductive coatings and clean the joining surfaces. Apply an antioxidant compound before joining the surfaces between the equipment and mounting metalwork.

Note **Statement 7016**—Battery Return Conductor

Treat the battery return conductor of this equipment as DC-I.

Note **Statement 7018—**System Recover Time

The equipment is designed to boot up in less than 30 minutes provided the neighboring devices are fully operational.

Note **Statement 7019—**Equipment Grounding Systems—Isolated Bonding Network (IBN)

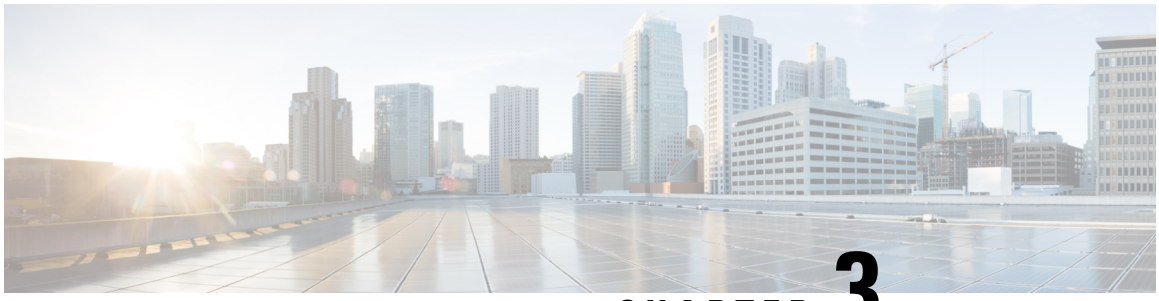
This equipment is suitable for installations using the IBN.

Note **Statement 8015—**Installation Location Network Telecommunications Facilities

This equipment is suitable for installation in network telecommunications facilities.

Note **Statement 8016—**Installation Location Where the National Electric Code (NEC) Applies

This equipment is suitable for installation in locations where the NEC applies.



CHAPTER 3

Installing the Chassis

- Safety, on page 15
- Installation Options with Rack-Mount Kits, on page 19
- Airflow Considerations, on page 19
- Installation Guidelines, on page 19
- Unpacking and Inspecting the Switch, on page 20
- Installing the Switch Using the NXK-ACC-KIT-1RU Rack-Mount Kit, on page 21
- Installing the Switch into a Two-Post Rack Using the NXK-ACC-KIT-2P Rack-Mount Kit, on page 25
- Grounding the Chassis, on page 28
- Starting the Switch, on page 29

Safety

Before you install, operate, or service the switch, see the *Regulatory, Compliance, and Safety Information for the Cisco N9000 Series* content for important Safety Information.



Warning

Statement 1071—Warning Definition

IMPORTANT SAFETY INSTRUCTIONS

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

SAVE THESE INSTRUCTIONS



Note **Statement 1089—**Instructed and Skilled Person Definitions

An instructed person is someone who has been instructed and trained by a skilled person and takes the necessary precautions when working with equipment.

A skilled person or qualified personnel is someone who has training or experience in the equipment technology and understands potential hazards when working with equipment.

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

To reduce risk of electric shock or fire, installation of the equipment must comply with local and national electrical codes.

Note **Statement 407—**Japanese Safety Instruction

You are strongly advised to read the safety instruction before using the product.

https://www.cisco.com/web/JP/techdoc/pldoc/pldoc.html

When installing the product, use the provided or designated connection cables/power cables/AC adapters.

〈製品使用における安全上の注意〉

www.cisco.com/web/JP/techdoc/index.html

接続ケーブル、電源コードセット、**AC**アダプタ、バッテリなどの部品は、必ず添付品または指定品をご使用ください。添付品・指定品以外をご使用になると故障や動作不良、火災の原因となります。また、電源コードセットは弊社が指定する製品以外の電気機器には使用できないためご注意ください。

Warning **Statement 1017—**Restricted Area

This unit is intended for installation in restricted access areas. Only skilled, instructed, or qualified personnel can access a restricted access area.

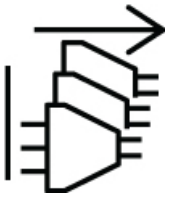
Warning **Statement 1091—**Installation by an Instructed Person or Skilled Person

Only an instructed person or skilled person should be allowed to install, replace, or service this equipment. See statement 1089 for the definition of an instructed person or skilled person.

Warning

Statement 1028—More Than One Power Supply

This unit might have more than one power supply connection. To reduce risk of electric shock, remove all connections to de-energize the unit.



Warning

Statement 1003—DC Power Disconnection

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

Warning

Statement 1046—Installing or Replacing the Unit

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

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

Warning

Statement 1022—Disconnect Device

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

Warning

Statement 1033—Safety Extra-Low Voltage (SELV)—IEC 60950/ES1–IEC 62368 DC Power Supply

To reduce the risk of electric shock, connect the unit *only* to a DC power source that complies with the SELV requirements in the IEC 60950-based safety standards or the ES1 requirements in the IEC 62368-based safety standards.



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 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.



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 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.



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



Note For AC input application, please refer to the statement below:

Warning **Statement 1005—**Circuit Breaker

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective devices is rated not greater than 20A (North America), 16A (Europe), and 13A (UK).

Installation Options with Rack-Mount Kits

The rack-mount kit enables you to install the switch into racks of varying depths. Position the switch with easy access to either the port connections or the fan and power supply modules.

Install the switch using these rack-mount options which you can order from Cisco.

- Rack-mount kit (NXK-ACC-KIT-2P)
- Rack-mount kit (NXK-ACC-KIT-1RU)
- Rack-mount kit (N3K-C3064-ACC-KIT)

The rack or cabinet that you use must meet the requirements listed in the section General Requirements for Cabinets and Racks, on page 53.

Note You are responsible for verifying that your rack and rack-mount hardware comply with the guidelines that are described in this document.

Airflow Considerations

The switch comes with fan and power supply modules that have either port-side intake or port-side exhaust airflow for cooling the switch. If you are positioning the port end of the switch in a cold aisle, verify that the switch has port-side intake fan modules with burgundy coloring. If you are positioning the fan and power supply modules in a cold aisle, verify that the switch has port-side exhaust fan modules with blue colorings. All fan modules must have the same direction of airflow.

Installation Guidelines

When installing the switch, follow these guidelines:

- Ensure that there is adequate clearance space around the switch to allow for servicing the switch and for adequate airflow.
- Ensure that you are positioning the switch in a rack so that it takes in cold air from the cold aisle and exhausts air to the hot aisle. If there is blue coloring on the fan modules, the switch is configured for port-side exhaust airflow and you must position the module side of the switch in a cold aisle. If there is burgundy coloring on the fan modules, the switch is configured for port-side intake airflow and you must position the port side of the switch in a cold aisle.

- Ensure that the chassis can be adequately grounded. If the switch is not mounted in a grounded rack, we recommend connecting the system ground on the chassis directly to an earth ground.
- Ensure that the site power meets the power requirements for the switch. If available, you can use an uninterruptible power supply (UPS) to protect against power failures.

Caution Avoid UPS types that use ferroresonant technology. These UPS types can become unstable with the switch, which can have substantial current draw fluctuations because of fluctuating data traffic patterns.

- Ensure that circuits are sized according to local and national codes. Typically, this often requires one or both of the following:
  - AC power supplies typically require at least a 15-A or 20-A AC circuit, 100 to 240 VAC, and a frequency of 50 to 60 Hz.

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

Note For AC input application, please refer to the statement below:

Warning **Statement 1005—**Circuit Breaker

This product relies on the building's installation for short-circuit (overcurrent) protection. Ensure that the protective devices is rated not greater than 20A (North America), 16A (Europe), and 13A (UK).

Unpacking and Inspecting the Switch

Before you install the switch, unpack and inspect the switch for damage or missing components. If anything is missing or damaged, contact your customer service representative immediately.

Tip Keep the shipping container in case the chassis requires shipping at a later time.

Before you begin

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

Procedure

Step 1 Compare the shipment to the equipment list provided by your customer service representative and verify that you have received all items, including:

- Accessory Kit

Step 2 Check for damage and report any discrepancies or damage to your customer service representative. Have this information ready:

- Invoice number of shipper (see packing slip)
- Model and serial number of the damaged unit
- Description of damage
- Effect of damage on the installation

Installing the Switch Using the NXK-ACC-KIT-1RU Rack-Mount Kit

To install the switch, attach front and rear mounting brackets to the switch, install slider rails on the rear of the rack, slide the switch onto the slider rails, and secure the switch to the front of the rack. Typically, the front of the rack is the side easiest to access for maintenance.

Note You supply the eight 10-32 or 12-24 screws required to mount the slider rails and switch to the rack.

Before you begin

- Inspected the switch shipment to ensure that you have everything ordered.
- Verify that the switch rack-mount kit includes these parts:
  - Front rack-mount brackets (2)
  - Rear rack-mount brackets (2)
  - Slider rails (2)
  - M4 x 0.7 x 8-mm Phillips countersink screws (10-12)

- The rack is installed and secured to its location.

Procedure

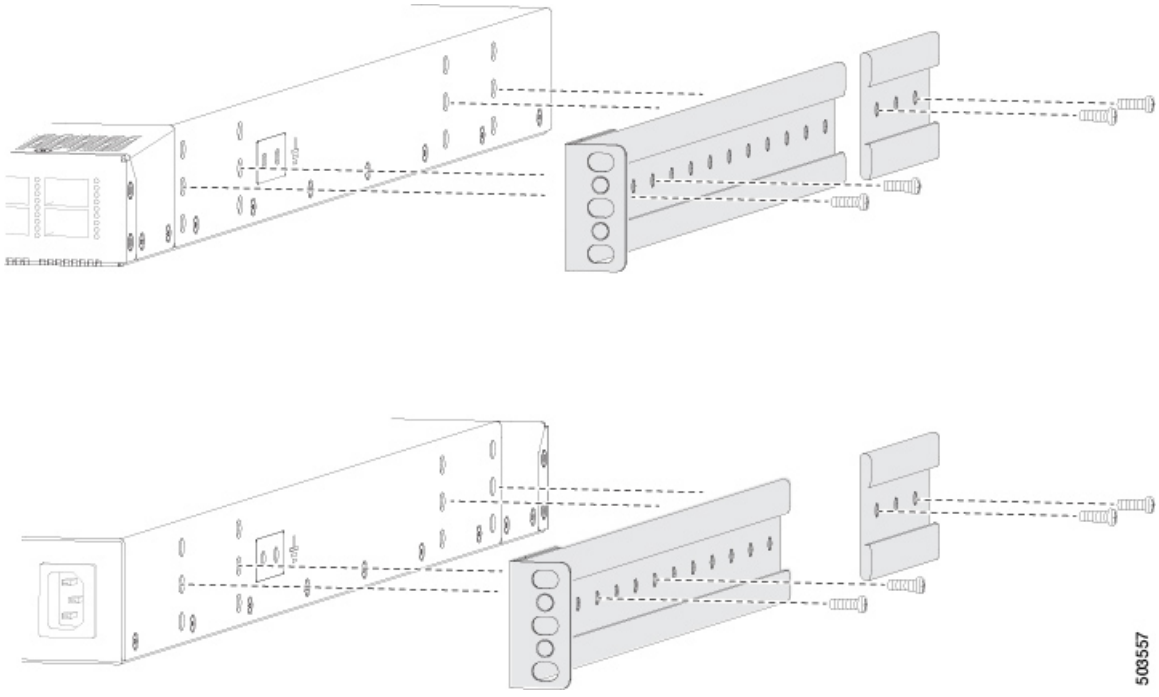
Step 1 Install two front rack-mount brackets and the two rear rack-mount brackets to the switch.

a) Determine which end of the chassis is to be located in the cold aisle.

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

b) Position the front rack-mount bracket and the rear rack-mount bracket so that its screw holes are aligned to the screw holes on the side of the chassis.

Note
Align the holes in the rack-mount bracket to the holes on the side of the chassis (see the two ways to mount these brackets on a typical chassis, in the figure). The holes that you use depend on the requirements of your rack and the amount of clearance required for interface cables (3 inches [7.6 mm] minimum) and module handles (1 inch [2.5 mm] minimum).



c) Secure the front-mount bracket and the back-mount bracket to the chassis using four M4 screws. Tighten each screw to 12 in-lb (1.36 N·m) of torque.

d) Repeat Step 1 for the other front rack-mount bracket and the other back-mount bracket on the other side of the switch. Be sure to position that bracket the same distance from the front of the switch.

Note

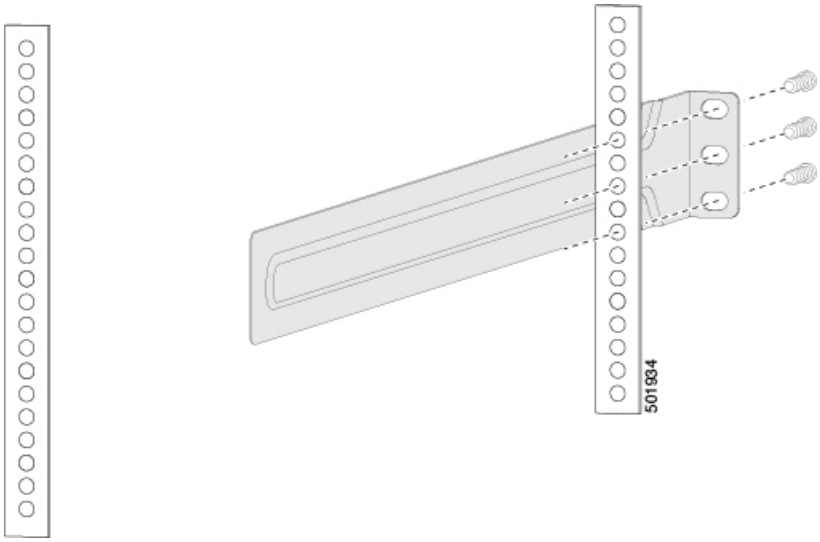
Depending on the chassis depth, the back rack-mount bracket may not fit. In that case, you do not need the back rack-mount bracket.

Step 2 If you are not installing the chassis into a grounded rack, attach a customer-supplied grounding wire to the chassis as explained in the Grounding the Chassis, on page 28 section. If you are installing the chassis into a grounded rack, skip this step.

Step 3 Install the slider rails on the rack or cabinet.

a) Determine which two posts of the rack or cabinet you should use for the slider rails. Of the four vertical posts in the rack or cabinet, two will be used for the front-mount brackets attached to the easiest accessed end of the chassis. The other two posts will have the slider rails.

b) Position a slider rail at the desired level on the back side of the rack. Use 12-24 screws or 10-32 screws, depending on the rack thread type. To attach the rails to the rack, see the figure. Tighten 12-24 screws to 30 in-lb (3.39 N·m) of torque. Tighten 10-32 screws to 20 in-lb (2.26 N m) of torque.

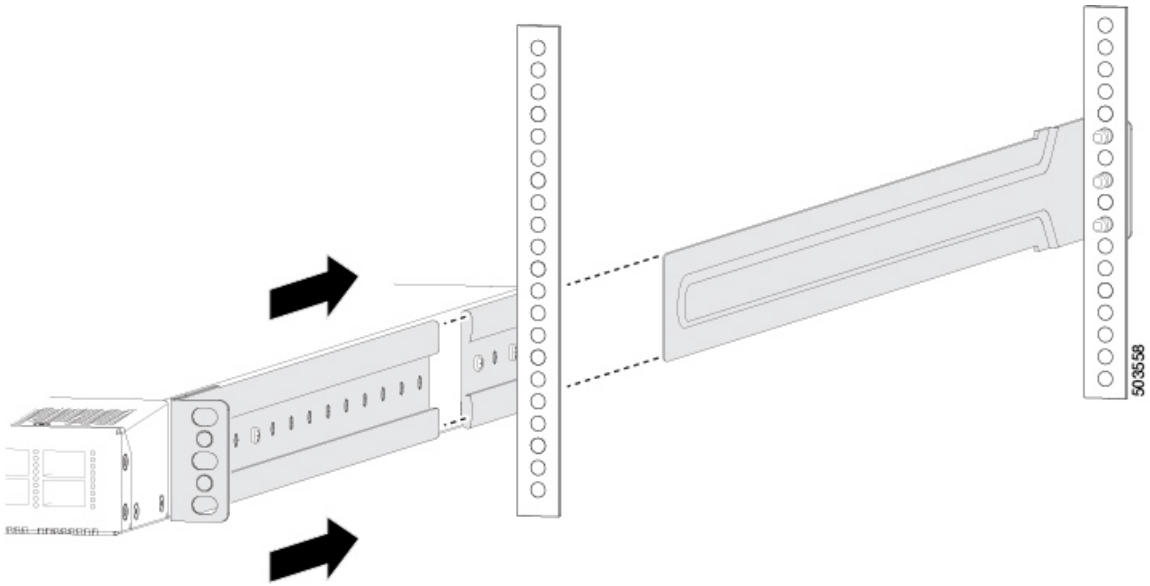


c) Repeat Step 3 to attach the other slider rail to the other side of the rack.

Make sure that the slider rails are at the same level. Use a level tool, tape measure, or carefully count the screw holes in the vertical mounting rails.

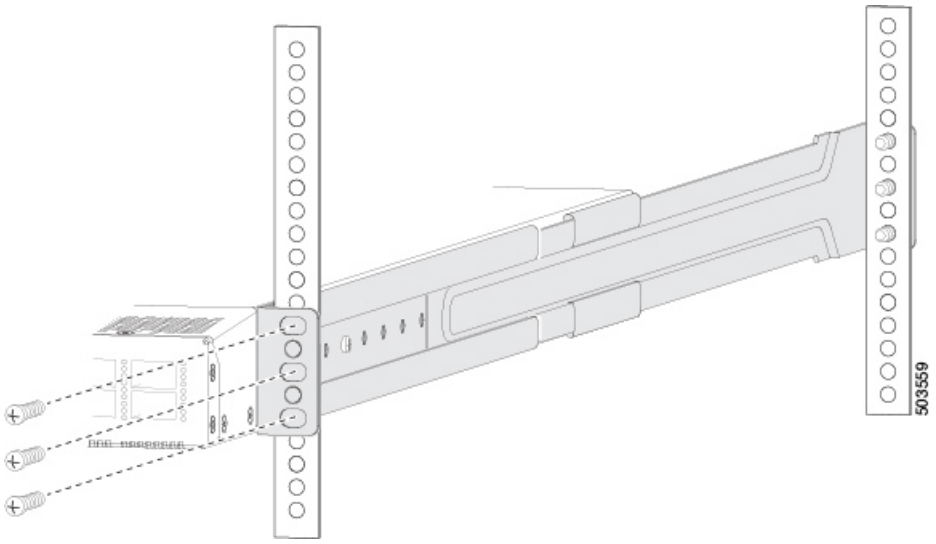
Step 4 Insert the switch into the rack and attach it.

a) Holding the switch with both hands, position the two, rear rack-mount brackets on the switch between the rack or cabinet posts that do not have slider rails attached to them (see the figure).



b) Align the two rear rack-mount guides on either side of the switch with the slider rails installed in the rack. Slide the rack-mount guides onto the slider rails. Gently slide the switch all the way into the rack until the front rack-mount brackets come in contact with two rack or cabinet posts.

c) Holding the chassis level, insert screws (12-24 or 10-32, depending on the rack type) in each of the two front rack-mount brackets (using a total of six screws) and into the cage nuts or threaded holes in the vertical rack-mounting rails (see the figure).



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

Step 5 If you attached a grounding wire to the chassis grounding pad, connect the other end of the wire to the facility ground.

Installing the Switch into a Two-Post Rack Using the NXK-ACC-KIT-2P Rack-Mount Kit

To install the switch, attach the front mounting brackets to the switch and secure the switch to the front of the rack. Typically, the front of the rack is the side easiest to access for maintenance.

Note This is not the preferred rack installation method. This method may not be earthquake safe and will not be NEBS compliant.

Note You supply six 10-32 or 12-24 screws required to mount the rails to the rack.

Before you begin

- Inspect the switch shipment to ensure that you have everything ordered.
- Make sure that the switch rack-mount kit includes these parts:
  - Front rack-mount brackets (2)
  - M4 x 0.7 x 8-mm Phillips countersink screws (8)
- The rack is installed and secured to its location.

SUMMARY STEPS

1. Install two front rack-mount brackets to the switch.
2. If you are not installing the chassis into a grounded rack, attach a customer-supplied grounding wire to the chassis as explained in the Grounding the Chassis, on page 28 section. If you are installing the chassis into a grounded rack, skip this step.
3. Insert the switch into the rack and attach it.
4. If you attached a grounding wire to the chassis grounding pad, connect the other end of the wire to the facility ground.

DETAILED STEPS

Procedure

Step 1 Install two front rack-mount brackets to the switch.

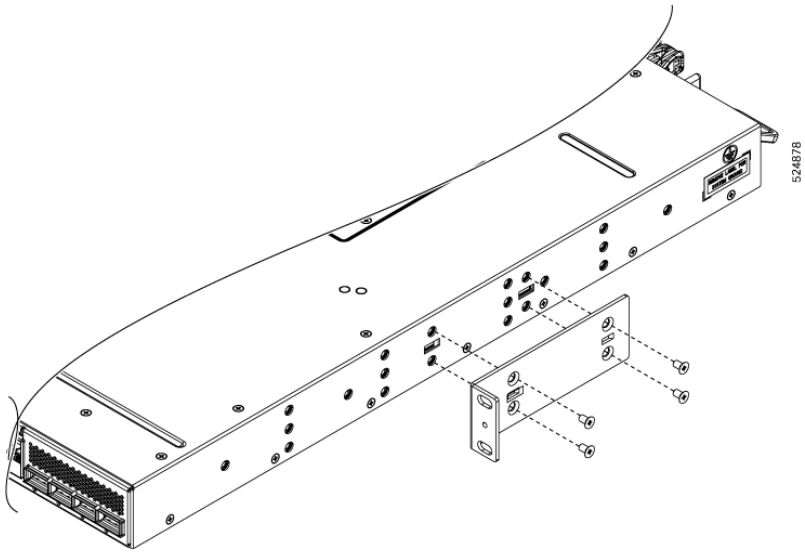
a) Determine which end of the chassis goes in the cold aisle.

- If the switch has port-side intake modules (fan modules with burgundy coloring), position the switch so that its ports will be in the cold aisle.

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

b) Position the front rack-mount bracket and the rear rack-mount bracket so that its screw holes are aligned to the screw holes on the side of the chassis.

Note
Align the holes in the rack-mount bracket to the holes on the side of the chassis (see the two ways to mount these brackets on a typical chassis, in the figure). The holes that you use depend on the requirements of your rack and the amount of clearance required for interface cables (3 inches [7.6 mm] minimum) and module handles (1 inch [2.5 mm] minimum).



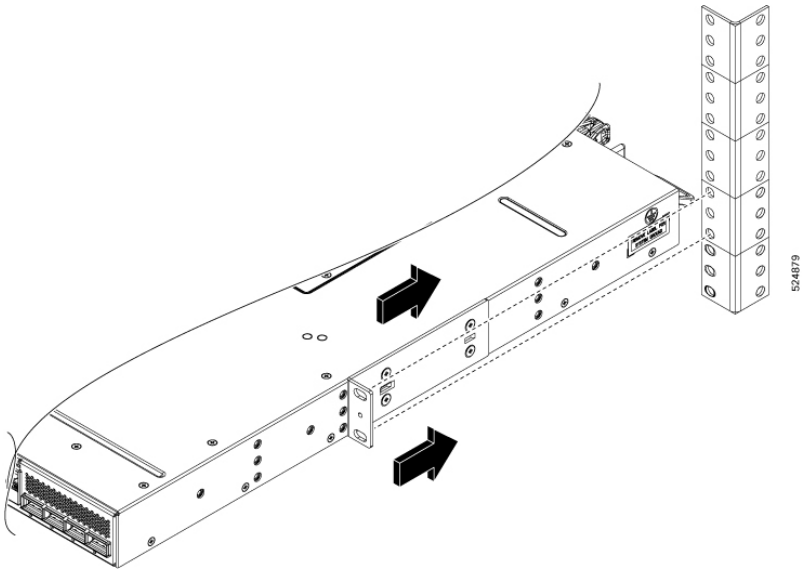
c) Secure the front-mount bracket to the chassis using four M4 screws and tighten each screw to 12 in-lb (1.36 N·m) of torque.

d) Repeat Step 1 for the other front rack-mount bracket on the other side of the switch. Be sure to position that bracket the same distance from the front of the switch.

Step 2 If you are not installing the chassis into a grounded rack, attach a customer-supplied grounding wire to the chassis as explained in the Grounding the Chassis, on page 28 section. If you are installing the chassis into a grounded rack, skip this step.

Step 3 Insert the switch into the rack and attach it.

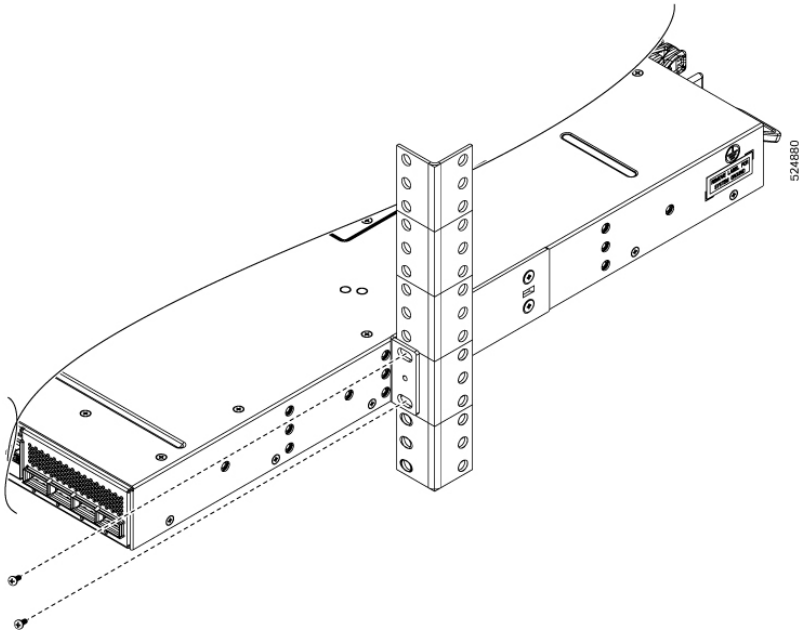
a) Holding the switch with both hands, position the brackets on the switch between the cabinet posts (see the figure).



b) Gently slide the switch all the way into the rack until the front rack-mount brackets come in contact with the cabinet posts.

Note
If you attached a grounding cable to the chassis, bend one of the rack-mounts slightly to allow the grounding lug to go behind the rail.

c) Holding the chassis level, insert screws (12-24 or 10-32, depending on the rack type) in each of the two front rack-mount brackets (using a total of six screws) and into the cage nuts or threaded holes in the vertical rack-mounting rails (see the figure).



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

Step 4 If you attached a grounding wire to the chassis grounding pad, connect the other end of the wire to the facility ground.

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 Provide an electrical conducting path between the product chassis and the metal surface of the enclosure or rack in which it is mounted or to a grounding conductor. To ensure electrical continuity, use thread-forming type mounting screws that remove any paint or non-conductive coatings and establish a metal-to-metal contact. Remove any paint or other non-conductive coatings on the surfaces between the mounting hardware and the enclosure or rack. Clean the surfaces and apply an antioxidant before installation.

Ground the rack if using LVDC power supplies. If using AC or HVDC power supplies, the power cord for the AC power supplies provides grounding for the chassis. For supplemental grounding or bonding, attach a customer-supplied grounding cable to the chassis ground pad.

Ground the chassis. If you are using a 2-post rack, attach a customer-supplied grounding cable. Attach the cable to the chassis grounding pad and the facility ground. If you are using a 4-post rack, ensure that your chassis is grounded through the rack mount system or the power cable (AC or HVDC).

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.

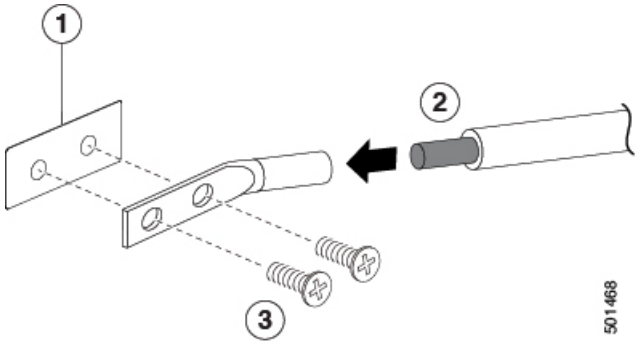
Before you begin

Before you can ground the chassis, verify the earth ground contact has a solid connection to the data center building.

Procedure

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 figure. Verify that the ground wire is securely attached to the grounding lug by attempting to pull the wire out of the crimped lug (tug test).



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 figure 1. 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 the Switch

Start the switch by connecting it to its dedicated power source. If you need *n*+*n* redundancy, connect each power supply in a switch to a different power source.

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

Before you begin

- The switch must be installed and secured to a rack or cabinet.
- The switch must be adequately grounded.
- The rack must be close enough to the dedicated power source so that you can connect the switch to the power source by using the designated power cables.
- You have the designated power cables for the power supplies that you are connecting to the dedicated power sources.

Note Depending on the outlet receptacle on your AC power distribution unit, you might need an optional jumper power cord to connect the switch to your outlet receptacle.

- The switch is not connected to the network (this includes any management or interface connections).
- The fan and power supply modules are fully secured in their chassis slots.

Procedure

Step 1 (Optional) For any HVAC/HVDC power supply, connect it to a power source like this:

a) Using the recommended high voltage power cable for your country or region, connect the Anderson Power Saf-D-Grid connector on the power cable to the power receptacle on the power supply. Make sure that the connector clicks when fully pushed into the receptacle.

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

- When connecting to an HVAC power source, insert the plug in a receptacle for the HVAC power source.
- When connecting to an HVDC power source, do this:
  1. Verify that the power is turned off at a circuit breaker for the power source terminals.
  2. Remove the nuts from each of the terminal posts for the power source.
  3. Place the power cable ground-wire terminal ring on the ground terminal for the power source and secure them with a terminal nut.
  4. Place the power cable negative-wire terminal ring on the negative terminal for the power source and secure them with a terminal nut.
  5. Place the power cable positive-wire terminal ring on the positive terminal for the power source and secure them with a terminal nut.
  6. If there is a safety cover for the power source terminals, place and secure it over the terminals.
  7. Turn on the power at the power source circuit breaker.

Step 2 (Optional) For any DC power supply, do this:

a) Turn off the circuit breaker for the power source.

b) When using an LV DC power supply that does not use a lug, connect the supplied wiring harness to the source. Or connect the user-supplied wires to the LV DC power source.

c) When using an LV DC power supply that does not use a lug, connect the attached plug of the supplied wiring harness to the power supply. Or attach the lugs of the user supplied wires to the power supply.

d) If there is a safety cover for the power source terminals, place and secure it over the terminals.

e) Turn on the power at the circuit breaker for the DC power source.

Step 3 Verify that the power supply LED is on and green.

Step 4 Listen for the fans; they should begin operating when the power supply is powered.

Step 5 After the switch boots, verify that these LEDs are lit:

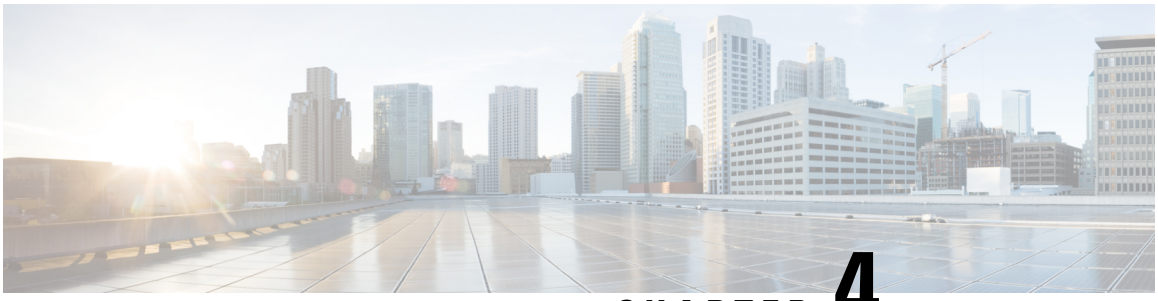
- On the fan modules, the Status (STA or STS) LED is green.

  If a fan module Status LED is not green, try reinstalling the fan module.

- After initialization, the switch chassis Status (labeled as STA or STS) LED is green.

Step 6 Verify that the system software has booted and the switch has initialized without error messages.

A setup utility automatically launches the first time that you access the switch and guides you through the basic configuration. For instructions on how to configure the switch and check module connectivity, see the appropriate Cisco N9000 Series Configuration Guides.



CHAPTER 4

Connecting the Switch to the ACI Fabric

- ACI Fabric Topology, on page 33
- Preparing to Connect to Other Devices, on page 34
- Connecting Leaf Switches to APICs, on page 35
- Connecting Leaf Switches to Spine Switches, on page 37
- Replacing an Existing Switch in the ACI Fabric, on page 38
- Setting Up an Optional Console Interface, on page 39
- Setting Up an Optional Management Connection, on page 39
- Maintaining Transceivers and Optical Cables, on page 40

ACI Fabric Topology

The ACI fabric topology includes these major components:

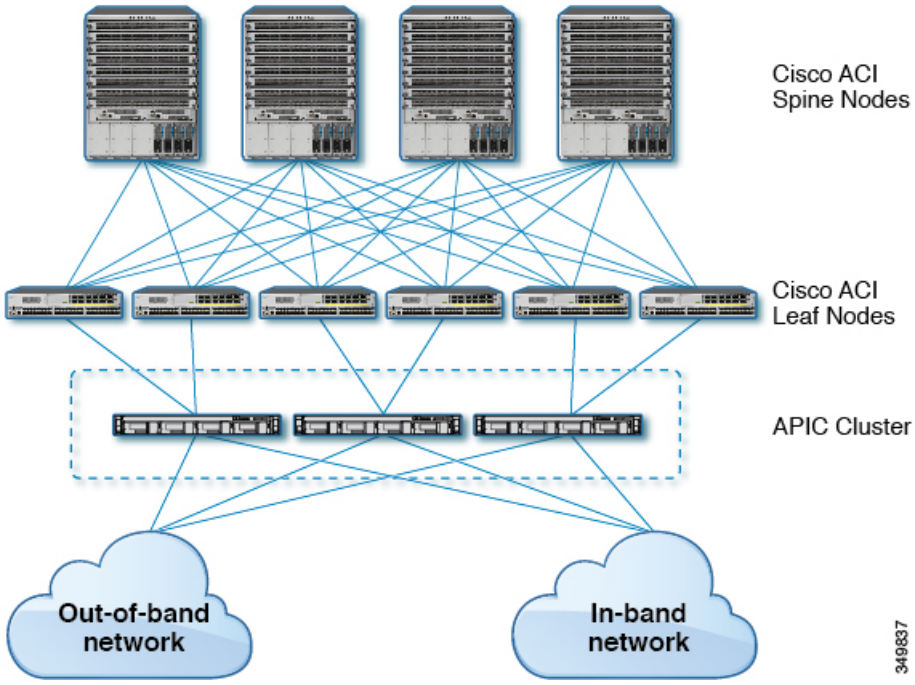
- Application Centric Infrastructure Controller (APIC) appliance (cluster of APICs)
- Leaf switches (for switch compatibility, please see the data sheets)
- Spine switches (for switch compatibility, please see the data sheets)

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 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 these items 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.

For more information about removing and installing the transceivers, see the Cisco N9408 ACI-Mode Switch Hardware Installation Guide, "*Optic Transceiver Removal Using the Optics Extraction Tool*".

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

- 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

Downlink one or two (recommended for redundancy) Cisco N9000 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 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 N93108TC-FX switch).
- The **VIC 1225** module supports optical transceivers, optical cables, and switches with optical downlink ports (such as: Cisco N93600CD-GX switch).
- The **VIC 1455** module supports optical transceivers, optical cables, and switches with optical downlink ports (such as: Cisco N93600CD-GX switch).



Note You cannot use breakout ports for Cisco APIC connectivity.

Before you begin

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

Procedure

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 transceiver, insert the transceiver into the VIC port. 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 these 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 these 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 these 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 these 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, or 10 for lengths in meters])
  - Cisco SFP+ Twinax Cables (SFP-H10GB-CU*x*M [where *x*=1, 2, 3, 5, 7, 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, connect one cable to either port-1 or port-2. Connect another cable to either port-3 or port-4. **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, 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.

Warning **Statement 1255—**Laser Compliance Statement

Pluggable optical modules comply with IEC 60825-1 Ed. 3 and 21 CFR 1040.10 and 1040.11 with or without exception for conformance with IEC 60825-1 Ed. 3 as described in Laser Notice No. 56, dated May 8, 2019.

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 these types:
  - 32-port 100-Gigabit (such as: N9K-X9732C-EX)
  - 36-port 100-Gigabit (such as: N9K-X9736C-FX)
  - N9K-X9400-22L linecard expansion module (LEM)
  - N9K-X9400-16W LEM
  - N9K-X9400-8D LEM

Note

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

Procedure

Step 1 For the transceivers with removable cables, separate the transceivers 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.

Replacing an Existing Switch in the ACI Fabric

To replace an existing switch in the ACI fabric, see "Upgrading the Switch Hardware" in the Cisco APIC Installation and ACI Upgrade and Downgrade Guide.

Setting Up an Optional Console Interface

Optionally set up a console interface for performing the initial configuration of the switch. Use the interface cable provided in the accessory kit to connect the switch to your console device. 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.

Procedure

Step 1 Configure the terminal emulator program to match each of these 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. Insert the DB-9 connector on the other end of the cable to the serial port on the console device.

What to do next

Perform the initial configuration for the switch (see the *Cisco ACI Getting Started Guide*).

Setting Up an Optional Management Connection

Optionally set up an out-of-band management connection for monitoring and troubleshooting purposes. Depending on your switch, 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, complete the initial configuration for the switch and establish an IP address before you create the management connection.

Procedure

Step 1 Connect the interface cable to a management port on the switch.

- For the RJ-45 management port, use a copper interface cable with RJ-45 connectors (used for shorter connections).

- For the SFP management port, use an optical interface cable with LH or SX SFP transceivers (used for longer connections).

Note
If you use the management interface, connect only one of the two management ports. The switch does not support using two management ports at the same time.

Step 2 Connect the other end of the cable to an external hub, switch, or router.

Maintaining Transceivers and Optical Cables

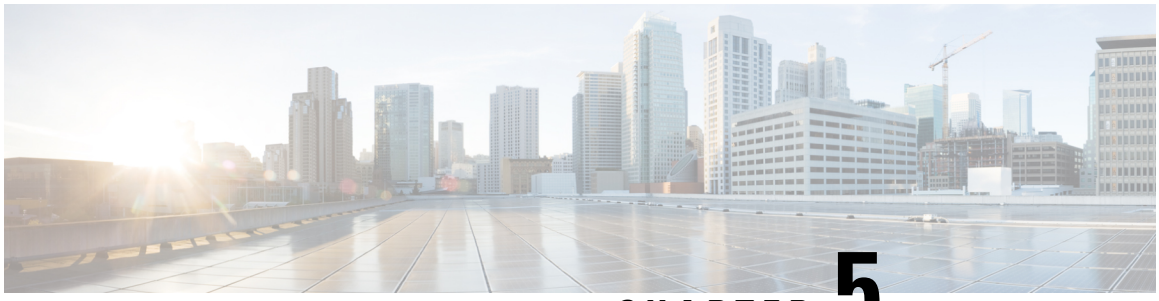
Keep transceivers and fiber-optic cables clean and dust free to maintain high signal accuracy and prevent damage to the connectors. Contamination increases attenuation (loss of light) and should be below 0.35 dB.

Consider these 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.



Note When you need to remove a fiber-optic transceiver, first remove the fiber-optic cable from the transceiver **before** you remove the transceiver from the port.



CHAPTER 5

Replacing Components

- Replacing a Fan Module, on page 41
- Replacing a Power Supply Module, on page 42
- Installing and Removing Small-Form Pluggable Modules, on page 47
- Install and Remove OSFP/QSFP Transceiver Modules, on page 48
- Attaching the Optical Network Cable, on page 50
- Removing the Transceiver Module, on page 51

Replacing a Fan Module

You can replace a fan module while the switch is operating, as long as you perform the replacement within one minute. If you cannot perform the replacement within one minute, leave the original fan module in the chassis to maintain the designed airflow until you have the replacement fan module on hand and can perform the replacement.

Caution If you are replacing a module during operations, verify the replacement fan module has the correct direction of airflow. This means that it has the **same airflow direction** as the other modules in the chassis. Also, verify that the airflow direction takes in air from a cold aisle and exhausts air to a hot aisle. Otherwise, the switch can overheat and shutdown.

If you are changing the airflow direction of all the modules in the chassis, shutdown the switch before replacing all the fan and power supply modules with modules using the other airflow direction. During operations, all of the modules must have the same direction of airflow.

Removing a Fan Module

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

Procedure

Step 1 On the fan module that you are removing, press the two sides of the fan module handle together, and pull on the handles enough to unseat it from its connectors.

Step 2 Holding the handle, pull the module out of the chassis.

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

Installing a Fan Module

Before you begin

- A fan slot must be open and ready for the new fan module to be installed.
- If the switch is operating, you must have a new fan module on hand and ready to install within one minute of removing the original fan module.
- The new fan module must have the **same airflow direction** as the other fan and power supply modules installed in the switch.

Procedure

Step 1 Holding the fan module by its handle, align the back of the fan module (the side with the electrical connectors) to the open fan slot in the chassis.

Step 2 Slide the fan module into the slot until it clicks in place.

Step 3 Verify that the Status (STS) LED turns on and becomes green.

Replacing a Power Supply Module

The switch requires two power supplies for redundancy. With one power supply providing the necessary power for operations, replace the other power supply during operations as long as the new power supply has the same airflow direction as the other modules in the chassis.

Replace a power supply with another supported power supply that has the same power source type as the other installed power supply. Additionally, the airflow direction of the power supply must match or conform to the airflow direction of the installed fan modules. For the airflow direction used by the switch, see the coloring of the fan modules.

Removing an AC Power Supply

To remove an AC power supply, disconnect the power cable and remove the module from the chassis.

Before you begin

- To replace a power supply during operations, there must be a functioning power supply providing power to the switch while you replace the other power supply. If there is only one power supply installed in the switch and you need to replace it, install the new power supply in the open slot and power it up before removing the original power supply.
- Ensure that the chassis is grounded. For grounding instructions, see Grounding the Chassis, on page 28.

Procedure

Step 1 Disconnect the power cord from the power receptacle on the power supply to be removed. Verify that the LED turns off.

Note
The LED might be on and amber colored. This indicates that the input power has been disconnected.

Step 2 Remove the power supply from the chassis by pushing and holding its thumb latch to the left and pulling the power supply part way out of the chassis.

Step 3 Place your other hand under the power supply to support it while you slide it out of the chassis.

Either place the power supply on an antistatic surface or pack it in its packing materials.

What to do next

Install the replacement power supply.

Removing an HVAC/HVDC Power Supply

You can remove one power supply while the other one provides power to the switch.

To disconnect the power supply from its power cables, shut off the power from the power source and disconnect the connector for the power cables.

Procedure

Step 1 Remove the power cable from the power supply by pressing the tab of the Anderson Power SAF-D-Grid connector and pull the cable and connector out of the power supply.

Verify that the LEDs turn off on the power supply that you are removing.

Step 2 Grasp the power supply handle while pressing the release latch towards the power supply handle.

Step 3 Place your other hand under the power supply to support it while you slide it out of the chassis.

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

What to do next

Install an HVAC/HVDC power supply in the open slot.

Removing a DC Power Supply

You can remove one power supply while the other one provides power to the switch.

To disconnect the power supply from its power cables, shut off the power from the power source and disconnect the connector for the power cables.

Procedure

Step 1 Turn off the circuit breaker for the power feed to the power supply that you are replacing.

Verify that the LEDs turn off on the power supply that you are removing.

Step 2 Remove the power cable from the power supply by pressing the latch on the Cisco-supplied power cord to allow removal from the power supply.

Step 3 Grasp the power supply handle while pressing the release latch towards the power supply handle.

Step 4 Pull the power supply out of the bay.

What to do next

Install a DC power supply in the open slot.

Installing an AC Power Supply

You can replace one power supply while the other one provides power to the switch.

Before you begin

- The power supply that you are installing must be capable of using the same airflow direction as the fan trays installed in the same switch. It must use the same type of power source as the other power supply installed in the same switch. (Do not mix AC and DC power supplies in the same switch.)

Note If the power supply that you are replacing has a different color handle than the replacement power supply, verify that it has or will have the same airflow direction as the other modules in the switch.

- An AC power source must be within reach of the power cable that will be used with the replacement power supply. If you are using *n*+*n* power redundancy, there must be a separate power source for each power supply installed in the chassis. Otherwise, only one power source is required.
- There must be an earth-ground connection to the chassis that you are installing the replacement module. Typically, the chassis is grounded by its metal-to-metal connection with a grounded rack. If you need to ground the chassis, see Grounding the Chassis, on page 28.

Procedure

Step 1 Holding the replacement power supply with one hand underneath the module and the other hand holding the handle, turn the power supply so that its release latch is on the side. Align the back end of the power supply (the end with the electrical connections) to the open power supply slot. Carefully slide the power supply all the way into the slot until it clicks into place.

Note
If the power supply does not fit into the open slot, turn the module over, before sliding it carefully into the open slot.

Step 2 Test the installation by trying to pull the power supply out of the slot without using the release latch.

If the power supply does not move out of place, it is secured in the slot. If the power supply moves, carefully press it all the way into the slot until it clicks into place.

Step 3 Attach the power cable to the electrical inlet on the front of the power supply.

Step 4 Verify that the other end of the power cable is attached to the appropriate power source for the power supply.

Step 5 Verify that the power supply is operational by making sure that the power supply LED is green.

Installing an HVAC/HVDC Power Supply

You can replace one power supply while the other one provides power to the switch.



Note If the power supply that you are replacing has a different color handle than the replacement power supply, verify that it has or will have the same airflow direction as the other modules in the switch.

Before you begin

- If you are using *n*+*n* power redundancy, there must be a separate power source for each power supply installed in the chassis. Power sources must be of the same type—do not mix AC and DC power sources for the same switch. Otherwise, only one power source is required.
- There must be an earth-ground connection to the chassis that you are installing the replacement module. Typically, the chassis is grounded by its metal-to-metal connection to a grounded rack. If you need to ground this chassis by another means, see Grounding the Chassis, on page 28.

Procedure

Step 1 Holding the replacement power supply with one hand underneath the module and the other hand holding the handle, turn the power supply so that its release latch is on the side. Align the back end of the power supply (the end with the electrical connections) to the open power supply slot. Carefully slide the power supply all the way into the slot until it clicks into place.

Note
If the power supply does not fit into the open slot, turn the module over. Slide it into the open slot.

Step 2 Test the installation by trying to pull the power supply out of the slot without using the release latch.

If the power supply does not move out of place, it is secured in the slot. If the power supply moves, carefully press it all the way into the slot until it clicks into place.

Step 3 Insert the power supply cord Anderson SAF-D-Grid connector into the power supply inlet. Ensure the connector is locked. Gently tug on the cord near the connector to ensure the locking tab is engaged.

Step 4 Verify that the other end of the power cable is connected to the appropriate power source for the power supply.

Step 5 If using an HVDC power source, turn on the circuit breaker for the DC power source connected to the power supply.

Step 6 Verify that the power supply is operational by making sure that the power supply LED is green.

Installing a DC Power Supply

You can replace one power supply while the other one provides power to the switch.

Before you begin

- The circuit breaker for the DC power source for the power supply must be turned off.
- The power supply that you are installing must be capable of using the same airflow direction as the fan trays installed in the same switch.
- A DC power source must be within reach of the power cable that will be used with the replacement power supply. If you are using *n*+*n* power redundancy, there must be a separate power source for each power supply installed in the chassis. Otherwise, only one power source is required.
- There must be an earth-ground connection to the chassis that you are installing the replacement module. Typically, the chassis is grounded by its metal-to-metal connection to a grounded rack. If you need to ground this chassis by another means, see Grounding the Chassis, on page 28.
- All DC power supplies have reverse polarity protection. When you inadvertently connect the input power (+) to the DC PSU's – terminal and the input power – to the DC PSU's (+) terminal, the PSU will not be damaged and will operate fine after the input power feeds are correctly wired.

Procedure

Step 1 Holding the replacement power supply with one hand underneath the module and the other hand holding the handle, turn the power supply so that its release latch is on the side. Align the back end of the power supply (the end with the electrical connections) to the open power supply slot. Carefully slide the power supply all the way into the slot until it clicks into place.

Note
If the power supply does not fit into the open slot, turn the module over. Carefully slide it into the open slot.

Step 2 Verify the rack is properly grounded, so that when the chassis is installed in the rack, it will be grounded.

Step 3 Turn on the circuit breaker for the DC power source connected to the power supply.

Step 4 Verify that the power supply is operational by making sure that the power supply LED is green.

Installing and Removing Small-Form Pluggable Modules

Before you begin

See the Cisco N93400LD-H1 switch datasheet on cisco.com for a list of supported SFP and SFP+ modules. Use only supported SFP/SFP+ modules on the platform.

Warning **Statement 1008—**Class 1 Laser Product

This product is a Class 1 laser product.

Note We recommend that you wait 30 seconds between removal and insertion of an SFP on an interface module. This allows the transceiver software to initialize and synchronize with the standby RSP. Changing an SFP more quickly could result in transceiver initialization issues that disable the SFP.

Note QSFP-DD optic (400G/200G) should have a wait time of 2 minutes between removal and reinsertion.

- Do not remove the dust plugs from the SFP and SFP+ modules or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the module ports and cables from contamination and ambient light.
- Removing and installing an SFP and SFP+ module can shorten its useful life. Do not remove and insert any SFP/SFP+ module more often than is necessary.

- To prevent ESD damage, follow your normal board and component handling procedures when connecting cables to the switch and other devices.
- When you insert several SFP and SFP+ modules in multiple ports, wait for 5 seconds between inserting each SFP/SFP+. This will prevent the ports from going into error / disabled mode. Similarly, when you remove an SFP and SFP+ from a port, wait for 5 seconds before reinserting it.

SUMMARY STEPS

1. Attach an ESD-preventive wrist strap to your wrist and to an earth ground surface.
2. Find the send (TX) and receive (RX) markings that identify the top of the SFP/SFP+ module.
3. If the SFP/SFP+ module has a bale-clasp latch, move it to the open, unlocked position.
4. Align the module in front of the slot opening and push until you feel the connector snap into place.
5. If the module has a bale-clasp latch, close it to lock the SFP/SFP+ module in place.
6. Remove the SFP and SFP+ dust plugs and save.
7. Connect the SFP and SFP+ cables.

DETAILED STEPS

Procedure

	Command or Action	Purpose
Step 1	Attach an ESD-preventive wrist strap to your wrist and to an earth ground surface.	
Step 2	Find the send (TX) and receive (RX) markings that identify the top of the SFP/SFP+ module.	On some SFP/SFP+ modules, the send and receive (TX and RX) markings might be shown by arrows that show the direction of the connection.
Step 3	If the SFP/SFP+ module has a bale-clasp latch, move it to the open, unlocked position.	
Step 4	Align the module in front of the slot opening and push until you feel the connector snap into place.	
Step 5	If the module has a bale-clasp latch, close it to lock the SFP/SFP+ module in place.	
Step 6	Remove the SFP and SFP+ dust plugs and save.	
Step 7	Connect the SFP and SFP+ cables.	

Install and Remove OSFP/QSFP Transceiver Modules

This section provides the installation, cabling, and removal instructions for the Quad Small Form-Factor Pluggable transceiver modules. Refer to the Cisco Transceiver Modules Compatibility Information for additional details on optical transceivers.

The figure shows a typical 800-Gigabit QSFP-DD optical transceiver.

Installing the Transceiver Module

Warning **Statement 1079—**Hot Surface

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



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

Caution Protect the transceiver ports by inserting clean dust caps (8000-QSFP-DCAP) into any ports not in use or that do not have optical modules plugged in. If optical modules are plugged in but not in use, use the dust caps that were supplied with the optical modules to protect the TX and RX surfaces of the optical module.

Clean the optic surfaces of the fiber cables before you plug them back into the optical ports of another module.

The switch ships with dust caps plugged in. We **highly** recommend you keep the dust caps plugged in until you are ready to plug an optic. The dust caps protect the ports from possible EMI interference and also avoid contamination due to dust collection.

Caution To meet the EMI interference requirements, use the metal dust caps when the ports are not in use by optical modules.

Before you begin

Required Tools and Equipment

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

Procedure

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

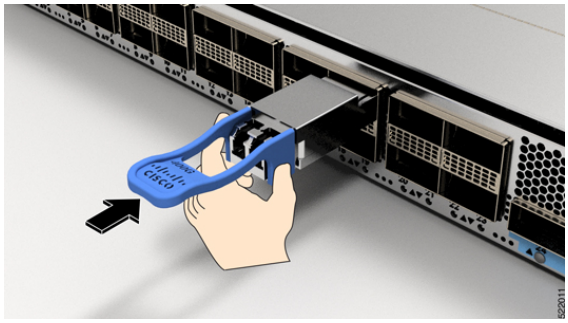
Step 2 Remove the transceiver module from its protective packaging.

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

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

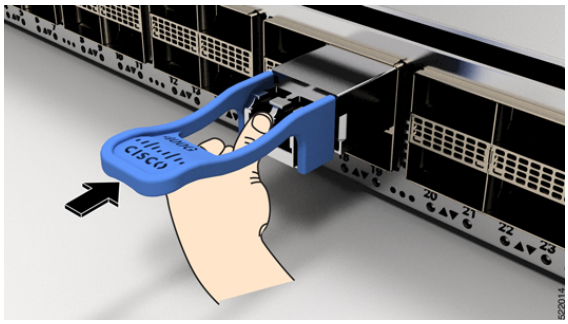
Step 5 Align the transceiver module in front of the module's transceiver socket opening and carefully slide the transceiver into the socket until the transceiver contacts the socket electrical connector.

Figure 2: Installing the QSFP Transceiver Module



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

Figure 3: Seating the QSFP Transceiver Module



IMPORTANT: If the latch isn't fully engaged, you might accidentally disconnect the transceiver module.

Attaching the Optical Network Cable

Before you begin

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

- Keep the protective dust plugs installed in the unplugged fiber-optic cable connectors and in the transceiver optical bores until you are ready to make a connection.
- Inspect and clean the optical connector end faces just before you make any connections.
- Grasp the optical connector only by the housing to plug or unplug a fiber-optic cable.

Note

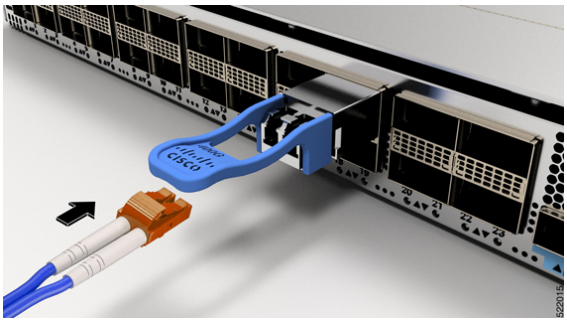
- The transceiver modules and fiber connectors are keyed to prevent incorrect insertion.
- The multiple-fiber push-on (MPO) connectors on the optical transceivers support network interface cables with either physical contact (PC) or ultra-physical contact (UPC) flat polished face types. The MPO connectors on the optical transceivers do not support network interface cables with an angle-polished contact (APC) face type.
- Inspect the MPO connector for the correct cable type, cleanliness, and any damage. For complete information on inspecting and cleaning fiber-optic connections, see the *Inspection and Cleaning Procedures for Fiber-Optic Connections* document.

Procedure

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

Step 2 Attach the network interface cable MPO connectors immediately to the transceiver module.

Figure 4: Cabling a Transceiver Module



Removing the Transceiver Module

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

To remove a transceiver module, use these steps:

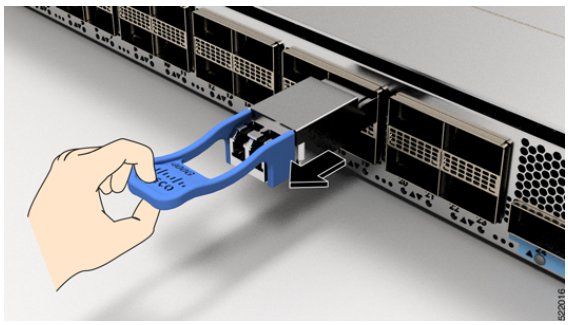
Procedure

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

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

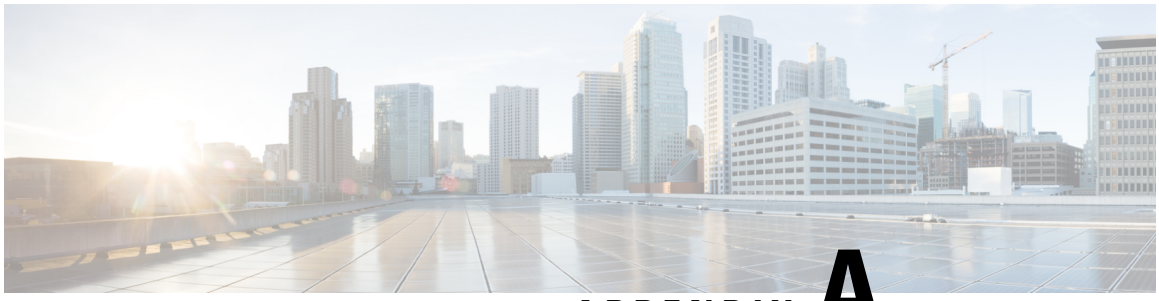
Step 3 Grasp the pull-tab and gently pull to release the transceiver from the socket.

Figure 5: Removing the QSFP Transceiver Module



Step 4 Slide the transceiver out of the socket.

Step 5 Place the transceiver module into an antistatic bag.



APPENDIX A

Rack Specifications

- Overview of Racks, on page 53
- General Requirements for Cabinets and Racks, on page 53
- Requirements Specific to Standard Open Racks, on page 54
- Requirements Specific to Perforated Cabinets, on page 54
- Cable Management Guidelines, on page 54

Overview of Racks

Install the switch in these types of cabinets and racks, assuming an external ambient air temperature range of 0 to 104°F (0 to 40°C):

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

Note

- If you are using an enclosed cabinet, we recommend one of the thermally validated types, either standard perforated or solid-walled with a fan tray.
- We do not recommend using racks that have obstructions (such as power strips). The obstructions could impair access to field-replaceable units (FRUs).

General Requirements for Cabinets and Racks

The cabinet or rack must meet these requirements:

- Standard 19-inch (48.3 cm) (two- or four-post EIA cabinet or rack, with mounting rails that conform to English universal hole spacing per section 1 of ANSI/EIA-310-D-1992). For more information, see Requirements Specific to Perforated Cabinets, on page 54.

  The spacing between the posts of the rack must be (EIA-310-D-1992 19-inch rack compatible) wide enough to accommodate the width of the chassis.

- The minimum vertical rack space requirement per chassis is:
  - For a one RU (rack unit) switch, 1.75 inches (4.4 cm)
  - For a one and a half RU (rack unit) switch, 2.63 (6.68 cm)
  - For a two RU (rack unit) switch, 3.5 inches (8.8 cm)
  - For a three RU (rack unit) switch, 5.25 inches (13.3 cm)
- The width between the rack-mounting rails must be at least 17.75 inches (45.0 cm) if the rear of the device is not attached to the rack. For four-post EIA racks, this measurement is the distance between the two front rails.

Four-post EIA cabinets (perforated or solid-walled) must meet these requirements:

- The minimum spacing for the bend radius for fiber-optic cables should have the front-mounting rails of the cabinet offset from the front door by a minimum of 3 inches (7.6 cm).
- The distance between the outside face of the front mounting rail and the outside face of the back mounting rail should be 23.0 to 30.0 inches (58.4 to 76.2 cm) to allow for rear-bracket installation.

Requirements Specific to Standard Open Racks

If you are mounting the chassis in an open rack (no side panels or doors), ensure that the rack meets these requirements:

- The minimum vertical rack space per chassis must be equal to the rack unit (RU) of the chassis. One rack unit is equal to 1.75 inches (4.4 cm).
- The distance between the chassis air vents and any walls should be 2.5 inches (6.4 cm).

Requirements Specific to Perforated Cabinets

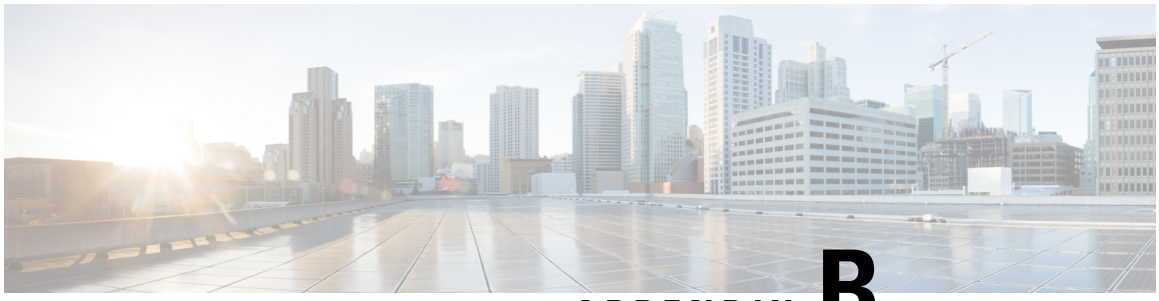
A perforated cabinet has perforations in its front and rear doors and side walls. Perforated cabinets must meet these requirements:

- The front and rear doors must have at least a 60 percent open area perforation pattern, with at least 15 square inches (96.8 square cm) of open area per rack unit of door height.
- The roof should be perforated with at least a 20 percent open area.
- The cabinet floor should be open or perforated to enhance cooling.

The Cisco R Series rack conforms to these requirements.

Cable Management Guidelines

To help with cable management, allow additional space in the rack above and below the chassis to make it easier to route all of the fiber optic or copper cables through the rack.



APPENDIX B

System Specifications

- Environmental Specifications, on page 55
- Switch Dimensions, on page 55
- Switch and Module Weights and Quantities, on page 56
- Transceiver and Cable Specifications, on page 56
- Switch Power Input Requirements, on page 56
- Power Specifications, on page 57
- Power Cable Specifications, on page 58
- Regulatory Standards Compliance Specifications, on page 60

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	Operating	5 to 90%
	Nonoperating	5 to 95%
Altitude	Altitude rating is 10,000 ft (3048 m). For China, it is 6,562 ft (2000 m).	

Switch Dimensions

Switch	Width	Depth	Height
Cisco N93400LD-H1	17.3 inches (43.94 cm)	19.69 inches (50.0 cm)	1.72 inches (4.4 cm) (1 RU)

Switch and Module Weights and Quantities

Component	Weight per Unit	Quantity
Cisco N93400LD-H1 Chassis (N9K-C93400LD-H1)	18.7 lb (8.48 kg)	1
Fan Module – Port-side exhaust (blue) (NXA-SFAN-35CFM-PE) – Port-side intake (burgundy) (NXA-SFAN-35CFM-PI)	— 0.277 lb (0.125 kg)	5
Power Supply module – 1400-W AC port-side exhaust (blue) (NXA-PAC-1400W-PE) – 1400-W AC port-side intake (burgundy) (NXA-PAC-1400W-PI) – 2000-W HVAC/HVDC port-side intake (burgundy) (N9K-PHV-2KW-PI) – 2000-W DC port-side exhaust (blue) (NXA-PDC-2KW-PE) – 2000-W DC port-side intake (burgundy) (NXA-PDC-2KW-PI)	— 2.5 lb (1.13 kg) 2.5 lb (1.13 kg) 2.73 lb (1.23 kg) 2.73 lb (1.23 kg) 2.73 lb (1.23 kg)	2 (1 for operations and 1 for redundancy)

Transceiver and Cable Specifications

To see the transceiver specifications and installation information, see https://www.cisco.com/c/en/us/support/interfaces-modules/transceiver-modules/products-device-support-tables-list.html.

Switch Power Input Requirements

This table lists the typical amount of power that the switch consumes. It also lists the maximum amount of power that you must provision for the switch and power supply for peak conditions.

Note Some power supplies have capabilities that are greater than the maximum power requirements for a switch. To determine the power consumption characteristics for the switch, use the typical and maximum requirements that are listed here.

Note If you want to use optics that consume **5W or more power on all the 36 ports**, you must install 1100W power supplies.

Switch	Typical Power Consumption (AC or DC)	Maximum Power Consumption (AC or DC)	Heat Dissipation Requirement
Cisco N93400LD-H1	394 W	765	2610.288 BTUs per hour

Power Specifications

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

1400-W AC Power Supply Specifications

Property	Specification
Input Voltage Range	100 VAC to 127 VAC 200 VAC to 240 VAC
Input Frequency	50 to 60 Hz
Efficiency	90% or greater (20 to 100% load)
Output Power	1,000 W/36 W 100-127 VAC 1,400 W/36 W 200-240 VAC
Redundancy Modes	1 +1
RoHS Compliance	Yes
Hot Swappable	Yes

2000-W HVAC/HVDC Power Supply Specifications

These specifications apply to the NXA-PHV-2KW power supplies.

Property	Specification
Power	2000 W
Input Voltage Range	200 to 277 VAC 240 VDC to 380 VDC
Output Power	2000W (36W standby)
Frequency	50 to 60 Hz (200 to 277 VAC)

Property	Specification
Efficiency	90% or greater (20 to 100% load)
Redundancy Modes	1+1
RoHS Compliance	Yes
Hot Swappable	Yes

2000-W DC Power Supply Specifications

These specifications apply to the NXA-PDC-2KW power supplies.

Property	Specification
Power	2000 W
Input Voltage Range	Nominal: -48 to -60 VDC
Frequency	-
Efficiency	90% or greater (20 to 100% load)
Output Power	2000W (36W standby)
Redundancy Modes	1+1
RoHS Compliance	Yes
Hot Swappable	Yes

Power Cable Specifications

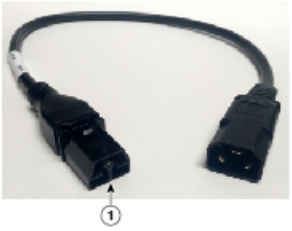
These sections show the power cables that you can order and use with this switch.

Power Cable Specifications for AC Power Supplies

Locale	Power Cord Part Number	Cord Set Description
	CAB-C13-C14-2M	Power Cord Jumper, C13-C14 Connectors, 6.6 feet (2.0 m)
	CAB-C13-CBN	Cabinet jumper power cord, 250 VAC, 10 A, C14-C13 connectors, 2.3 feet (0.7 m)
Argentina	CAB-250V-10A-AR	250 V, 10 A, 8.2 feet (2.5 m)
Australia	CAB-9K10A-AU	250 VAC, 10 A, 3112 plug, 8.2 feet (2.5 m)
Brazil	CAB-250V-10A-BR	250 V, 10 A, 6.9 feet (2.1 m)

Locale	Power Cord Part Number	Cord Set Description
European Union	CAB-9K10A-EU	250 VAC, 10 A, CEE 7/7 plug, 8.2 feet (2.5 m)
India	CAB-IND-10A	10 A, 8.2 feet (2.5 m)
India	CAB-C13-C14-2M-IN	Power Cord Jumper, C13-C14 Connectors, 6.6 feet (2.0 m)
India	CAB-C13-C14-3M-IN	Power Cord Jumper, C13-C14 Connectors, 9.8 feet (3.0 m)
Israel	CAB-250V-10A-IS	250 V, 10 A, 8.2 feet (2.5 m)
Italy	CAB-9K10A-IT	250 VAC, 10 A, CEI 23-16/VII plug, 8.2 feet (2.5 m)
Japan	CAB-C13-C14-2M-JP	Power Cord Jumper, C13-C14 Connectors, 6.6 feet (2.0 m)
North America	CAB-9K12A-NA	125 VAC, 13 A, NEMA 5-15 plug, 8.2 feet (2.5 m)
North America	CAB-AC-L620-C13	NEMA L6-20-C13, 6.6 feet (2.0 m)
Peoples Republic of China	CAB-250V-10A-CN	250 V, 10 A, 8.2 feet (2.5 m)
South Africa	CAB-250V-10A-ID	250 V, 10 A, 8.2 feet (2.5 m)
Switzerland	CAB-9K10A-SW	250 VAC, 10 A, MP232 plug, 8.2 feet (2.5 m)
United Kingdom	CAB-9K10A-UK	250 VAC, 10 A, BS1363 plug (13 A fuse), 8.2 (2.5 m)
All except Argentina, Brazil, and Japan	NO-POWER-CORD	No power cord included with switch

HVAC/HVDC Power Cables Supported by ACI-Mode and NX-OS Mode Switches

Part Number	Cord Set Description	Photo
CAB-HVAC-SD-0.6M	HVAC 2-foot (0.6 m) cable with Saf-D-Grid and SD connectors 277V AC	

Part Number	Cord Set Description	Photo
CAB-HVAC-C14-2M	HVAC 6.6-foot (2.0 m) cable with Saf-D-Grid and C14 (use for up to 240 V) connector 250V AC	
CAB-HVAC-RT-0.6M	HVAC 2-foot (0.6 m) cable with Saf-D-Grid and RT connector 277V AC	
CAB-HVDC-3T-2M	HVDC 6.6-foot (2.0 m) cable with Saf-D-Grid and three terminal connectors 300V AC / 400V DC (+200/-200 V DC)	
NO-POWER-CORD	All except Argentina, Brazil, and Japan No power cord included with switch	Not applicable

Table 1: HVAC/HVDC Power Cables Callout Table

1	Connect this end to the power supply unit.

Regulatory Standards Compliance Specifications

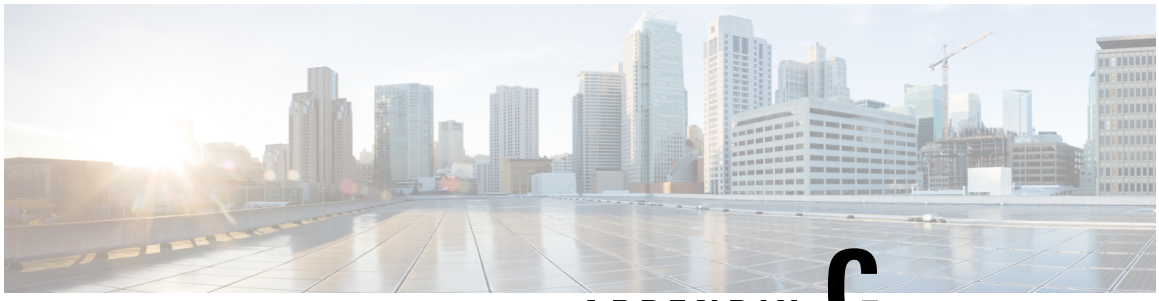
This table lists the regulatory standards compliance for the switch.

Table 2: Regulatory Standards Compliance: Safety and EMC

Specification	Description
Regulatory compliance	Products should comply with CE Markings according to directives 2004/108/EC and 2006/95/EC.

Specification	Description
Safety	• CAN/CSA-C22.2 No. 60950-1 Second Edition • CAN/CSA-C22.2 No. 62368-1-19 Third Edition • ANSI/UL 60950-1 Second edition • IEC 62368-1 • EN 62368-1 • AS/NZS 62368-1 • GB4943 • UL 62368-1
EMC: Emissions	• 47CFR Part 15 (CFR 47) Class A • AS/NZS CISPR22 Class A • CISPR22 Class A • EN55022 Class A • ICES003 Class A • VCCI Class A • EN61000-3-2 • EN61000-3-3 • KN22 Class A • CNS13438 Class A
EMC: Immunity	• EN55024 • CISPR24 • EN300386 • KN 61000-4 series
RoHS	The product is RoH-6 compliant with exceptions for leaded-ball grid-array (BGA) balls and lead press-fit connectors.

System Specifications



APPENDIX C

LEDs

- Switch Chassis LEDs, on page 63
- Fan Module LEDs, on page 64
- Power Supply LEDs, on page 64

Switch Chassis LEDs

The BCN, STS, and ENV, LEDs are located on the left side of the front of the switch. The port LEDs appear as triangles pointing up or down to the nearest port.

LED	Color	Status
BCN	Flashing blue	The operator has activated this LED to identify this switch in the chassis.
	Off	This switch is not being identified.
STS	Green	The switch is operational.
	Flashing amber	The switch is booting up.
	Amber	Temperature exceeds the minor alarm threshold.
	Red	Temperature exceeds the major alarm threshold.
	Off	The switch is not receiving power.
ENV	Green	Fans and power supply modules are operational.
	Amber	At least one fan or power supply module is not operating.
(port)	Green	Port admin state is 'Enabled', SFP is present and the interface is connected (that is, cabled, and the link is up).
	Amber	Port admin state is 'Disabled, or the SFP is absent, or both.
	Off	Port admin state is 'Enabled' and SFP is present, but interface is not connected.

LED	Color	Status
(SYNC)	Green	The frequency are synchronized to external interface. The external interface could be GPS, Recovered RX clk).
	Amber	Freerun/Holdover - Time core is in freerun or holdover mode.
	Off	Time core clock synchronization is disabled.
(TIMING)	Green	The time phase are synchronized to external interface. The external interface could be GPS (Recovered RX clk).
	Amber	Freerun/Holdover - Time core is in freerun or holdover mode.
	Off	Time core clock synchronization is disabled.
(GPS)	Green	Not supported (off)
	Off	Not supported (off)

Fan Module LEDs

LED	Color	Status
Status	Green	The fan module is operational.
	Red	The fan module is not operational (fan is probably not functional).
	Off	Fan module is not receiving power.

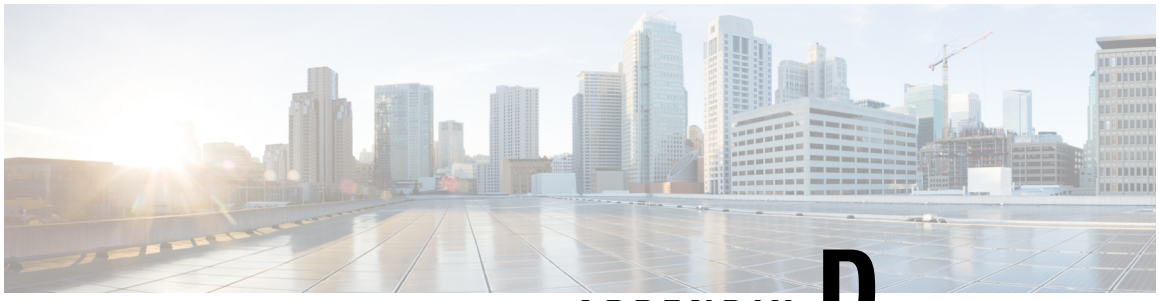
Power Supply LEDs

The power supply LEDs are located on the right portion of the power supply.

Table 3: Power Supply LEDs

LEDs	Status
Off	The power supply is not functioning due to lack of input or output power. The input voltage is below the acceptable operating range. There is no 12 V standby from a parallel power supply unit.

LEDs	Status
Solid Amber	Failure (no output) or one of these possible conditions: • AC input below operating range, but 12V standby power is being supplied from a parallel power supply unit, • Over voltage, • Over current, • Over temperature, or • OTP due to fan failure.
Blinking Amber (1 Hz)	Power supply is operating but a warning condition has occurred—possibly one of these conditions: • High temperature, • High power, or • Slow fan.
Blinking Green (2 Hz)	Input is present and its voltage is within the operating range. The power supply is in standby mode due to PSON_L=High.
Blinking Green (1 Hz)	The power supply is Bootloading (startup mode). **Note** This applies only to NXA-PDC-2KW-PI and NXA-PDC-2KW-PE power supplies.
Solid Green	The power supply provides a regulated 12 V main output and a 12 V standby output.



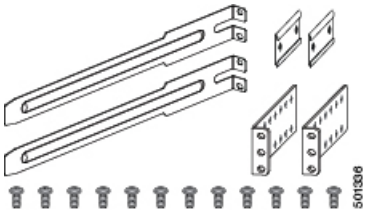
APPENDIX D

Additional Kits

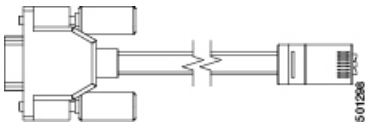
- Rack Mount Kit N3K-C3064-ACC-KIT, on page 67
- Rack Mount Kit for a Two-Post Rack, on page 68
- Airflow Sleeve, on page 68

Rack Mount Kit N3K-C3064-ACC-KIT

The following table lists and illustrates the contents for the 1-RU rack-mount kit (N3K-C3064-ACC-KIT).

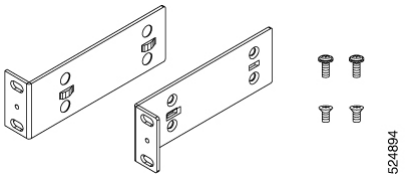
Illustration	Description	Quantity
	Rack-mount kit • Front-mount angled bracket (2) • Rear-mount slider bracket (2) • Slider rails (2) • M4 x 7 mm mounting screws (16)	1
	Ground lug kit • Two-hole lug (1) • M4 x 8-mm Phillips pan-head screws (2)	1
Not applicable	EAC Compliance document	1
Not applicable	Hazardous substances list for customers in China	1

The following table lists and illustrates the console cable (CAB-CONSOLE-RJ45) that can be ordered.

Illustration	Description	Quantity
	Console cable with DB-9F and RJ-45F connectors	1

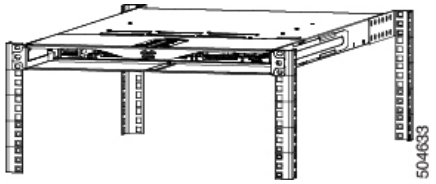
Rack Mount Kit for a Two-Post Rack

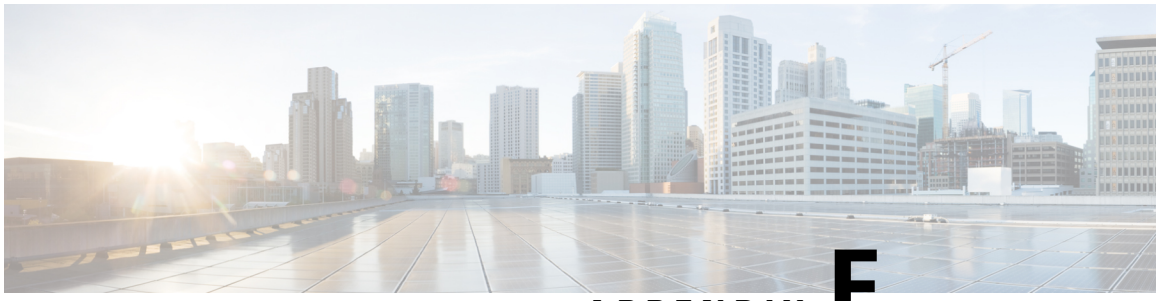
The table lists and illustrates the contents for the two-post rack-mount kit (NXK-ACC-KIT-2P).

Illustration	Description	Quantity
	Rack-mount kit • Bracket (2) • M4 Phillips pan-head screws (4) • Number-8 Phillips flat-head screws (8)	1

Airflow Sleeve

This table lists and illustrates the airflow sleeve (N9K-AIRFLOW-SLV).

Illustration	Description	Quantity
	Airflow sleeve	1



APPENDIX E

Site Preparation and Maintenance Records

- Site Preparation Checklist, on page 69
- Contact and Site Information, on page 70
- Chassis and Module Information, on page 71

Site Preparation Checklist

Planning the location and layout of your equipment rack or cabinet is essential for successful switch operation, ventilation, and accessibility.

The table lists the site planning tasks. We recommend that you complete the tasks before you install the switch. Your completion of each task ensures a successful switch installation.

Planning Activity	Verification Time and Date
Space evaluation:	
Space and layout	
Floor covering	
Impact and vibration	
Lighting	
Physical access	
Maintenance access	
Environmental evaluation:	
Ambient temperature	
Humidity	
Altitude	
Atmospheric contamination	
Airflow	

Planning Activity	Verification Time and Date
Power evaluation:	
Input power type	
Power receptacles	
Receptacle proximity to the equipment	
Dedicated (separate) circuits for power redundancy	
UPS for power failures	
Grounding: proper wire gauge and lugs	
Circuit breaker size	
Grounding evaluation:	
Data center ground	
Cable and interface equipment evaluation:	
Cable type	
Connector type	
Cable distance limitations	
Interface equipment (transceivers)	
EMI evaluation:	
Distance limitations for signaling	
Site wiring	
RFI levels	

Contact and Site Information

Use the worksheet to record contact and site information for the installation.

Contact person	
Contact phone	

Contact e-mail	
Building/site name	
Data center location	
Floor location	
Address (line 1)	
Address (line 2)	
City	
State/Provence	
Contact person	
ZIP/postal code	
Country	

Chassis and Module Information

Use the worksheet to record information about the switch.

Contract number	
Chassis serial number	
Product Identification (PID) number	

Use the worksheet to record network-related information.

Switch IP address	
Switch IP netmask	
Hostname	
Domain name	
IP broadcast address	
Gateway/router address	
DNS address	

Use the worksheet to record information about the modules in the switch.

Module Slot	Module Type	Module Serial Number	Notes
QSFP/QSFP-DD Tranceiver			

Module Slot	Module Type	Module Serial Number	Notes
SFP/SFP+ Tranceiver			