Cisco N93180YC-EX ACI Mode Hardware Installation Guide

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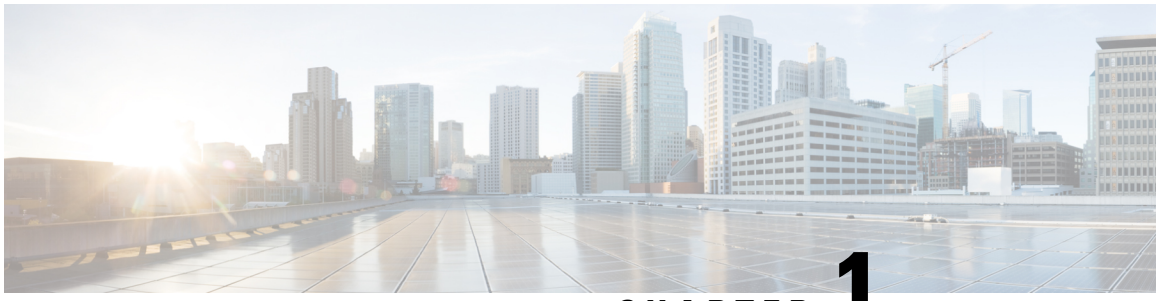


CHAPTER 1

Overview

• Overview, on page 1

Overview

The Cisco N9K-C93180YC-EX switch is a 1-RU, fixed-port switch designed for spine-leaf-APIC deployment in data centers. This switch has 48 10/25-Gigabit SFP+ Application Policy Infrastructure Controllers (APICs) facing ports that also support 1-Gigabit connections, and it has six fixed 40/100-Gigabit QSFP28 spine-facing ports. The chassis for this switch includes the following user-replaceable components:

Note You can order this switch in a 24-port configuration (N9K-C93180YC-EX-24)

- Fan modules (four) with the following airflow choices:
  - Port-side intake airflow with burgundy coloring (NXA-FAN-30CFM-B)
  - Port-side exhaust airflow with blue coloring (NXA-FAN-30CFM-F)

Note Each fan module has two rotors. The switch can function normally if one rotor inside the any one fan module fails. In case of more than one rotor failure, the switch will issue a warning and power down in 2 minute.

- Power supply modules (two—One for operations and one for redundancy [1+1]) with the following choices:
  - 650-W AC power supply with port-side intake airflow (burgundy coloring) (NXA-PAC-650W-PI)
  - 650-W AC power supply with port-side exhaust airflow (blue coloring) (NXA-PAC-650W-PE)
  - 1200-W HVAC/HVDC power supply with dual-direction airflow (white coloring) (N9K-PUV-1200W)
  - 930-W DC power supply with port-side exhaust airflow (gray coloring) (UCS-PSU-6332-DC)
  - 930-W DC power supply with port-side intake airflow (green coloring) (UCSC-PSU-930WDC)

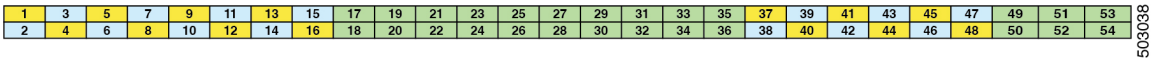
- 930-W DC power supply with port-side intake airflow (burgundy coloring) (NXA-PDC-930W-PI)
- 930-W DC power supply with port-side exhaust airflow (blue coloring) (NXA-PDC-930W-PE)

Note Both power supplies must be the same type. Do not mix AC, DC, or HVAC/HVDC power supplies.

Note All fan modules and power supplies must use the same airflow direction during operations. If you are using the 1200-W HVAC/HVDC power supply, the power supply automatically uses the same airflow direction as used by the other modules in the switch.

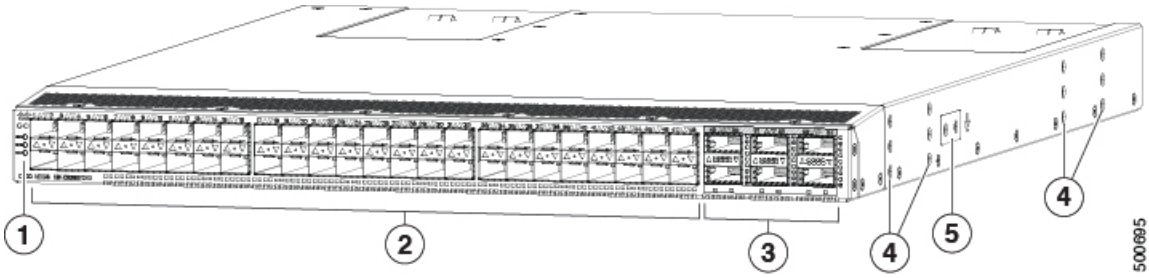
Deployment Scheme for SFP-10G-T-X Transceivers

The following figure shows the maximum configuration density of SFP-10G-T-X SFP+ transceivers for this switch.



	Active Port deploying the SFP+ 10GBASE-T transceiver, with max power consumption up to 2.5W. Once configured with “media-type 10g-tx” in NX-OS or “Link Level Policy -> Physical Media Type -> SFP 10G TX” in ACI, these ports can deploy SFP-10G-T-X. Without such configuration, they behave like normal ports.
	Port Shutdown or Active with Passive Copper Cables only (Max. power consumption up to 0.1W). Once 10g-tx is configured on yellow ports, ports to the left, right, top and bottom of the yellow port are referenced as blue ports. These adjacent ports will then support only low power Passive Copper DAC cable, or these can be left empty to conserve power. If 10g-tx configuration is removed from adjacent yellow ports, the blue ports will revert to behaving like normal ports.
	Active Port deploying any Cisco 1/10/25G optics (SFP, SFP+, SFP28) EXCLUDING SFP+ 10GBASE-T, with max power consumption up to 1.5W. These ports are not part of any scheme and can deploy all regular Cisco optics and behave like normal ports.

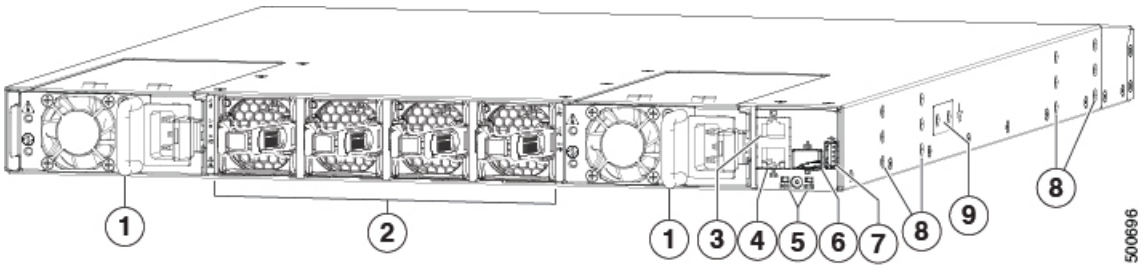
The following figure shows the hardware features seen from the port side of the chassis.



1	Chassis LEDs (Beacon [BCN], Status [STS], and Environment [ENV])	4	Screw holes (6) for attaching rack mounting brackets
2	48 10/25-Gigabit SFP+ ports to APICs	5	Screw holes (2) for attaching grounding lug
3	6 40/100-Gigabit QSFP28 optical ports for uplink connections to spine switches		

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

The following figure shows the hardware features seen from the power supply side of the chassis.



1	Two power supplies (one used for operations and one used for redundancy) (AC power supplies shown) with power supply slot 1 on the left and slot 2 on the right.	6	Out-of-band management port (SFP port)
2	Four fan modules with fan slot 1 on the left and fan slot 4 on the right	7	USB port that is used for saving or copying functions.
3	Console port (RS232 port)	8	Screw holes (6) for attaching rack mounting brackets
4	Out-of-band management port (RJ-45 port)	9	Screw holes (2) for attaching grounding lug
5	Chassis LEDs (Beacon [BCN] and Status [STS])		

Note There is a limit to USB 2.0 devices that use less than 2.5 W (less than 0.5 A inclusive of surge current). There is no support for devices, such as external hard drives, that instantaneously draw more than 0.5 A.

Depending on whether you plan to position the ports in a hot or cold aisle, you can order the fan and power supply modules with port-side intake or port-side exhaust airflow. To determine the airflow direction of the modules installed in your switch, see the following table.

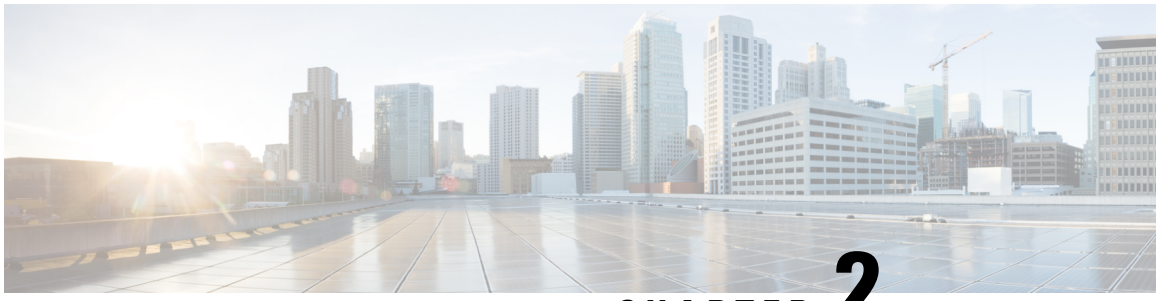
Replaceable Modules	Port-Side Intake Airflow Coloring	Port-Side Exhaust Airflow Coloring
Fans	Burgundy	Blue
AC power supplies	Burgundy	Blue

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

Note Fans and power supply modules must have the same direction of airflow. Otherwise, the switch can overheat and shut down. If you are installing a dual-direction power supply, that module will automatically use the same airflow direction as the other modules in the switch.

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.

The switch supports the Fabric Extenders (FEXs) listed at FEX Support page.



CHAPTER 2

Preparing the Site

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- Humidity Requirements, on page 6
- Altitude Requirements, on page 6
- Dust and Particulate Requirements, on page 6
- Minimizing Electromagnetic and Radio Frequency Interference, on page 7
- Shock and Vibration Requirements, on page 8
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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).

Overview of Module Temperatures

Built-in, automatic sensors in all switches in the Cisco N9000 Series monitor your switch at all times. Each module (supervisor, I/O, and fabric) has temperature sensors with two thresholds:

Note For any Major temperature alarms from the sensors, the switch powers down in 2 minutes. Power on the switch after fixing the temperature issue.

- Minor temperature threshold—If exceeded, a minor alarm occurs and these actions happen for all four sensors:
  - System messages display.
  - System sends Call Home alerts (if configured).

- System sends SNMP notifications (if configured).
- System fan speed will increment.

- Major temperature threshold—If exceeded, a major alarm occurs and these actions happen:

  If the threshold is exceeded in a switching module, only that module is shut down.

  For all sensors:

  - System messages display.
  - System sends Call Home alerts (if configured).
  - System sends SNMP notifications (if configured).
  - System fan speed will increment.
  - If the major threshold is exceeded in a switching module, only that module is shut down.
  - If the major threshold is exceeded in an active supervisor module with HA-standby or standby present, only that supervisor module is shut down and the standby supervisor module takes over.
  - If you do not have a standby supervisor module in your switch, you have 2 minutes to decrease the temperature. During this interval, the software monitors the temperature every 5 seconds and continuously sends system messages every 10 seconds, as configured.

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 650-W AC power supplies (NEBS compliant)
- Two 1200-W HVAC/HVDC power supplies
- Two 930-W DC power supplies

Note Both power supplies must be the same type. Do not mix AC, DC, and HVAC/HVDC power supplies in the same chassis.

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

The power supplies are rated to output up to 650 W (AC power supplies), up to 1200 W (HVAC/HVDC power supplies), or up to 930 W (DC power supplies), but the switch requires less than that amount of power from the power supply. To operate the switch, you must provision enough power from the power source to cover the requirements of both the switch and a power supply. Typically, this switch and a power supply require 276 W of power input from the power source, but you must provision as much as 460 W of power input from the power source to cover peak demand.

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.

Warning **Statement 1005—**Circuit Breaker when using DC power supplies

This product relies on the building's installation for short-circuit (overcurrent) protection.

- Ensure that the protective devices are rated not greater than 30A when the switch is powered with regular DC power supplies (rated 48-60VDC).
- Ensure that the protective devices are rated not greater than 10A when the switch is powered with HVDC power supplies (rated 240-350VDC).

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.
- Dual-direction airflow—The direction of the installed fan modules determines the airflow.
- 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.

- Gray coloring on DC power supplies indicates port-side exhaust airflow.
- Green coloring on DC power supplies 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:

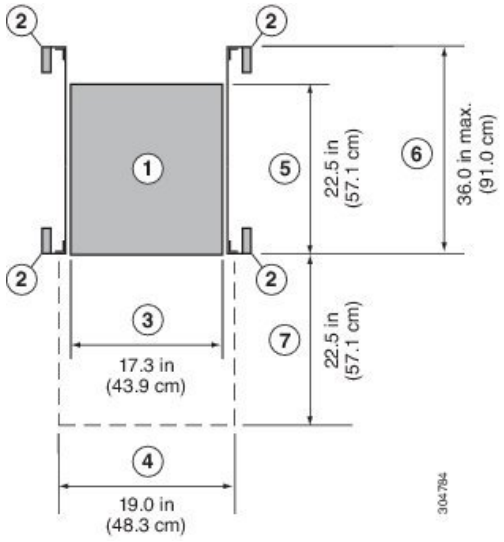
- Use a standard 19-inch (48.3-cm), four-post Electronic Industries Alliance (EIA) cabinet or rack with mounting rails that conform to English universal hole spacing per section 1 of the ANSI/EIA-310-D-1992 standard.
- The depth of a four-post rack must be 24 to 32 inches (61.0 to 81.3 cm) between the front and rear mounting rails (for proper mounting of the bottom-support brackets or other mounting hardware).
- Required clearances between the chassis and the edges of its rack or the interior of its cabinet are:
  - 4.5 inches (11.4 cm) between the front of the chassis and the interior of the cabinet (required for cabling).

- 3.0 inches (7.6 cm) between the rear of the chassis and the interior of the cabinet (required for airflow in the cabinet if used).
- No clearance is required between the chassis and the sides of the rack or cabinet (no side airflow).

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
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).
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)		

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

Network Equipment-Building System (NEBS) Statements

The regulatory compliance statements and requirements for the Network Equipment Building System (NEBS) certification are listed here.

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 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:

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:

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

The intrabuilding port(s) of the equipment or subassembly is suitable for connection to intrabuilding or unexposed wiring or cabling only. The intrabuilding port(s) of the equipment or subassembly MUST NOT be metallically connected to interfaces that connect to the OSP or its wiring for more than 6 meters (approximately 20 feet). These interfaces are designed for use as intrabuilding interfaces only (Type 2, 4, or 4a ports as described in GR-1089) and require isolation from the exposed OSP cabling. The addition of primary protectors is not sufficient protection in order to connect these interfaces metallically to an OSP wiring system.

The following ports are considered intrabuilding ports on the equipment:

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 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

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 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

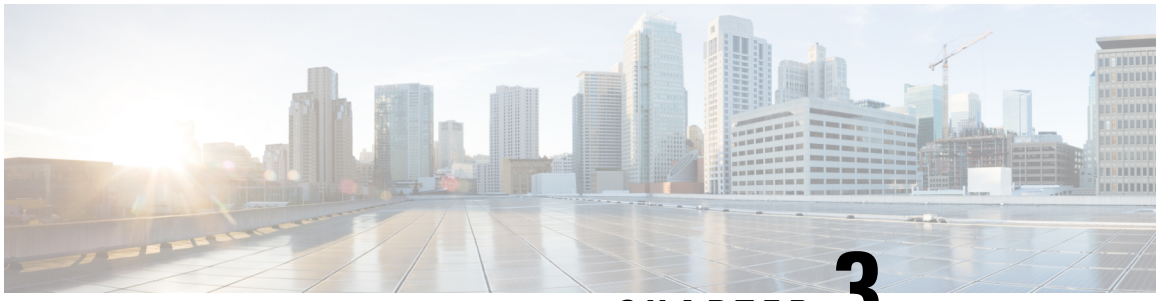
This equipment is suitable for installation in locations where the NEC applies.

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.



CHAPTER 3

Installing the Switch 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
- Procure Tools and Equipment, on page 21
- Installing the Switch Using the N3K-C3064-ACC-KIT Rack-Mount Kit, on page 22
- Grounding the Chassis, on page 26
- Starting the Switch, on page 28

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

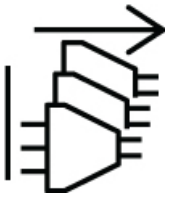
This unit is intended for installation in restricted access areas. Only skilled, instructed, or qualified personnel can access a restricted access area.

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:

- Rack-mount kit (NXK-ACC-KIT-1RU) which you can order from Cisco. This option offers you easy installation, greater stability, increased weight capacity, added accessibility, and improved removability with front and rear removal.
- Rack-mount kit (N3K-C3064-ACC-KIT) which you can order from Cisco.

The rack or cabinet that you use must meet the requirements listed in the section General Requirements for Cabinets and Racks, on page 47.

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, 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 these:
  - 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.
  - HVAC/HVDC power supplies require the following:
    - HVAC input voltage range of 230 to 277 VAC with a frequency of 50 to 60 Hz
    - HVDC input voltage range of -240 to -380 VDC
  - DC power supplies require the following:
    - DC input voltage range of –48 to -60 VDC nominal (self-ranging, –40 to –60 VDC)
    - DC line input current (steady state) of 23 A peak at –48 VDC

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.

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

Step 3 Check to be sure that each of the power supply and the fan tray modules have the expected direction of airflow.

- Port-side intake airflow modules
  - Burgundy (fan modules and AC power supplies)
  - Green (DC power supplies)
- Port-side exhaust airflow modules
  - Blue (fan modules and AC power supplies)
  - Gray (DC power supplies)
- Dual-direction airflow power-supply modules
  - White (see the color of the fan modules to determine the airflow direction used)

Note
All power supplies and fan modules must have the same direction of airflow.

Procure Tools and Equipment

Obtain these necessary tools and equipment for installing the chassis:

- Number 1 and number 2 Phillips screwdrivers with torque capability to rack-mount the chassis.
- 3/16-inch flat-blade screwdriver.
- Tape measure and level.
- ESD wrist strap or other grounding device.

- Antistatic mat or antistatic foam.
- Crimping tool for lug.
- Wire-stripping tool.
- M4 screws to fix brackets (16).
- M4 screws to fix a ground lug (2).

Installing the Switch Using the N3K-C3064-ACC-KIT Rack-Mount Kit

To install the switch, you must 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 must supply the eight 10-32 or 12-24 screws required to mount the slider rails and switch to the rack.

Before you begin

- You have inspected the switch shipment to ensure that you have everything ordered.
- Make sure that the switch rack-mount kit includes the following parts:
  - Front rack-mount brackets (2)
  - Rear rack-mount brackets (2)
  - Slider rails (2)
  - M4 x 0.7 x 8-mm Phillips countersink screws (12)
- The rack is installed and secured to its location.

Procedure

Step 1 Install two front-mount brackets to the switch as follows:

a) Determine which end of the chassis is to be located in the cold aisle as follows:

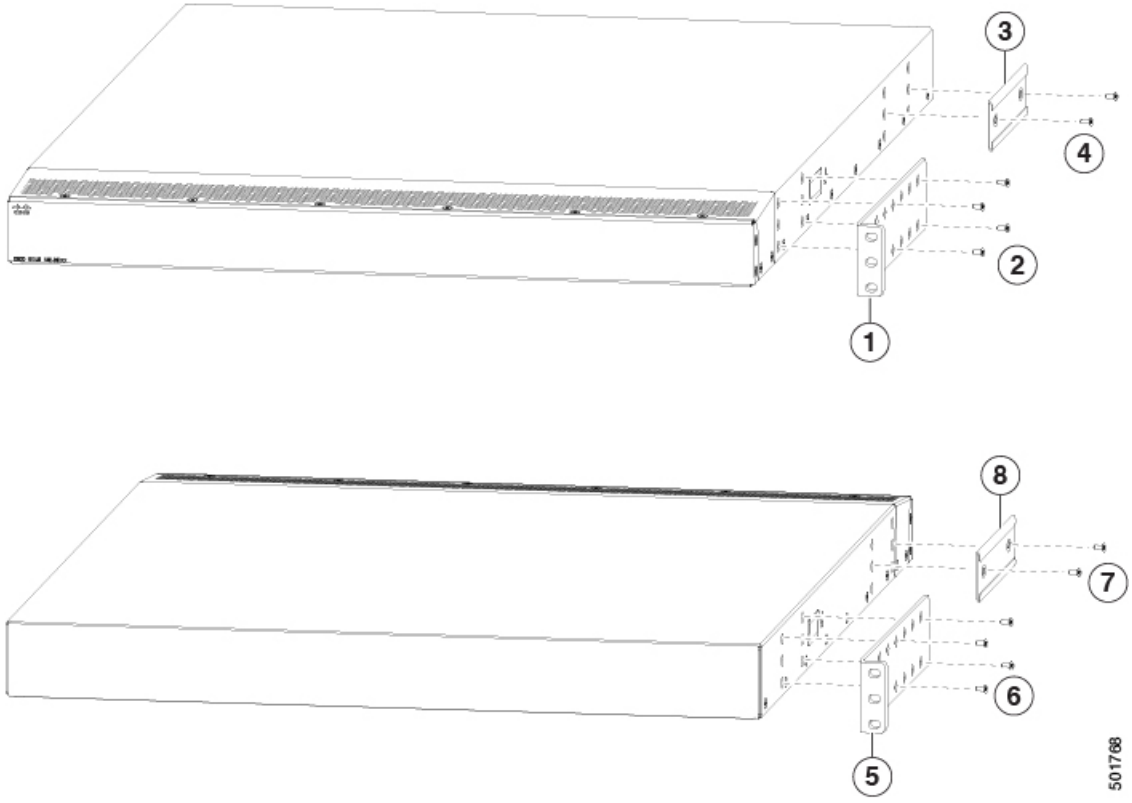
- If the switch has port-side intake modules (fan modules with burgundy coloring), position the switch so that its ports will be in the cold aisle.
- If the switch has port-side exhaust modules (fan modules with blue coloring), position the switch so that its fan and power supply modules will be in the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

Note

If the power supply modules have white coloring, look at the fan modules to determine the airflow direction for the switch.

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

Note
You can align any four of the holes in the front rack-mount bracket to four of the six screw holes on the side of the chassis (see the two ways to mount these brackets on a typical chassis, in following 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).



1	Front rack-mount bracket aligned to the port end of the chassis	5	Front rack-mount bracket aligned to the module end of the chassis
2	Four M4 screws used to attach the bracket to the chassis	6	Four M4 screws used to attach the bracket to the chassis
3	Rear rack-mount guide aligned to the module end of the chassis	7	Two M4 screws used to attach the bracket to the chassis
4	Two M4 screws used to attach the bracket to the chassis	8	Rear rack-mount guide aligned to the port end of the chassis

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 and be sure to position that bracket the same distance from the front of the switch.

Step 2 Install the two rear rack-mount brackets on the chassis as follows:

a) Align the two screw holes on a rear rack-mount bracket to the middle two screw holes in the remaining six screw holes on a side of the chassis. If you are aligning the guide to holes that are near the port connections end of the chassis, see Callout 3 in the previous figure. Otherwise, see Callout 7 in the previous figure.

b) Attach the guide to the chassis using two M4 screws (see Callout 4 or 8 in the previous figure). Tighten the screws to 12 in-lb (1.36 N·m) of torque.

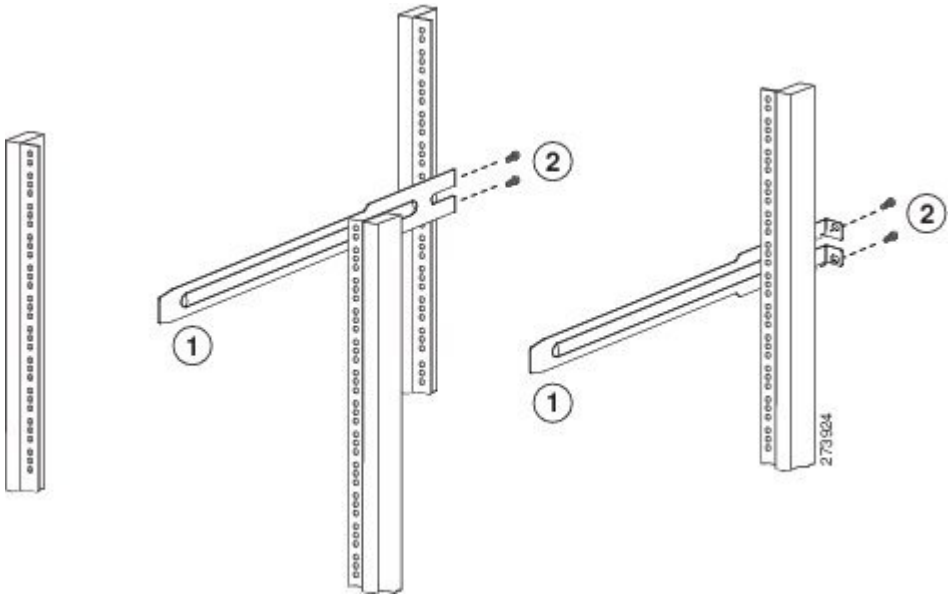
c) Repeat Step 2 for the other rear rack-mount bracket on the other side of the switch.

Step 3 If you are not installing the chassis into a grounded rack, you must attach a customer-supplied grounding wire to the chassis as explained in the Grounding the Chassis, on page 26 section.. If you are installing the chassis into a grounded rack, you can skip this step.

Step 4 Install the slider rails on the rack or cabinet as follows:

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, and 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 and use two 12-24 screws or two 10-32 screws, depending on the rack thread type, to attach the rails to the rack (see the following figure). Tighten 12-24 screws to 30 in-lb (3.39 N·m) of torque and tighten 10-32 screws to 20 in-lb (2.26 N·m) of torque.



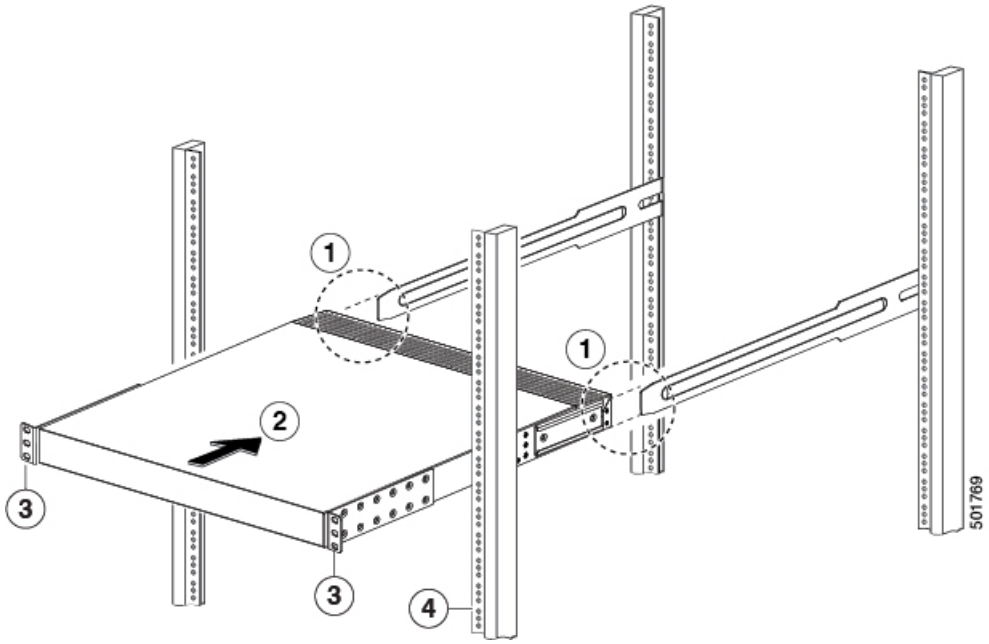
1	Slider rail with screw holes aligned to screw holes in rack	2	Two customer-supplied 12-24 or 10-32 screws used to attach each slider rail to the rack

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

To make sure that the slider rails are at the same level, you should use a level tool, tape measure, or carefully count the screw holes in the vertical mounting rails.

Step 5 Insert the switch into the rack and attach it as follows:

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 following figure).

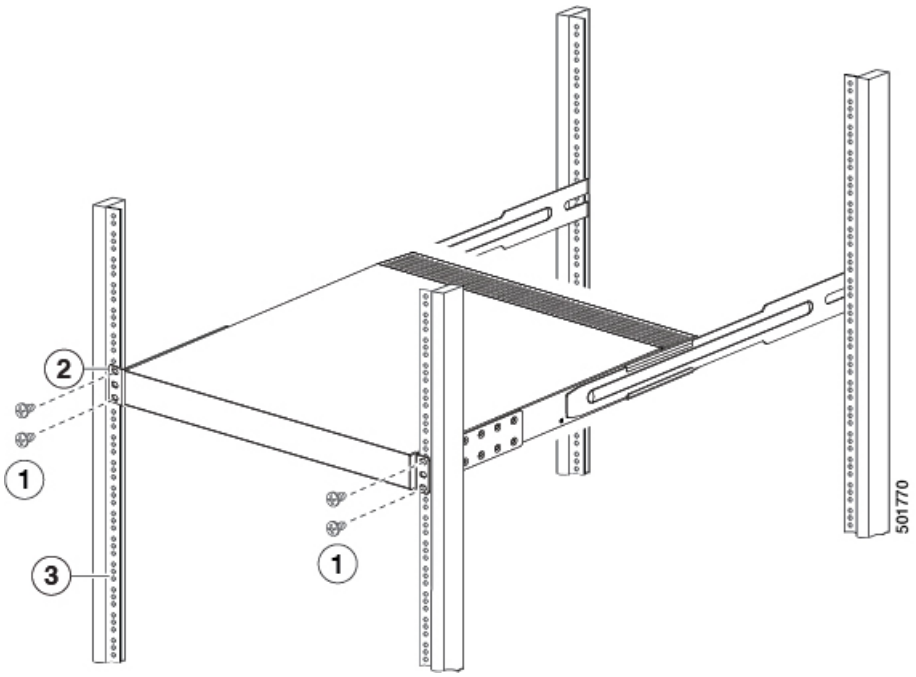


1	Align the two rear rack-mount bracket guides with the slider rails installed in the rack.	3	Front-mount brackets.
2	Slide the rack-mount guides onto the slider rails until the front rack-mount brackets come in contact with the front rack-mount rails.	4	Mounting rails on rack or cabinet posts.

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, and then 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.

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

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



1	Fasten the chassis to the front of the rack with two 12-24 or 10-32 screws on each side.	3	Mounting rails on rack or cabinet posts.
2	Front-mount bracket.		

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 6 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.

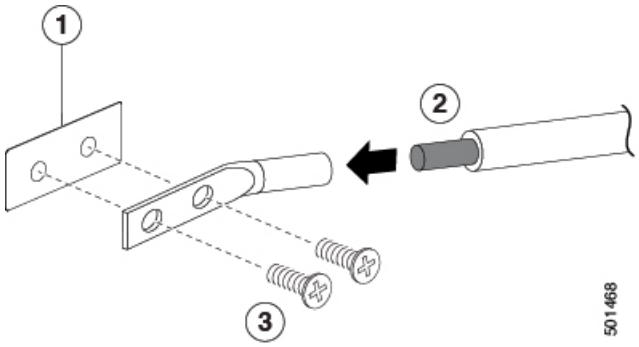
Before you begin

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:

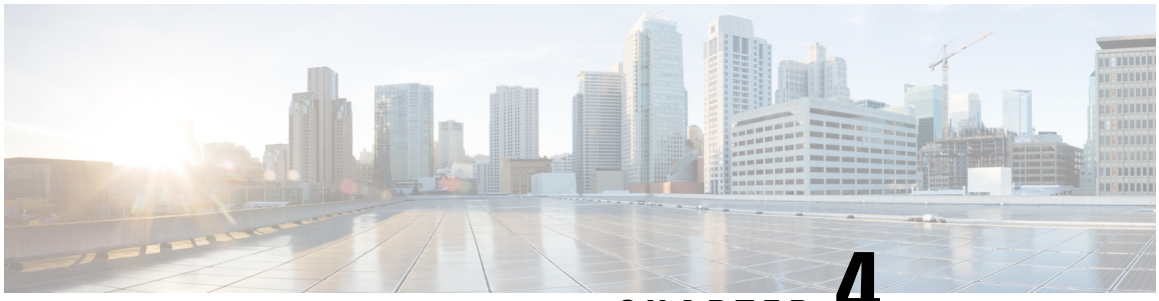
- On the fan modules, the Status (STA or STS) LED is green.

  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 31
- Preparing to Connect to Other Devices, on page 32
- Connecting Leaf Switches to APICs, on page 33
- Connecting Leaf Switches to Spine Switches, on page 35
- Installing a Gigabit Ethernet module (GEM), on page 36
- Replacing an Existing Switch in the ACI Fabric, on page 37
- Setting Up an Optional Console Interface, on page 37
- Setting Up an Optional Management Connection, on page 38
- Maintaining Transceivers and Optical Cables, on page 38

ACI Fabric Topology

The ACI fabric topology includes these major components:

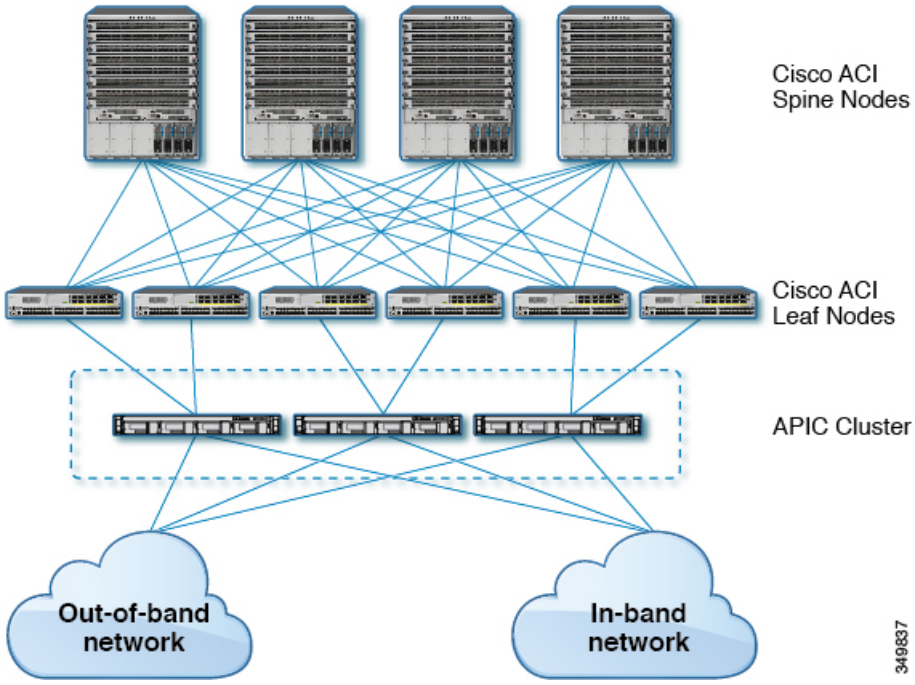
- Application Centric Infrastructure Controller (APIC) appliance (cluster of APICs)
- Leaf switches (for switch compatibility, please see the data sheets)
- Spine switches (for switch compatibility, please see the data sheets)

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.

Installing a Gigabit Ethernet module (GEM)

Procedure

Step 1 Clear the switch's current configuration. Use the `setup-clean-config` command.

Step 2 Power off the switch; disconnect the power.

Step 3 Replace the current GEM card with the new GEM card.

Step 4 Power on the switch.

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

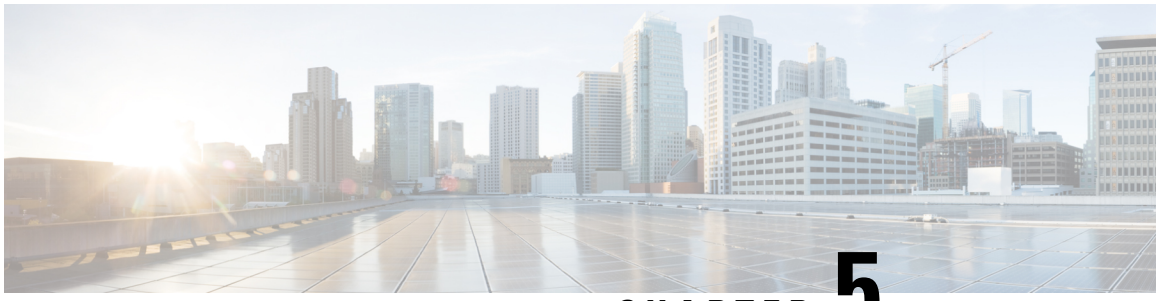
Keep transceivers and fiber-optic cables clean and dust free to maintain high signal accuracy and prevent damage to the connectors. Contamination increases attenuation (loss of light) and should be below 0.35 dB.

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

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.

Replacing an AC Power Supply

Replace an AC power supply during operations as long as the other power supply provides power to the switch.

Before you begin

Note Determine the airflow direction by looking at the coloring of the latch on each power supply. AC power supplies with burgundy latches have port-side *intake* airflow direction AC power supplies with blue latches have port-side *exhaust* airflow direction.

- The replacement power supply must have the same wattage and airflow direction as the power supply being replaced. Do not mix AC, DC, HVAC/HVDC power supplies in the same 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.
- There must be an earth ground connection to the chassis that you are installing the replacement module. AC power supplies connected to AC power sources are automatically grounded through their power cable.

Procedure

Step 1 Remove an AC power supply.

a) Holding the plug for the power cable, pull the plug out from the power receptacle on the power supply and verify that both power supply LEDs are off.
b) Grasp the power supply handle while pressing the colored release latch towards the power supply handle.
c) 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 connections on the back side of the module and prevent anything else from coming into contact with and damaging the connectors.

Step 2 Install the replacement power supply.

a) 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 right side and align the back end of the power supply (the end with the electrical connections) to the open power supply slot before carefully sliding 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.

b) 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 in place.

c) Attach the power cable to the electrical outlet on the front of the power supply.
d) Make sure that the other end of the power cable is attached to the appropriate power source for the power supply.

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

e) Verify that the power supply is operational by making sure that the power supply LED is green.

Replacing a High Voltage (HVAC/HVDC) Power Supply

Replace an HVACHVDC power supply during operations as long as the other power supply provides power to the switch.

Before you begin

- The replacement power supply must have the same wattage and airflow direction as the power supply being replaced. Do not mix AC, DC, HVAC/HVDC power supplies in the same switch.

Note Determine the airflow direction by looking at the coloring of the latch on each power supply. HVAC/HVDC power supplies have white latches. White latches indicate that they have dual airflow directional capability. Those power supplies automatically use the same airflow direction as the fan modules installed in the same switch.

- An HVAC/HVDC 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.
- There must be an earth ground connection to the chassis in which you are installing the replacement power supply. HVAC/HVDC power supplies connected to AC power sources are automatically grounded by their power cable when connected to the power supply and AC power source. HVAC/HVDC power supplies connected to DC power sources have Saf-D-Grid power cables with three connectors on the power source end--you connect one of those connectors to the earth ground.

Procedure

Step 1 Remove an HVAC/HVDC power supply.

a) Turn off the circuit breaker for the power feed to the power supply that you are replacing.

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

b) Remove the power cable from the power supply by pressing the tab on the top of the Anderson Power SAF-D-Grid connector and pull the cable and connector out of the power supply.
c) Grasp the power supply handle while pressing the colored release latch towards the power supply handle.
d) 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 connections on the back side of the module and prevent anything else from coming into contact with and damaging the connectors.

Step 2 Install the replacement power supply.

a) 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 right side and align the back end of the power supply (the end with the electrical connections) to the open power supply slot before carefully sliding 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.

b) 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 in place.

c) Attach the Saf-D-Grid end of the power cable to the electrical outlet on the front of the power supply.
d) Make sure that the other end of the power cable is attached to the appropriate power source for the power supply.
   - For an HVAC power source, plug the other end of the power cable into the power source.
   - For a HVDC power source, verify that the circuit breaker is turned off and then connect each of the three cable connectors to the appropriate DC and grounding terminals on the power source. If there is a cover plate for the DC terminals, install the plate to prevent accidental contact with the terminals.

e) If using an HVDC power source, turn on the circuit breaker for the power source.
f) Verify that the power supply is operational by making sure that the power supply LED is green.

Replacing a DC Power Supply

Replace a DC power supply during operations so long as the other power supply provides power to the switch.

Before you begin

- Replace a power supply with the same wattage and airflow direction as the power supply being replaced. Do not mix AC, DC, HVAC/HVDC power supplies in the same switch.

Note Determine the airflow direction by looking at the coloring of the latch on each power supply. AC power supplies with burgundy latches have port-side *intake* airflow direction. AC power supplies with blue latches have port-side *exhaust* airflow direction.

- A DC power source must be within reach of the power cables 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.
- There must be an earth ground connection to the chassis in which you are installing the replacement power supply. If the switch is mounted properly in a grounded rack then there is no need to ground the PSU. Some DC power supplies connected to DC power sources have three power cables (two for DC power and one for grounding). Some, like the (NXA-PDC-1100W) only have two power cables (both for DC power).
- We recommend 8-AWG wire for DC installation in the U.S.

- 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 Remove a DC power supply.

a) Turn off the circuit breaker for the power feed to the power supply that you are replacing.

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

b) Remove the DC power connector block from the power supply.

1. Push the orange plastic button on the top of the connector block inward toward the power supply.
2. Pull the connector block out of the power supply.

c) Grasp the power supply handle while pressing the release latch towards the power supply handle.

d) 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 connections on the back side of the module and prevent anything else from coming into contact with and damaging the connectors.

Step 2 Install the replacement power supply.

a) 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 right side and align the back end of the power supply (the end with the electrical connections) to the open power supply slot before carefully sliding 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.

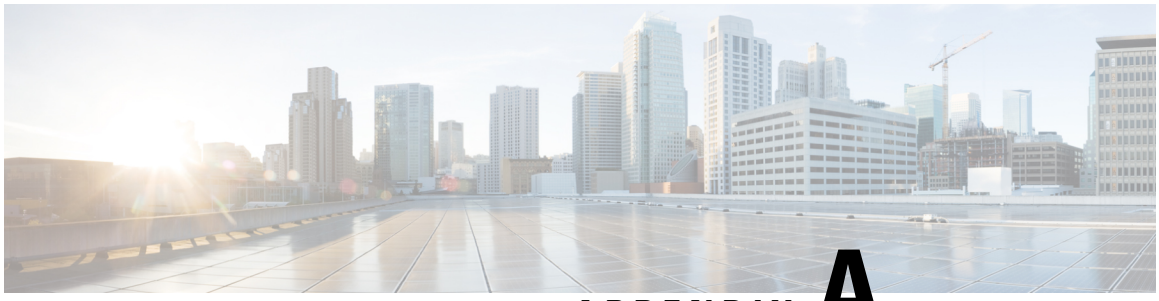
b) Test the installation by trying to pull the power supply out of the slot without using the release latch.

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 in place.

c) Attach the power connector block end of the power cable to the electrical outlet on the front of the power supply.

d) Turn on the circuit breaker for the power source.

e) Verify that the power supply is operational by making sure that the power supply LED is green.



APPENDIX A

Rack Specifications

- Overview of Racks, on page 47
- General Requirements for Cabinets and Racks, on page 47
- Requirements Specific to Standard Open Racks, on page 48
- Requirements Specific to Perforated Cabinets, on page 48
- Cable Management Guidelines, on page 48

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 48.

  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

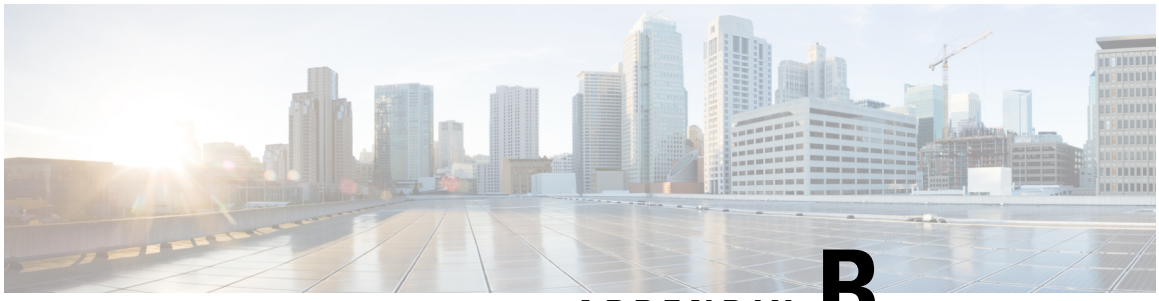
A perforated cabinet has perforations in its front and rear doors and side walls. Perforated cabinets must meet these requirements:

- 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 49
- Switch Dimensions, on page 49
- Switch and Module Weights and Quantities, on page 50
- Transceiver and Cable Specifications, on page 50
- Switch Power Input Requirements, on page 50
- Power Specifications, on page 51
- Power Cable Specifications, on page 54
- Regulatory Standards Compliance Specifications, on page 56

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	Operating	0 to 13,123 feet (0 to 4,000 meters)

Switch Dimensions

Switch	Width	Depth	Height
Cisco N93180YC-EX	17.5 inches (44.5 cm)	22.5 inches (57.1 cm)	1.72 inches (4.4 cm) (1 RU)

Switch and Module Weights and Quantities

Component	Weight per Unit	Quantity
Cisco N93180YC-EX Chassis (N9K-C93180YC-EX)	17.2 lb (7.8 kg)	1
Fan Module – Port-side exhaust (blue) (NXA-FAN-30CFM-F) – Port-side intake (burgundy) (NXA-FAN-30CFM-B)	— 0.26 lb (0.12 kg)	4
Power Supplies – 650-W AC port-side exhaust (blue) (NXA-PAC-650W-PE) – 650-W AC port-side intake (burgundy) (NXA-PAC-650W-PI) – 1200-W HVAC/HVDC dual-direction (white) (N9K-PUV-1200W) – 930-W DC port-side exhaust (gray) (UCS-PSU-6332-DC) – 930-W DC port-side intake (green) (UCSC-PSU-930WDC) – 930-W DC port-side exhaust (blue) (NXA-PDC-930W-PE) – 930-W DC port-side intake (burgundy) (NXA-PDC-930W-PI)	— 2.42 lb (1.1 kg) 2.42 lb (1.1 kg) 2.42 lb (1.1 kg) 2.42 lb (1.1 kg) 2.42 lb (1.1 kg) 2.42 lb (1.1 kg) 2.42 lb (1.1 kg) 2.42 lb (1.1 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 N93180YC-EX	210 W	470 W	1603.706 BTUs per hour

Power Specifications

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

650-W AC Power Supply Specifications

These specifications apply to the following power supplies:

- NXA-PAC-650W-PE
- NXA-PAC-650W-PI

Characteristic	Specification
AC input voltage	Nominal range: 100 and 240 VAC (Range: 90-132 VAC, 180-264 VAC)
AC input frequency	Nominal range: 50 to 60 Hz (Range: 47-63 Hz)
Maximum AC input current	7.6 A at 90 - 132 VAC 3.65 A at 180 - 264 VAC
Maximum input volt-amperes	760 VA at 100 VAC
Maximum output power per power supply	650 W
Maximum inrush current	11 A (sub-cycle duration)
Maximum hold-up time	12 ms at 650 W
Power supply output voltage	12 VDC
Power supply standby voltage	12 VDC
Efficiency rating	Climate Savers Platinum Efficiency (80Plus Platinum certified)
Form factor	RSP1

1200-W HVAC/HVDC Power Supply Specifications

These specifications apply to the N9K-PUV-1200W power supplies.

Characteristic	Specification
Input voltage • AC (for 1230 W output) • DC (for 1230 W output)	• Nominal range: 100-240 Vac (Range: 90-264 Vac) • Nominal range: 200-277 Vac (Range: 180-305 Vac) • Nominal range: 240-380 Vdc (Range: 1204-400 Vdc)
AC input frequency	Nominal: 50 to 60 Hz (Range: 47-63 Hz)
Maximum AC input current	10 A at 100 Vac
Maximum inrush current	35 A (cold turn on); 70 A (hot turn on)
Maximum output Watts • For 200 to 277 VAC • For 192 to 400 VDC	Per power supply • 1230 W • 1230 W
Power supply output voltage • For 200 to 277 VAC • For 192 to 400 VDC	Per power supply • 12 Vdc at 100 A • 12 Vdc at 100 A
Power supply standby voltage	12 V at 2.5 A
Efficiency rating	Climate Savers Platinum Efficiency (80Plus Platinum certified)
Form factor	RSP1

930-W DC Power Supply (Port-Side Intake) Specifications

These specifications apply to the 930-W DC (UCSC-PSU-930WDC) port-side intake power supplies.

Characteristic	Specification
DC input voltage range	Nominal range: -48 to -60 VDC nominal (Range: -40 to -60 VDC)
Maximum DC input current	23 A at -48 VDC
Maximum input W	1104 W
Maximum output power per power supply	930 W
Maximum inrush current	35 A (sub-cycle duration)
Maximum hold-up time	8 ms at 930 W
Power supply output voltage	12 VDC
Power supply standby voltage	12 VDC

Characteristic	Specification
Efficiency rating	Greater than 92% at 50% load
Form factor	RSP1

930-W DC Power Supply (Port-Side Exhaust) Specifications

These specifications apply to the 930-W DC (UCS-PSU-6332-DC) power supplies.

Characteristic	Specification
Maximum DC input current	23 A at -48 VDC
Maximum input W	1104 W
Maximum output power per power supply	930 W
Maximum inrush current	35 A at +35° Celcius
Maximum hold-up time	8 ms at 50 % load
Power supply output voltage	12 VDC
Power supply standby voltage	12 VDC
Efficiency rating	Climate Savers Platinum Efficiency (80Plus Platinum certified)
Form factor	1U

930-W DC Power Supply Specifications

These specifications apply to the NXA-PDC-930W power supplies.

Characteristic	Specification
DC input voltage range	Nominal range: -48 to -72 Vdc nominal (Range: -40 to -60 Vdc
Maximum DC input current	23 A at -48 Vdc
Maximum output power per power supply	930 W
Maximum inrush current	35 A (sub-cycle duration)
Maximum hold-up time	8 ms at 930 W
Power supply output voltage	12 Vdc
Power supply standby voltage	12 Vdc
Efficiency rating	Greater than 92% at 50% load

Characteristic	Specification
Form factor	RSP1

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)
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)

Locale	Power Cord Part Number	Cord Set Description
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

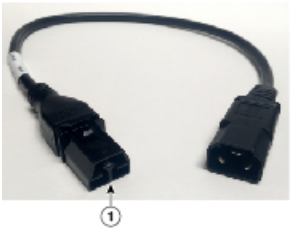
Part Number	Cord Set Description	Photo
CAB-HVAC-SD-0.6M	HVAC 2-foot (0.6 m) cable with Saf-D-Grid and SD connectors 277V AC	
CAB-HVAC-C14-2M	HVAC 6.6-foot (2.0 m) cable with Saf-D-Grid and C14 (use for up to 240 V) connector 250V AC	
CAB-HVAC-RT-0.6M	HVAC 2-foot (0.6 m) cable with Saf-D-Grid and RT connector 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

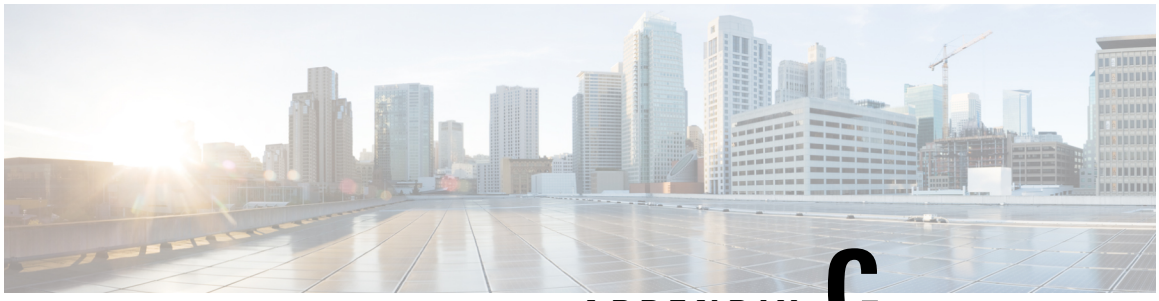
1	Connect this end to the power supply unit.

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.
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.



APPENDIX C

LEDs

- Switch Chassis LEDs, on page 57
- Fan Module LEDs, on page 58
- Power Supply LEDs, on page 58

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
(GPS)	Green	GPS interface provisioned and ports are turned on. ToD, 1PPS, 10MHz are all valid.
	Off	Either the interface is not provisioned, or the ports are not turned on. ToD, 1PPS, 10MHz are not valid.

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

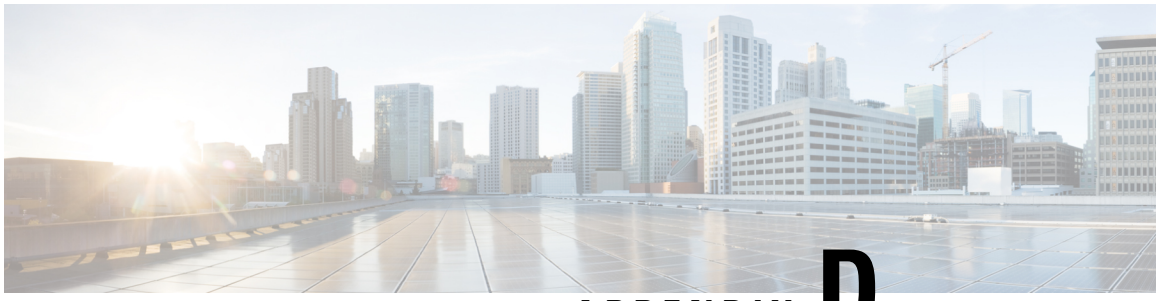
The power supply LEDs are located on the right portion of the power supply.

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.
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.

LEDs	Status
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.

LEDs



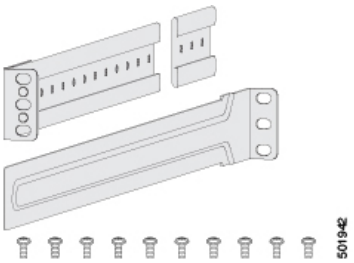
APPENDIX D

Additional Kits

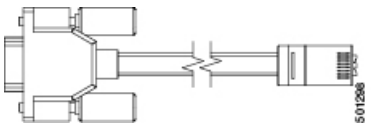
- Rack Mount Kit NXK-ACC-KIT-1RU, on page 61
- Rack Mount Kit N3K-C3064-ACC-KIT, on page 62

Rack Mount Kit NXK-ACC-KIT-1RU

This table lists and illustrates the contents for the 1-RU rack-mount kit (NXK-ACC-KIT-1RU).

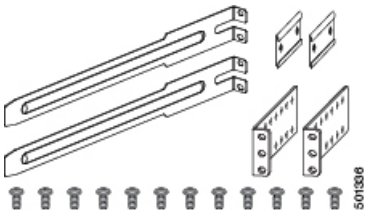
Illustration	Description	Quantity
	Rack-mount kit • Front brackets (2) • Rear brackets (2) • Slider rails (2) • M4 Phillips pan-head screws (10)	1
	Ground lug kit • Two-hole lug (1) • M4 x 8-mm Phillips pan-head screws (2)	1
Not applicable	EAC Compliance document	1
Not applicable	Hazardous substances list for customers in China	1

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

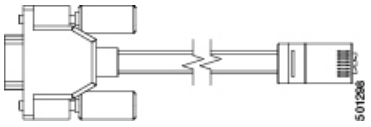
Illustration	Description	Quantity
	Console cable with DB-9F and RJ-45F connectors	1

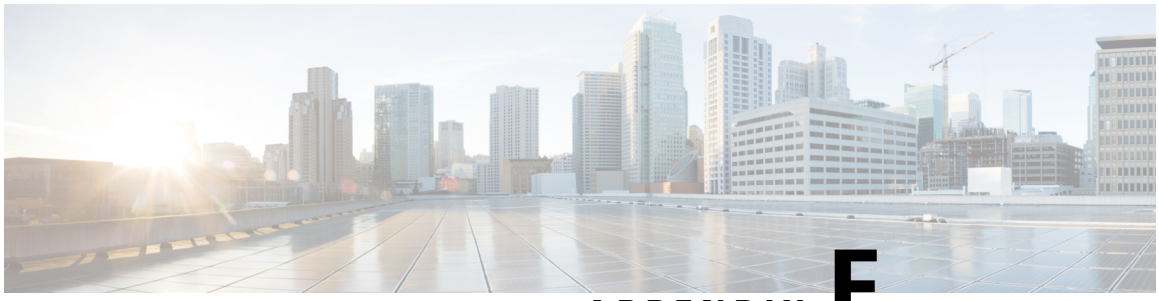
Rack Mount Kit N3K-C3064-ACC-KIT

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



APPENDIX E

Site Preparation and Maintenance Records

- Site Preparation Checklist, on page 63
- Contact and Site Information, on page 64
- Chassis and Module Information, on page 65

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
Fan module 1			

Module Slot	Module Type	Module Serial Number	Notes
Fan module 2			
Fan module 3			
Fan module 4			
Power Supply 1			
Power Supply 2			
QSFP/QSFP-DD Tranceiver			
SFP/SFP+ Tranceiver			