



Cisco NCS 4201 Hardware Installation Guide

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Preface

The preface describes the revision history, audience, organization, and conventions of the Cisco NCS 4201. It also lists sources for obtaining additional information and technical assistance from Cisco.

Document Revision History

The following table lists the major changes made to this document.

Date	Change Summary
August 5, 2016	Initial release

Document Audience

This guide is intended for users who are responsible for installing the Cisco NCS 4201. It is intended for users who may not be familiar with the initial configuration and troubleshooting tasks, the relationship among tasks, or the Cisco IOS software commands necessary to perform particular tasks.

Organization

This guide includes the following sections:

Title	Description
Overview	Describes the features and specifications of the Cisco NCS 4201.
Preparing for Installation	Describes the installation of the Cisco NCS 4201 at your site.
Installing the Cisco NCS 4201	Describes the installation of chassis on a rack as well as installation of its components.
Initial Configuration	Describes basic chassis configuration.
Troubleshooting	Describes troubleshooting information.
Site Log	Provides a record of actions related to installing and maintaining the chassis.

Conventions

This document uses the following conventions:

Convention	Indication
bold font	Commands and keywords and user-entered text appear in bold font .
<i>italic font</i>	Document titles, new or emphasized terms, and arguments for which you supply values are in <i>italic font</i> .
[]	Elements in square brackets are optional.
{x y z }	Required alternative keywords are grouped in braces and separated by vertical bars.
[x y z]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
courier font	Terminal sessions and information the system displays appear in courier font.
< >	Nonprinting characters such as passwords are in angle brackets.
[]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.



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



Tip Means *the following information will help you solve a problem* . The tips information might not be troubleshooting or even an action, but could be useful information, similar to a Timesaver.



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



Timesaver Means *the described action saves time* . You can save time by performing the action described in the paragraph.



Warning **IMPORTANT SAFETY INSTRUCTIONS**

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

SAVE THESE INSTRUCTIONS



Warning Statements using this symbol are provided for additional information and to comply with regulatory and customer requirements.

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, using the Cisco Bug Search Tool (BST), submitting a service request, and gathering additional information, see [What's New in Cisco Product Documentation](#).

To receive new and revised Cisco technical content directly to your desktop, you can subscribe to the [What's New in Cisco Product Documentation RSS feed](#). The RSS feeds are a free service.



CHAPTER 1

Overview

The Cisco NCS 4201 Network Convergence Systems are full-featured, compact one-RU high converged access platforms designed for the cost-effective delivery of TDM to IP or MPLS migration services. These temperature-hardened, high-throughput, small-form-factor, low-power-consumption systems are optimized for circuit emulation (CEM) and business applications. NCS 4201 chassis allow service providers to deliver dense scale in a compact form factor and unmatched CEM and Carrier Ethernet (CE) capabilities. They also provide a comprehensive and scalable feature set, supporting both Layer 2 VPN (L2VPN) and Layer 3 VPN (L3VPN) services in a compact package.

- [Cisco NCS 4201 Features, on page 1](#)

Cisco NCS 4201 Features

The Cisco NCS 4201 family has the following capability:

- 1 RU form factor with fixed ENET interfaces (four 10GE and twenty-four 1GE SFP) and redundant modular power supplies (AC/DC).

The following table provides a snapshot of the number and type of supported ports:

Table 1: Supported Ports on Cisco NCS 4201

1 GE Port	10 GE Port	Type of 1 GE Port	Type of 10 GE Port	Timing Ports
24	4	24 Fiber	Built in 4 SFP+	NA

GE SFP Ports

The GE SFP ports support the following features:

- 100Base-FX and 1000Base-X SFP modules.
- Copper SFP modules
- Digital optical monitoring as specified by the SFP.
- Any mix of SFPs is supported unless specifically noted.
- Pause flow control as defined by the 802.3x standard.
- Frame size of 9216 bytes.

- Synchronous ENET operation that provides its recovered receive clock as an input clock source for the SETS as well as uses the system-wide reference clock to derive its transmit clock.



Note Copper based SFPs do not support synchronous ENET operations.

SFP+ Ports

The SFP+ ports support the following features:

- Digital optical monitoring as specified by the optical transceiver module.
- Any mix of SFPs is supported unless specifically noted.
- Pause flow control as defined by the 802.3x standard.
- Frame size of 9216 bytes.

Front and Back Panel

The following figures display the Cisco NCS 4201 chassis views.



Note The Cisco NCS 4201 can also have AC and DC PSUs in the same chassis.

Figure 1: Cisco NCS 4201 – 3D View

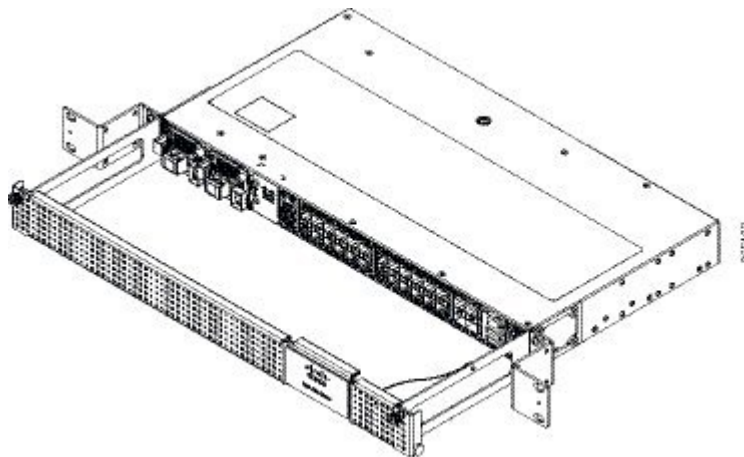


Figure 2: Front Panel of Cisco NCS 4201 with AC PSU

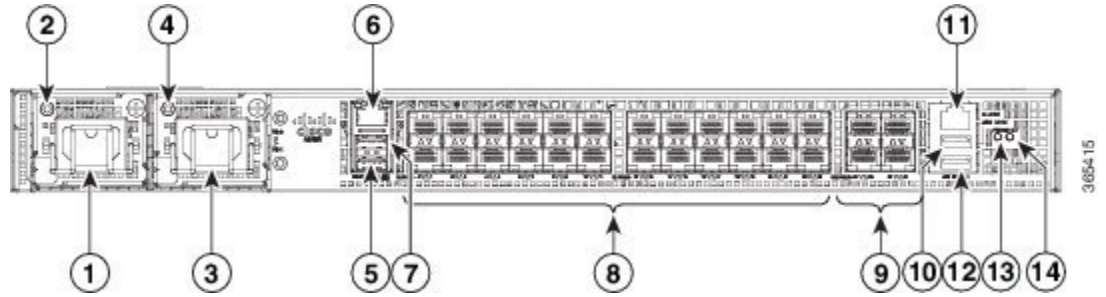
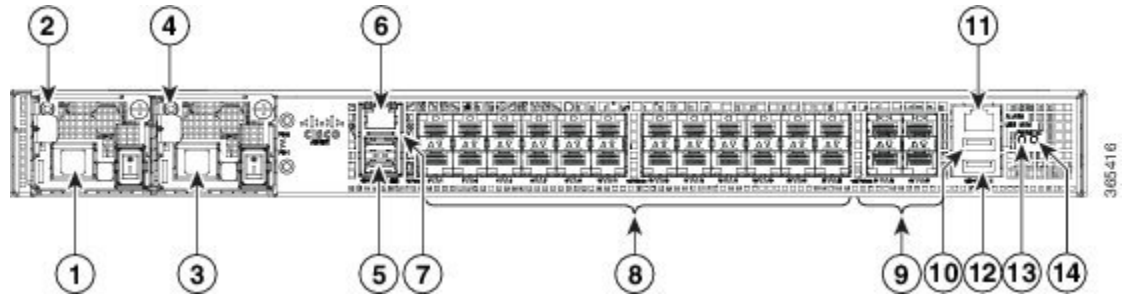
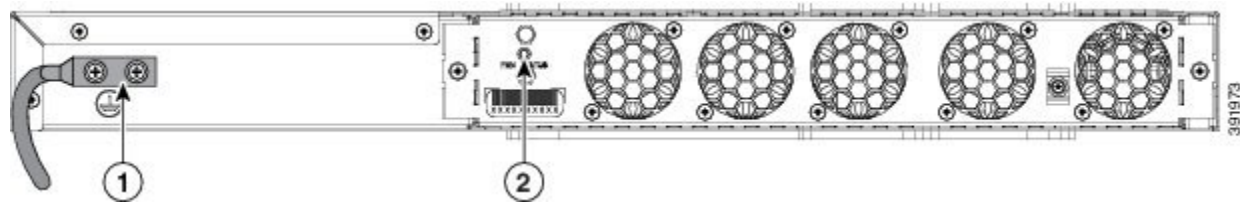


Figure 3: Front Panel of Cisco NCS 4201 with DC PSU



1	Power Supply 0 (AC or DC)	8	24x1GE SFP Fiber
2	Power Supply 0 LED (AC or DC)	9	4x10GE SFP+
3	Power Supply 1 (AC or DC)	10	USB Memory port
4	Power Supply 1 LED (AC or DC)	11	Alarm port
5	Console port (TIA/EIA-232F)	12	USB Console port
6	Management port	13	Board power LED
7	Auxiliary Console port	14	System Status LED

Figure 4: Back Panel of Cisco NCS 4201



1	Grounding lugs	2	Fan status LED
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Specifications

The table below describes the other features of Cisco NCS 4201 (AC and DC).

Table 2: Cisco NCS 4201 Specifications

Specification	Cisco NCS 4201
DimensionWidth x Depth x Height	17.5 x 18.99 x 1.703 inches Note Dimensions include the door.
Weight	6.33 kg Note Weight includes a fully-loaded chassis, along with the door.
Rack Unit	One RU
Airflow	Front to back
Cable access	Front cable access
Modularity	None
FRUs	PSUs and fan tray
Power Supply	
Redundant	Yes
AC	Yes
Power Specification	250 W Maximum
DC	Yes
Power Specification	250 W Maximum
System Power Consumption	145 W Maximum, 110 W Typical
System Throughput	64 Gbps/95 Mpps
Heat Dissipation	494.76 BTU/hr Maximum, 375.33 BTU/hr Typical
Operating Temperature/Humidity	−40° C to 70° C 5-95% RH
Alarms	<ul style="list-style-type: none"> • 4 alarm dry contact inputs (normally open) • LED indicators for critical, major and minor alarms
TDM Support	None
Mounting option	Front Z-bracket mount for 23 inches rack
Port Configuration	24x1G and 4x10G ports

Specification	Cisco NCS 4201
Port Numbering	24x1G SFP (Fiber) – Port [0:23]4x10G SFP+ – Port [24:27]
Combo Ports	No combo ports
LEDs	System Status LED Data Port LEDs Management Port LED PSU LED Fan Tray LED
Temperature Sensors	Five temperature sensors for Board Two temperature sensors for each PSU
Timing Interfaces	1588v2 and SyncE feature supported

External Interfaces

The Cisco NCS 4201 have these external physical interfaces on the front panel:

Network Interfaces

The network interfaces are provided through fixed ports.

- GE SFP ports (fiber)—supports 100/1000 modes
- 10GE SFP+—supports 10G mode.

External Alarm Inputs

The Cisco NCS 4201 supports four dry contact alarm inputs through an RJ-45 jack on the front panel.

- Normally Open—indicates that no current flows through the alarm circuit and the alarm is generated when the current is flowing.

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

Management Interfaces

The Cisco NCS 4201 have the following management interfaces:

Management ENET Port

A single management copper ENET port supporting 10/100/1000Base-T operation is provided on the front panel. It uses a standard RJ-45 jack.



Note This is not a data plane port.



Note This interface does not support Synchronous Ethernet Clocking.

RS232-EIA Console Port

The RS232-EIA console port provides transmission (Tx), reception (Rx), and ground (Gnd).



Note The RS232-EIA console port is enabled only through the Cisco-designed cable adapter USB type A cable to RJ-45 adapter cable. To use this port, disable the flow control on the terminal.

USB Console

A single USB 2.0 Type-A receptacle is provided on the front panel of the Cisco NCS 4201 for providing console access to ROMMON, Cisco IOS-XE and diagnostics. While it uses the Type-A connector, it operates as a USB peripheral only for connection to an external host computer. This interface requires the use of a Type-A to Type-A connector instead of a standard USB cable.



Note Use of the USB console is mutually exclusive of the RS232 console port. When the USB console cable is inserted in the USB console port, the RS232 console port is automatically disabled. This interface requires the use of a Type-A to Type-A USB cable.



Note To use the USB console, you must download and install EXAR driver XR21x1410 on the external host computer.

USB Mass Storage

A single USB 2.0 Type-A receptacle is provided on the front panel of the Cisco NCS 4201 for inserting external USB mass storage devices, such as standard USB flash drives. This interface is used to load images, load or store configurations, write logs, and so on. It supports operation up to 12Mbps.

Maximum memory supported in ROMmon is 8GB and in Cisco IOS is 16GB.

RS232 Auxiliary Console Port

The RS232 Aux console port provides transmission (Tx), reception (Rx), and ground (Gnd).



Note The RS232 Aux console port is enabled only through the Cisco-designed cable adapter from USB type A cable to RJ-45 adapter cable. To use this port flow control must be disabled.



Note This is a debug-only port. It is recommended that this port be used by field service engineers only.

Power Supply and Fans

The Cisco NCS 4201 support either AC or DC power supplies in a 1+1 redundant configuration. The PSUs are hot-swappable. Load is shared between PSUs when both the PSUs are inserted and powered-up. Status LED provided on both AC and DC PSU indicates the status and output condition.

Table 3: Power Supply Specification

Specification	AC	DC
Voltage	100 V – 240 V, 50/60Hz	-48/-60 V or 24 V
Current	2.6 A through a standard C16 type receptacle	5.5 A –48/-60 V 11 A –24 V through a two-position terminal block
Input Power	260 W (ASR-920-PWR-A)	260 W (ASR-920-PWR-D)



Note The Cisco NCS 4201 can have AC and DC PSUs in the same chassis.



Note DC PSU can be switched on or off using a switch on the front panel of the DC PSU.



Note For DC PSU, the UVP and OVP limits vary depending on the input voltage applied at power up: For -48/-60 V: UVP= -36 Vdc and OVP = -72 Vdc For 24 V: UVP =18 Vdc and OVP = 32 Vdc



Note This product requires surge protection as part of the building installation. To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, an external surge protective device (SPD) is required at the AC power service equipment.



Note For DC systems, if a surge of more than 1KV is expected, add an appropriate external surge protective device.

The Cisco NCS 4201 has removable fan tray as part of the system. The fan tray is hot-swappable. The system is designed to operate at its maximum operating temperature of 70° C and at 65° C in case of failure of a single fan, for a maximum of four hours.

LED Indicators

This section describes the different types of LEDs and their behavior.

PWR and STAT LEDs

The PWR and STAT LEDs are available on the front panel. These LEDs provide power on the board (PWR) and overall chassis health (STAT) status. During power up state, these LEDs provide booting status and report errors.



Note The digital code signing functionality validates the integrity and authenticity of the ROMMON image before booting it.

Table 4: PWR and STAT LED Indications

PWR LED State	STAT LED state	Indication	Comment
Amber	Off	Power in the system is all right and FPGA configuration is taking place.	Permanent Amber/Off indicates FPGA configuration failure.
Amber	Red	FPGA Image Validation Error.	System is in unresponsive state. No console messages.
Flashing Amber and Green alternatively	Amber	Upgrade FPGA image error, continuing with Golden FPGA image.	—
Flashing Amber and Green alternatively	Off	FPGA configuration successful and Digital code signing successfully validated FPGA image. Digital code signing passed the control to Microloader to boot ROMMON.	—
Flashing Amber and Green alternatively	Red	Digital code signing reported failure in ROMMON image validation.	System is in unresponsive state. No console messages.
Green	Flashing Amber	ZTP process has begun.	Both LEDs turn Green once provisioning is complete.
Green	Off	IOS-XE image is booting.	
Green	Green	Successfully booted and system is operating normally.	—
Green	Amber	A minor alarm or synchronization is in Holdover or free-running mode	—
Green	Red	A major or critical alarm (high temperature reported for any sensor) or multiple fan failure.	—

CPU Management Port LEDs

The LED for the 10/100/1000 Management port is integrated on the connector itself. There are two LEDs in the connector—the LED on the left indicates the Link/Activity status and the LED on the right is non-functional.



Note The CPU management port LED on the right is non-functional and hence doesn't indicate any port status.

Table 5: CPU Management Port LED Indication

LED	LED State	Indication
Left	Green	Link up in 1000 Mbps
	Blinking Green	Activity in 1000 Mbps
	Amber/Orange	Link up in 100/10 Mbps
	Blinking Amber/Orange	Activity in 100/10 Mbps
	Off	Link down

SFP LEDs

Each SFP port has an LED indicator. The LED is configured such that the up arrow indicates the port on the upside and the down arrow indicates the port on the downside.

Table 6: SFP Port LED Indication

LED	LED State	Indication
Labeled same as the SFP port number	Green	Link up in 1000Base-X/100Base-FX
	Blinking Green	Activity in 1000 Base-X/100Base-FX
	Yellow	Fault/Error
	Off	Link down

SFP+ LEDs

Each SFP+ port has an LED indicator.

Table 7: SFP+ Port LED Indication

LED	LED State	Indication
Labeled same as the SFP port number	Green	Link up in 10G
	Blinking Green	Activity in 10G
	Yellow	Fault/Error
	Off	Link down

Power Supply Unit LEDs

Each power supply unit has a corresponding LED on the front panel.

Table 8: PSU LED Indication

LED	LED State	Indication
CK	Green	Power Supply is working and 12V output is alright.
	Red	12V output failure (Either input not present or fault in the power supply unit).

System–Interface LED Behavior

Table 9: 1G SFP LED Indication

Event	1G SFP Port LEDs
ROMMON	Off
IOS Shut	Off
IOS No shut (cable disconnect)	Yellow
IOS No shut (cable connect) (media-type SFP)	Green
IOS No shut (cable connect) (media-type auto)	Green

Table 10: Management Port LED Indication

Event	10G Port LEDs	Management Port LEDs (Link/Duplex)
ROMMON (cable connect)	Off	Green/Green (1000 Mbps, Full Duplex) Orange/Green (100/10 Mbps, Full Duplex)
ROMMON (cable disconnect)	Off	Off/Off
IOS Shut	Off	Off/Off
IOS No shut (cable disconnect)	Orange	Off/Off
IOS No shut (cable connect)	Green	Green/Green in 1G mode Orange/Green in 100/10M mode

Online Insertion and Removal

The Cisco NCS 4201 supports the following OIR operations:

- When an SFP is removed, there is no effect on traffic flowing on other ports.

- When an SFP is installed, the system initializes that port for operation based upon the current configuration. If the inserted SFP is incompatible with the current configuration for that port, the port does not become operational until the configuration is updated.
- Both power supplies are installed and active and the load may be shared between them or a single PSU could support the whole load. When a power supply is not working or the input cable is removed, the remaining power supply takes the entire load without disruption.
- When a fan tray is removed or replaced, there is no need to power down the chassis. However, when the fan tray is removed from chassis the chassis shuts down automatically after some time, depending on the ambient temperature. The time duration before the chassis shuts down is shown in the table below:

Table 11: Cisco NCS 4201 Shut Down Time Table

Sl.	Inlet Ambient Temperature (°Celsius)	Shut Down Time (Minimum)
1	-10 to -5	14 minutes
2	-4 to 15	8 minutes
3	16 to 29	6 minutes 30 seconds
4	30 to 40	4 minutes 30 seconds
5	41 to 44	3 minutes 20 seconds
6	45 to 49	2 minutes 50 seconds
7	50 to 54	2 minutes 10 seconds
8	55 to 59	1 minutes 35 seconds
9	60 to 64	1 minute
10	65 and above	35 seconds



CHAPTER 2

Preparing for Installation

This chapter describe how to prepare for the installation of the Cisco NCS 4201 at your site, and contains the following sections:

- [Safety Guidelines, on page 13](#)
- [Site Planning, on page 19](#)
- [Receiving the Chassis, on page 28](#)

Safety Guidelines

Before you begin the installation of the Cisco NCS 4201, review the safety guidelines in this chapter to avoid injuring yourself or damaging the equipment.

In addition, before replacing, configuring, or maintaining the Cisco NCS 4201, review the safety warnings listed in the *Regulatory Compliance and Safety Information for the Cisco NCS4200 Series* document.

The following sections describe the safety guidelines for the Cisco NCS 4201:

Standard Warning Statements

To see translations of the warnings that appear in this publication, see the *Regulatory Compliance and Safety Information for the Cisco NCS 4200 Series* document.



Warning

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. Statement 1006



Warning

This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security. Statement 1017



Warning Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040



Warning To prevent the system from overheating, do not operate it in an area that exceeds the maximum recommended ambient temperature of 158F (70C). Statement 1047



Warning The chassis should be mounted on a rack that is permanently affixed to the building. Statement 1049



Warning IMPORTANT SAFETY INSTRUCTIONS: This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device. Statement 1071



Warning This is a Class A Device and is registered for EMC requirements for industrial use. The seller or buyer should be aware of this. If this type was sold or purchased by mistake, it should be replaced with a residential-use type. Statement 294



Warning This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures. Statement 340



Warning This equipment is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC. Statement 287

Safety Guidelines for Personal Safety and Equipment Protection

The following guidelines help ensure your safety and protect the equipment. This list does not include all the potentially hazardous situations. Therefore, you should be on alert.

- Before moving the system, always disconnect all the power cords and interface cables.
- Never assume that power is disconnected from a circuit; always check.
- Before and after installation, keep the chassis area clear and dust free.
- Keep tools and assembly components away from walk areas where you or others could trip over them.
- Do not work alone if potentially hazardous conditions exist.
- Do not perform any action that creates a potential hazard to people or makes the equipment unsafe.

- Do not wear loose clothing that may get caught in the chassis.
- When working under conditions that may be hazardous to your eyes, wear safety glasses.

Safety Precautions for Module Installation and Removal

Be sure to observe the following safety precautions when you work on the chassis.

To see the translations of the warnings that appear in this publication, see the *Regulatory Compliance and Safety Information for the Cisco NCS 4200 Series* document.



Warning Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051



Warning Class 1M laser radiation when open. Do not view directly with optical instruments. Statement 1053



Warning Class 1 (CDRH) and Class 1M (IEC) laser products. Statement 1055



Warning 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. Statement 1056



Warning Do not stare into the beam or view it directly with optical instruments. Statement 1011



Warning Invisible laser radiation present. Statement 1016



Warning Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

Safety with Electricity



Warning Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units. Statement 12



Warning Before working on equipment that is connected to power lines, remove jewelry (including rings, necklaces, and watches). Metal objects will heat up when connected to power and ground and can cause serious burns or weld the metal object to the terminals. Statement 43



Warning Avoid using or servicing any equipment that has outdoor connections during an electrical storm. There may be a risk of electric shock from lightning. Statement 1088



Warning Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003



Warning Read the installation instructions before connecting the system to the power source. Statement 1004



Warning This product relies on the building's installation for short-circuit (overcurrent) protection. For a DC installation, ensure that the branch circuit breaker is rated a maximum 15A for DC systems. For AC systems, 15A for voltages greater than 200Vac; 20A for voltages below 127Vac. Statement 1005



Warning Take care when connecting units to the supply circuit so that wiring is not overloaded. Statement 1018



Warning The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device. Statement 1019



Warning To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ45 connectors. Use caution when connecting cables. Statement 1021



Warning A readily accessible two-poled disconnect device must be incorporated in the fixed wiring. Statement 1022



Warning To reduce the risk of fire, use only 26 AWG or larger telecommunication line cord. Statement 1023

**Warning**

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

**Warning**

Use copper conductors only. Statement 1025

**Warning**

This unit might have more than one power supply connection. All connections must be removed to de-energize the unit. Statement 1028

**Warning**

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. Statement 1032

**Warning**

Connect the unit only to DC power source that complies with the safety extra-low voltage (SELV) requirements in IEC 60950 based safety standards. Statement 1033

**Warning**

When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046

**Warning**

This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024

**Warning**

Installation of the equipment must comply with local and national electrical codes. Statement 1074

**Warning**

Hazardous voltage or energy may be present on power terminals. Always replace cover when terminals are not in service. Be sure uninsulated conductors are not accessible when cover is in place. Statement 1086

When working on equipment powered by electricity, follow these guidelines:

- Locate the room's emergency power-off switch. If an electrical accident occurs, you will be able to quickly turn off the power.

- Before starting work on the system, turn off the DC main circuit breaker and disconnect the power terminal block cable.
- Before doing the following, disconnect all power:
 - Working on or near power supplies
 - Installing or removing a chassis or network processor module
 - Performing most hardware upgrades
- Never install equipment that appears damaged.
- Carefully examine your work area for possible hazards, such as moist floors, ungrounded power extension cables, and missing safety grounds.
- Never assume that power is disconnected from a circuit; always check.
- Never perform any action that creates a potential hazard to people or makes the equipment unsafe.
- If an electrical accident occurs, proceed as follows:
 - Use caution, and do not become a victim yourself.
 - Turn off power to the chassis.
 - If possible, send another person to get medical aid. Otherwise, determine the condition of the victim, and then call for help.
 - Determine whether the person needs rescue breathing or external cardiac compressions; then take appropriate action.

In addition, use the following guidelines when working with any equipment that is disconnected from a power source, but still connected to telephone wiring or network cabling:

- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in wet locations unless the jack is specifically designed for it.
- Never touch uninsulated telephone wires or terminals unless the telephone line is disconnected at the network interface.
- When installing or modifying telephone lines, use caution.

Power Supply Considerations

Check the power at your site to ensure that you are receiving clean power (free of spikes and noise). Install a power conditioner, if necessary.

Preventing ESD Damage



Warning

This equipment needs to be grounded. Use a green and yellow 6 AWG ground wire to connect the host to earth ground during normal use. Statement 383

Electrostatic discharge (ESD) can damage equipment and impair electrical circuitry. ESD may occur when electronic printed circuit cards are improperly handled and can cause complete or intermittent failures. When removing and replacing modules, always follow ESD prevention procedures:

- Ensure that the chassis is electrically connected to earth ground.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact. To channel unwanted ESD voltages safely to ground, connect the clip to an unpainted surface of the chassis frame. To guard against ESD damage and shocks, the wrist strap and cord must operate effectively.

- If no wrist strap is available, ground yourself by touching a metal part of the chassis.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use available ejector levers or captive installation screws, if any, to release the bus connectors from the backplane or midplane.
- Handle components by their handles or edges only; do not touch the printed circuit boards or connectors.
- Place a removed component board side up on an antistatic surface or in a static-shielding container. If you plan to return the component to the factory, immediately place it in a static-shielding container.
- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Never attempt to remove the printed circuit board from the metal carrier.



Note For the safety of your equipment, periodically check the resistance value of the antistatic wrist strap. It should be between 1 and 10 Mohm.

Site Planning

The following sections describe how to plan for the installation of the Cisco NCS 4201 Chassis:

General Precautions

Observe the following general precautions when using and working with your Cisco NCS 4201:

- Keep your system components away from radiators and heat sources and do not block cooling vents.
- Do not spill food or liquids on your system components and never operate the product in a wet environment.
- Do not push any objects into the openings of your system components. Doing so can cause fire or electric shock by shorting out interior components.
- Position system cables and power supply cable carefully. Route system cables and the power supply cable and plug so that they are not stepped on or tripped over. Be sure that nothing else rests on your system component cables or power cable.
- Do not modify power cables or plugs. Consult a licensed electrician or your power company for site modifications. Always follow your local and national wiring rules.
- If you turn off your system, wait at least 30 seconds before turning it on again to avoid damage of system components.

Site Planning Checklist

Use the following checklist to perform and account for all the site planning tasks described in this chapter:

- The site meets the environmental requirements.
- The site's air conditioning system can compensate for the heat dissipation of the Cisco NCS 4201.
- The floor space that the Cisco NCS 4201 occupies can support the weight of the system.
- Electrical service to the site complies with the requirements.

- The electrical circuit servicing the Cisco NCS 4201 complies with the requirements.
- Consideration has been given to the console port wiring and limitations of the cabling involved, according to TIA/EIA-232F.
- The Cisco NCS 4201 Ethernet cabling distances are within the prescribed limitations.
- The equipment rack in which you plan to install the Cisco NCS 4201 complies with prescribed requirements.
- When selecting the location of the rack, careful consideration must be given to safety, ease of maintenance, and proper airflow.

Site Selection Guidelines

The Cisco NCS 4201 require specific environmental operating conditions. Temperature, humidity, altitude, and vibration can affect the performance and reliability of the chassis. The following sections provide specific information to help you plan for the proper operating environment.

The Cisco NCS 4201 are designed to meet the industry EMC, safety, and environmental standards described in the *Regulatory Compliance and Safety Information for the Cisco NCS 4200 Series* document.

Environmental Requirements

Environmental monitoring of the Cisco NCS 4201 protects the system and components from damage caused by excessive voltage and temperature conditions. To ensure normal operation and avoid unnecessary maintenance, plan and prepare your site configuration *before* installation. After installation, make sure that the site maintains the environmental characteristics described in table Cisco NCS 4201 Specifications.

For an outside plant installation (cell site cabinet, hut etc.), it is required that the Cisco NCS 4201 be protected against airborne contaminants, dust, moisture, insects, pests, corrosive gases, polluted air or other reactive elements present in the outside air. To achieve this level of protection, we recommend that the unit be installed in a fully sealed enclosure or cabinet. Examples of such cabinets include IP65 cabinets with heat exchanger complying with Telecordia GR487. Temperature must be maintained within –40 C to 70 C.

The equipment shall be placed inside a space protected from direct outside weather and environmental stresses by an enclosure, and where the operating climate, as defined by Class 2 of GR-3108-CORE, is between

- -40C (-40 F) and 70 C (158 F)
- 5 and 85% RH.

Physical Characteristics

Be familiar with the physical characteristics of the Cisco NCS 4201 to assist you in placing the system in the proper location. For more information, see table Cisco NCS 4201 Specifications.

Air Flow Guidelines

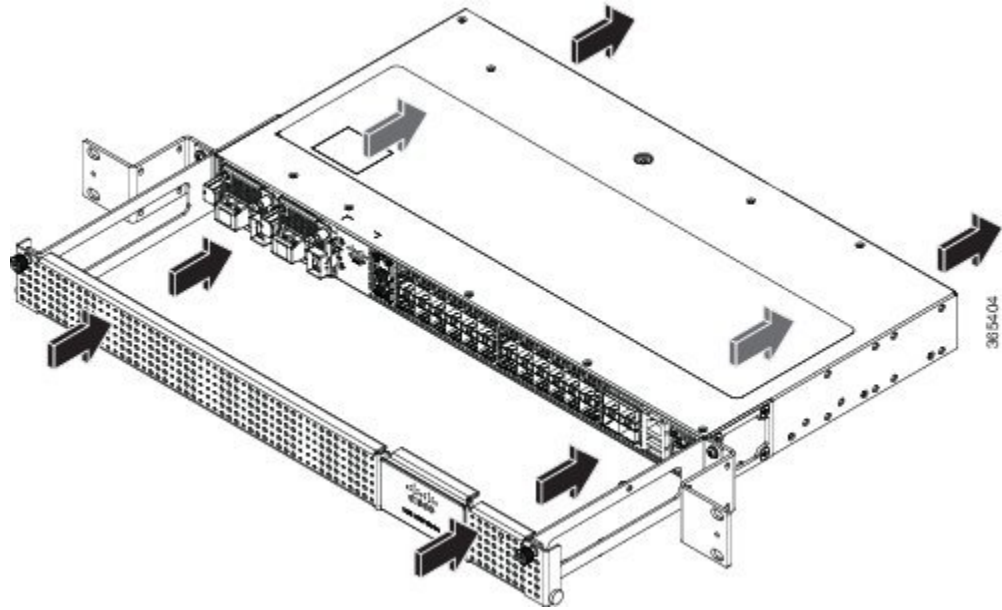
Cool air is circulated through the Cisco NCS 4201 by fans located along the back side of the chassis.

The internal fans maintain acceptable operating temperatures for the internal components by drawing in cool air through the vents, and circulating the air through the chassis.

The direction of air flow is from front-to-back.

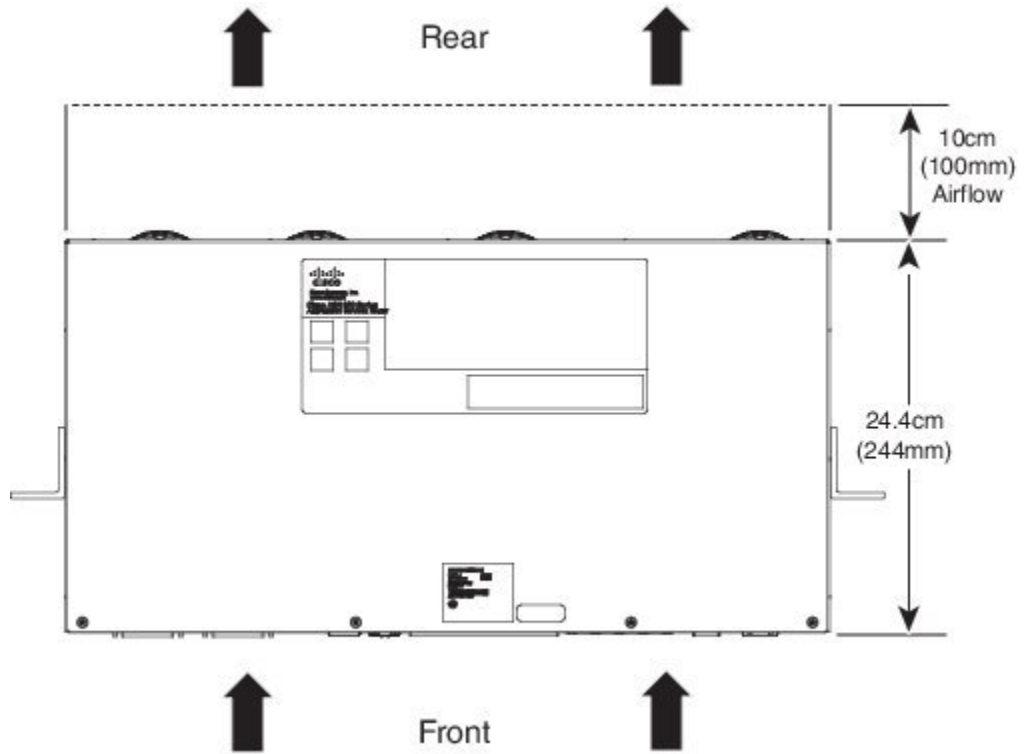
The figure below shows the direction of the air flow through the Cisco NCS 4201.

Figure 5: Air Flow in the Cisco NCS 4201



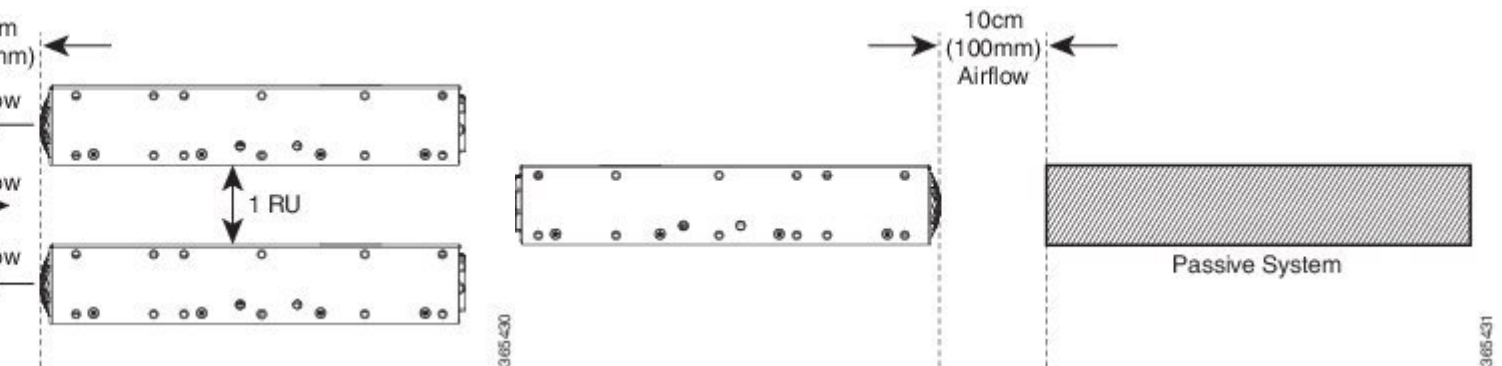
To ensure adequate air flow through the equipment rack, it is recommended that you maintain a minimum clearance distance as mentioned below, at all times.

- rear clearance—10 cm



Note the following points:

- When installing Cisco NCS 4201 in a back-to-back position with another device, ensure that there is a minimum of 10 cm air flow clearance between the two devices. Also ensure that the device behind the Cisco NCS 4201 is not installed in a way that it blows air into the Cisco NCS



- If airflow through the equipment rack and the chassis that occupy it is blocked or restricted, or if the ambient air being drawn into the rack is too warm, an overtemperature condition may occur within the rack and the chassis that occupy it.
- The site should also be as dust-free as possible. Dust tends to clog the chassis fans, reducing the flow of cooling air through the equipment rack and the chassis that occupy it, thus increasing the risk of an overtemperature condition.
- Enclosed racks must have adequate ventilation. Ensure that the rack is not congested because each chassis generates heat. An enclosed rack should have louvered sides and a fan to provide cooling air. Heat that is generated by the equipment near the bottom of the rack can be drawn upward into the intake ports of the equipment above.
- When mounting a chassis in an open rack, ensure that the rack frame does not block the exhaust fans.
- When rack-installed equipment fails, especially equipment in an enclosed rack, try operating the equipment by itself, if possible. Power off all the other equipment in the rack (and in adjacent racks) to give the chassis maximum cooling air and clean power.
- Avoid installing the Cisco NCS 4201 in a location in which the chassis air intake vents may draw in the exhaust air from adjacent equipment. Consider how the air flows through the chassis; the airflow direction is front to back, with ambient air drawn in from the vents located on the sides of the chassis.



Caution When mounting the chassis in any type of rack equipment, ensure that the inlet air to the chassis does not exceed 70 C.

Floor Loading Considerations

Ensure that the floor under the rack supporting the Cisco NCS 4201 is capable of supporting the combined weight of the rack and all the other installed equipment.

To assess the weight of a fully configured Cisco NCS 4201, see the table Cisco NCS 4201 Specifications.

For additional information about floor loading requirements, see the [GR-63-CORE, Network Equipment Building System \(NEBS\) Requirements: Physical Protection](#) document.

Site Power Guidelines

The Cisco NCS 4201 have specific power and electrical wiring requirements. Adhering to these requirements ensures reliable operation of the system. Follow these precautions and recommendations when planning your site power for the Cisco NCS 4201:

- The redundant power option provides a second, identical power supply to ensure that power to the chassis continues uninterrupted if one power supply fails or input power on one line fails.
- Connect each of the two power supplies to a separate input power source. If you fail to do this, your system might be susceptible to total power failure due to a fault in the external wiring or a tripped circuit breaker.
- To prevent a loss of input power, be sure that the total maximum load on each circuit supplying the power supplies is within the current ratings of the wiring and the breakers.
- Check the power at your site before installation, and periodically after installation to ensure that you are receiving clean power. Install a power conditioner, if necessary.
- Provide proper grounding to avoid personal injury and damage to the equipment due to lightning striking power lines or due to power surges. The chassis ground must be attached to a central office or other interior ground system.



Caution

This product requires short-circuit (overcurrent) protection to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.



Note

The Cisco NCS 4201 installation must comply with all the applicable codes, and is approved for use with copper conductors only. The ground bond-fastening hardware should be of compatible material and preclude loosening, deterioration, and electrochemical corrosion of hardware and joined material. Attachment of the chassis ground to a central office or other interior ground system must be made with a 6-AWG gauge wire copper ground conductor at a minimum.

For information on power specifications, see table Power Supply Specification.

Electrical Circuit Requirements

Each Cisco NCS 4201 requires a dedicated electrical circuit. If you equip the chassis with dual-power feeds, provide a separate circuit for each power supply to avoid compromising the power redundancy feature.

The Cisco NCS 4201 can be powered by a DC source or an AC source. Ensure that equipment grounding is present and observe the power-strip ratings. Make sure that the total ampere rating of all the products plugged into the power strip does not exceed 80% of the rating.

Site Cabling Guidelines

This section contains guidelines for wiring and cabling at your site. When preparing your site for network connections to the Cisco NCS 4201, consider the type of cable required for each component, and the cable limitations. Consider the distance limitations for signaling, electromagnetic interference (EMI), and connector compatibility. Possible cable types are fiber, thick or thin coaxial, foil twisted-pair, or unshielded twisted-pair cabling.

Also consider any additional interface equipment you need, such as transceivers, hubs, switches, modems, channel service units (CSU), or data service units (DSU).

Before you install the Cisco NCS 4201, have all the additional external equipment and cables on hand. For information about ordering, contact a Cisco customer service representative.

The extent of your network and the distances between the network interface connections depend, in part, on the following factors:

- Signal type
- Signal speed
- Transmission medium

The distance and rate limits referenced in the following sections are the IEEE-recommended maximum speeds and distances for signaling purposes. Use this information as a guideline when planning your network connections *>prior to* installing the Cisco NCS 4201.

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

Asynchronous Terminal Connections

The Cisco NCS 4201 provides a console port to connect a terminal or computer for local console access. The port has an RJ-45 connector and supports RS-232 asynchronous data with distance recommendations specified in the IEEE RS-232 standard.

Interference Considerations

When wires are run for any significant distance, there is a risk that stray signals will be induced on the wires as interference. If interference signals are strong, they may cause data errors or damage to the equipment.

The following sections describe the sources of interference and how to minimize their effects on the Cisco NCS 4201 system.

Electromagnetic Interference

All the equipment powered by AC current can propagate electrical energy that can cause EMI and possibly affect the operation of other equipment. The typical sources of EMI are equipment power cords and power service cables from electric utility companies.

Strong EMI can destroy the signal drivers and receivers in the Cisco NCS 4201 and even create an electrical hazard by causing power surges through the power lines into installed equipment. These problems are rare, but could be catastrophic.

To resolve these problems, you need specialized knowledge and equipment that could consume substantial time and money. However, you can ensure that you have a properly grounded and shielded electrical environment, paying special attention to the need for electrical surge suppression.

For information about the electrode magnetic compliance standards supported on the Cisco NCS 4201, see the *Regulatory Compliance and Safety Information for the Cisco NCS4200 Series* document.

Radio Frequency Interference

When electromagnetic fields act over a long distance, radio frequency interference (RFI) may be propagated. Building wiring can often act as an antenna, receiving the RFI signals and creating more EMI on the wiring.

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

Lightning and AC Power Fault Interference

If signal wires exceed the recommended cabling distances, or if signal wires pass between buildings, you should consider the effect that a lightning strike in your vicinity might have on the Cisco NCS 4201.

The electromagnetic pulse (EMP) generated by lightning or other high-energy phenomena can couple enough energy into unshielded conductors to damage or destroy electronic equipment. If you have previously experienced such problems, you should consult with RFI and EMI experts to ensure that you have adequate electrical surge suppression and shielding of signal cables in your Cisco NCS 4201 operating environment.

Rack-Mounting Guidelines

The following sections provide guidelines for rack-mounting the Cisco NCS 4201:

Precautions for Rack-Mounting

The following rack-mount guidelines are provided to ensure your safety:

- Ensure that the rack is level and stable before extending a component from the rack.
- Ensure that proper airflow is provided to the components in the rack.
- Do not step on or stand on any component or system when servicing other systems or components in a rack.
- When mounting the Cisco NCS 4201 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.

Rack Selection Guidelines

The Cisco NCS 4201 can be mounted on most two-post or four-post, 19-inch equipment racks that comply with the Electronic Industries Association (EIA) standard for equipment racks (EIA-310-D 19-inch). The rack must have at least two posts with mounting flanges to mount the chassis.



Caution When mounting a chassis in any type of rack equipment, ensure that the inlet air to the chassis does not exceed 70 C.

The distance between the center lines of the mounting holes on the two mounting posts must be 18.31 inch \pm 0.06 inch (46.50 cm \pm 0.15 cm). The rack-mounting hardware included with the chassis is suitable for most 19-inch equipment racks.

Consider installing the Cisco NCS 4201 in a rack with the following features:

- NEBS-compliant, 23-inch wide (48.3-cm) rack.

- Perforated top and open bottom for ventilation to prevent overheating.
- Leveling feet for stability.



Caution The Cisco NCS 4201 is not recommended to be installed in an enclosed rack because the chassis requires an unobstructed flow of cooling air to maintain acceptable operating temperatures for its internal components. If you use an enclosed rack, ensure that the air flow requirements are maintained as discussed in [Air Flow Guidelines](#) section.

Equipment Rack Guidelines

The placement of a rack can affect personnel safety, system maintenance, and the system's ability to operate within the environmental characteristics. Choose a proper location for the Cisco NCS 4201 by following the guidelines described here.

Locating for Safety

If the Cisco NCS 4201 is the heaviest or the only piece of equipment in the rack, consider installing it at or near the bottom to ensure that the rack's center of gravity is as low as possible.

For additional information about the proper placement of electronic equipment, consult the [GR-63-CORE, Network Equipment Building System \(NEBS\) Requirements: Physical Protection](#) document.

Locating for Easy Maintenance

It is recommended that you maintain a minimum clearance distance as mentioned below, at all times.

- rear clearance—10 cm

This space ensures that you can remove the Cisco NCS 4201 components and perform routine maintenance and upgrades easily.

Avoid installing the Cisco NCS 4201 in a congested rack and consider how routing of cables from other pieces of equipment in the same rack could affect access to the chassis cards.

The front and rear of the chassis must remain unobstructed to ensure adequate airflow and prevent overheating inside the chassis.

To avoid problems during installation and ongoing operations, follow these general precautions when you plan equipment locations and connections:

- Use the **show environment all** command regularly to check the internal system status. The environmental monitor continually checks the interior chassis environment; it provides warnings about high temperature and creates reports on other potentially dangerous occurrences. If warning messages are displayed, take immediate action to identify the cause, and correct the problem.
- Keep the Cisco NCS 4201 off the floor and out of areas that collect dust.
- Follow ESD-prevention procedures to avoid damage to equipment. Damage from static discharge can cause immediate or intermittent equipment failure.

Locating for Proper Airflow

Ensure that the Cisco NCS 4201 location has enough airflow to keep the system operating within the environmental characteristics and the air temperature is sufficient to compensate for the heat dissipated by the system. For more information, see the [Air Flow Guidelines](#) section.

Installation Checklist

To assist you with your installation and to provide a record of what was done by whom and when, photocopy the Cisco NCS 4201 Installation Checklist shown in table below. Use this to record the completion and verification of each procedure. After the checklist is completed, place it in your Site Log along with the other records pertaining to your new Cisco chassis.

Table 12: Cisco NCS 4201 Installation Checklist

Task	Verified By
Date on which chassis received	
Chassis and all accessories unpacked	
Types and numbers of interfaces verified	
Safety recommendations and guidelines reviewed	
Installation Checklist copied	
Site Log established and background information entered	
Site power voltages verified	
Site environmental specifications verified	
Required passwords, IP addresses, device names, and so on, available	
Required tools available	
Network connection equipment available	
Cable-management brackets installed (optional, but recommended)	
AC power cables connected to AC sources and chassis	
DC power cables connected to DC sources and chassis	
Network interface cables and devices connected	
System power turned on	
System boot complete (STATUS LED is on)	
Correct software configuration displayed after system banner appears	

Creating a Site Log

The Site Log provides a record of all the actions related to installing and maintaining the chassis. Keep it in an accessible place near the chassis so that anyone who performs tasks has access to it.

Create the Site Log prior to the installation. (See [Site Log](#) section for more information about the Site Log as well as a sample Site Log that can be used to make copies.)

Receiving the Chassis

Each Cisco NCS 4201 is shipped in a container that is strapped to a pallet, as illustrated in figures below.

Figure 6: Cisco NCS 4201 Packaged for Shipping

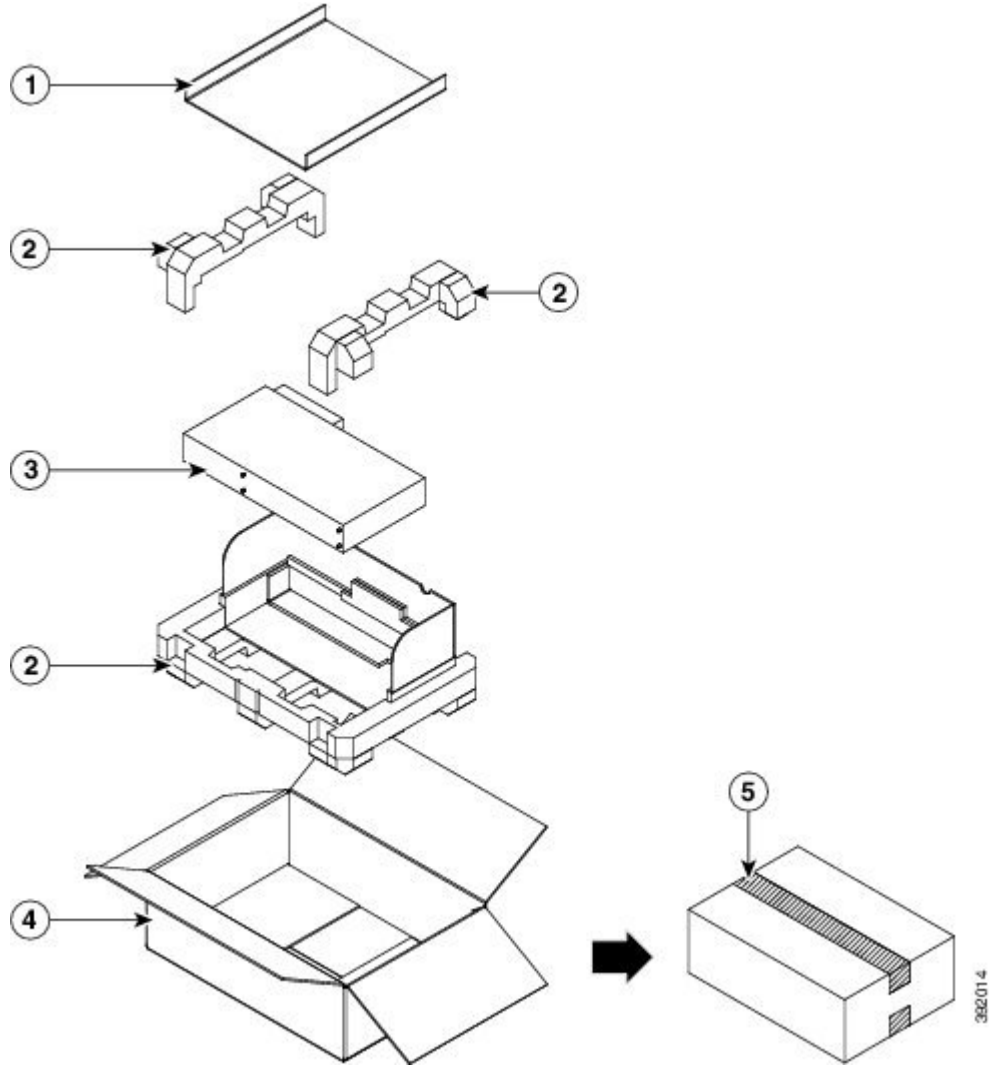


Table 13:

Label	Description	Label	Description
1	Outside carton for accessories	4	Packing carton
2	Assembly packaging material	5	Carton sealing tape
3	Chassis	-	-

Figure 7: Cisco NCS 4201 Packaged for Shipping

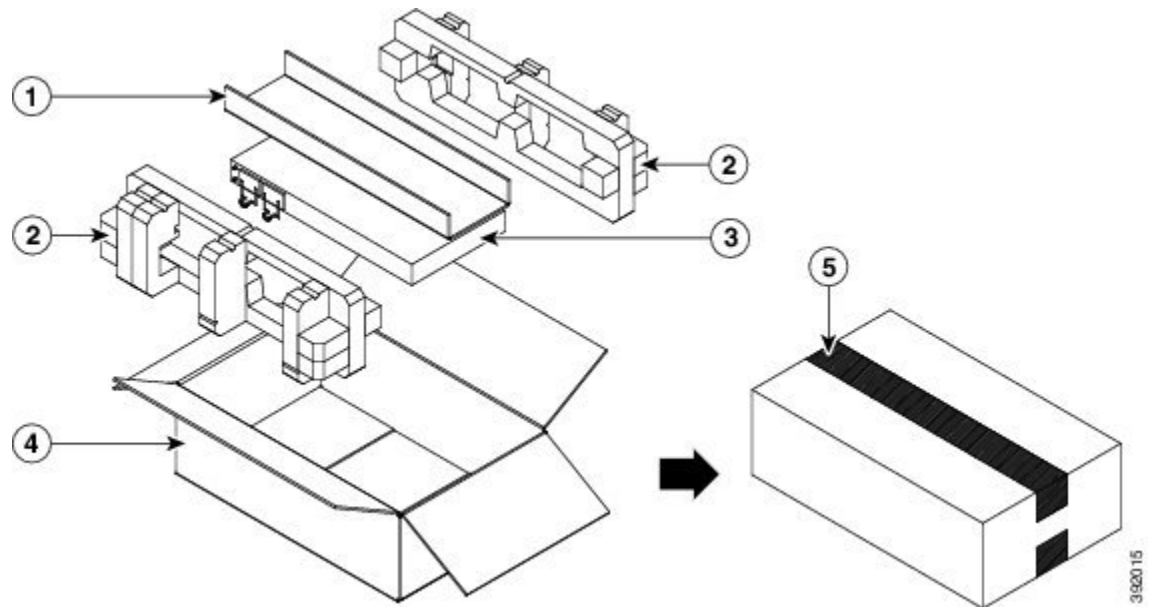


Table 14:

Label	Description	Label	Description
1	Outside carton for accessories	4	Packing carton
2	Assembly packaging material	5	Carton sealing tape
3	Chassis	-	-

Chassis-Lifting Guidelines

The chassis is not intended to be moved frequently. Before you install the system, ensure that your site is properly prepared so that you can avoid having to move the chassis later to accommodate power sources and network connections.

Each time you lift the chassis or any heavy object, follow these guidelines:

- Ensure that your footing is solid, and balance the weight of the chassis between your feet.
- Lift the chassis slowly; never move suddenly or twist your body as you lift.
- Keep your back straight and lift with your legs, not your back. If you must bend down to lift the chassis, bend at the knees, not at the waist, to reduce the strain on your back muscles.
- Do not remove installed components from the chassis.
- Always disconnect all external cables before lifting or moving the chassis.



Warning

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. Statement 1032

Tools and Equipment

You need the following tools and equipment to install and upgrade the chassis and its components:

- ESD-preventive cord and wrist strap
- Antistatic mat or antistatic foam
- Number 1 and Number 2 Phillips-head screwdrivers
- #12-24 pan-head screws to secure the chassis to the equipment rack
- Cables for connecting to the network ports (depending on the configuration)



Note For more information about cable specifications, see the [Troubleshooting](#) section.

- Ethernet hub, switch, or PC with a network interface card for connecting to the Ethernet ports
- Console terminal (an ASCII terminal or a PC running terminal emulation software) that is configured for 9600 baud, 8 data bits, no parity, no flow control, and 1 stop bit
- Console cable for connecting to the console port
- Ratcheting torque screwdriver with a Phillips head that exerts up to 30-pound force per square inch (in-lb) or 0.02-kilograms force per square millimeter (kgf/mm²) of pressure
- Crimping tool as specified by the ground lug manufacturer
- Wire-stripping tools for stripping both 6-AWG and 14-AWG wires
- Tape measure and level



Warning Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030

Unpacking and Verifying the Shipped Contents

When you receive your chassis, perform the following steps:

-
- Step 1** Inspect the box for any shipping damage. If there is obvious physical damage, contact your Cisco service representative.
- Step 2** Unpack the Cisco NCS 4201.
- Step 3** Perform a visual inspection of the chassis.
- Step 4** Use table below to check the contents of the Cisco NCS 4201 shipping container. Do not discard the shipping container. You will need the container if you move or ship the Cisco NCS 4201 in the future.

Table 15: Cisco NCS 4201 Default Shipping Container Contents

Component	Description
NCS 4201 DC Starter kit (NCS4201D-STRT-KIT=)	Chassis: NCS4201-SA XE-NCS42XX-318 Door: NCS4200-1RU-DOOR Fan Tray: ASR-920-FAN-F DC Power Supply: ASR-920-PWR-D
NCS 4201 AC Starter kit (NCS4201A-STRT-KIT=)	Chassis NCS4201-SA XE-NCS42XX-318 Door: NCS4200-1RU-DOOR Fan Tray: ASR-920-FAN-F AC Power Supply: ASR-920-PWR-A
Documentation	<i>Cisco NCS 4200 Series Pointer Card</i>
Optional equipment	Check the container for the following optional equipment: <ul style="list-style-type: none"> • Power cord if an AC power supply was shipped. There are no cords for the DC power supply units.

Most Cisco documentation is available online. The Cisco NCS 4200 Series Pointer Card that is shipped with your Cisco NCS 4201 contains links and information about the various documents that are available online.



CHAPTER 3

Installing the Cisco NCS 4201

This chapter describes how to install the Cisco NCS 4201 and includes the following sections:

- [Prerequisites](#), on page 33
- [Installing the Chassis in a Rack](#), on page 33
- [Installing and Removing the Front Door](#), on page 38
- [Installing and Removing the Fan Tray](#), on page 40
- [Installing the Power Supply](#), on page 42
- [Installing and Removing SFP Modules](#), on page 54
- [Installing the Chassis Ground Connection](#), on page 59
- [Connecting a Chassis to the Network](#), on page 62

Prerequisites

Before installing the Cisco NCS 4201, it is important to prepare for the installation by:

- Preparing the site (site planning) and reviewing the installation plans or method of procedures (MOP). See [Site Planning](#) section.
- Unpacking and inspecting the Cisco NCS 4201. See [Receiving the Chassis](#) section.
- Gathering the tools and test equipment required to properly install the Cisco NCS 4201. See [Tools and Equipment](#) section.

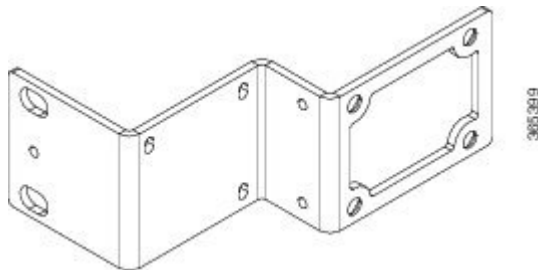
For more instructions on how to prepare for the installation of the Cisco NCS 4201, see [Preparing for Installation](#) chapter.

Installing the Chassis in a Rack

The procedures in this section apply to both horizontal and vertical mounting of the chassis in a rack:

Installing the Chassis Brackets

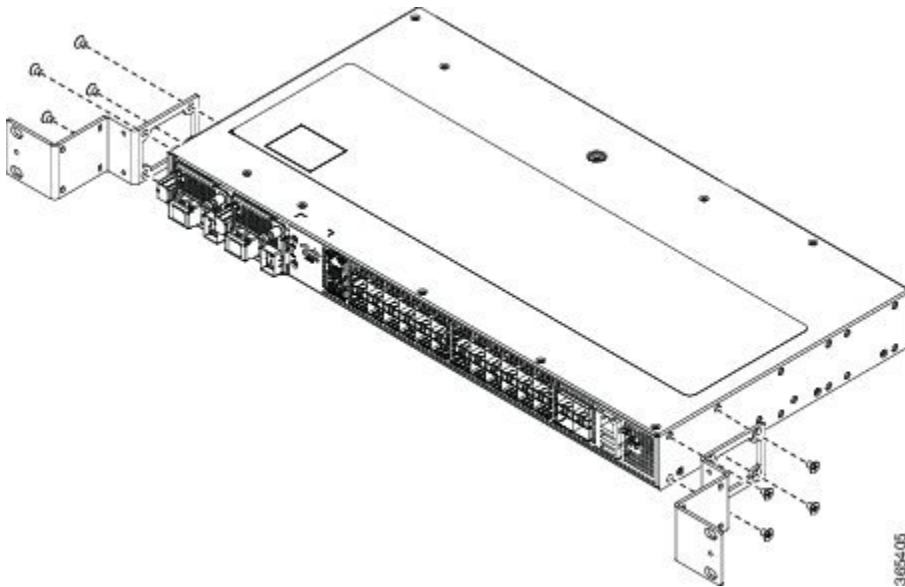
Figure 8: Z Rack Mounting Bracket



To install the brackets on the front of the chassis, perform these steps:

-
- Step 1** Remove the rack-mount brackets from the accessory kit and position them beside the chassis.
- Step 2** Position one of the brackets against the chassis side, and align the screw holes. The figure below shows how to attach the brackets on the Cisco NCS 4201 for a 23-inch rack.

Figure 9: Attaching Mounting Brackets to Cisco NCS 4201 for a 23-inch Rack (Front Z-bracket)



- Step 3** Secure the bracket to the chassis with the screws removed when performing Step 1. The recommended maximum torque is 10 in.-lb.
- Step 4** Repeat Step 3 and Step 3 for the other bracket.
-

Installing the Chassis in the Rack



Note Ensure adequate air flow when mounting the chassis in a rack. For more information, see the [Air Flow Guidelines](#) section.



Note Install the cable guides before installing the Cisco NCS 4201 on the rack. See [Attaching the Cable Guides](#) section.

To install the chassis in the equipment rack, perform these steps:

Step 1

Position the chassis in the rack as follows:

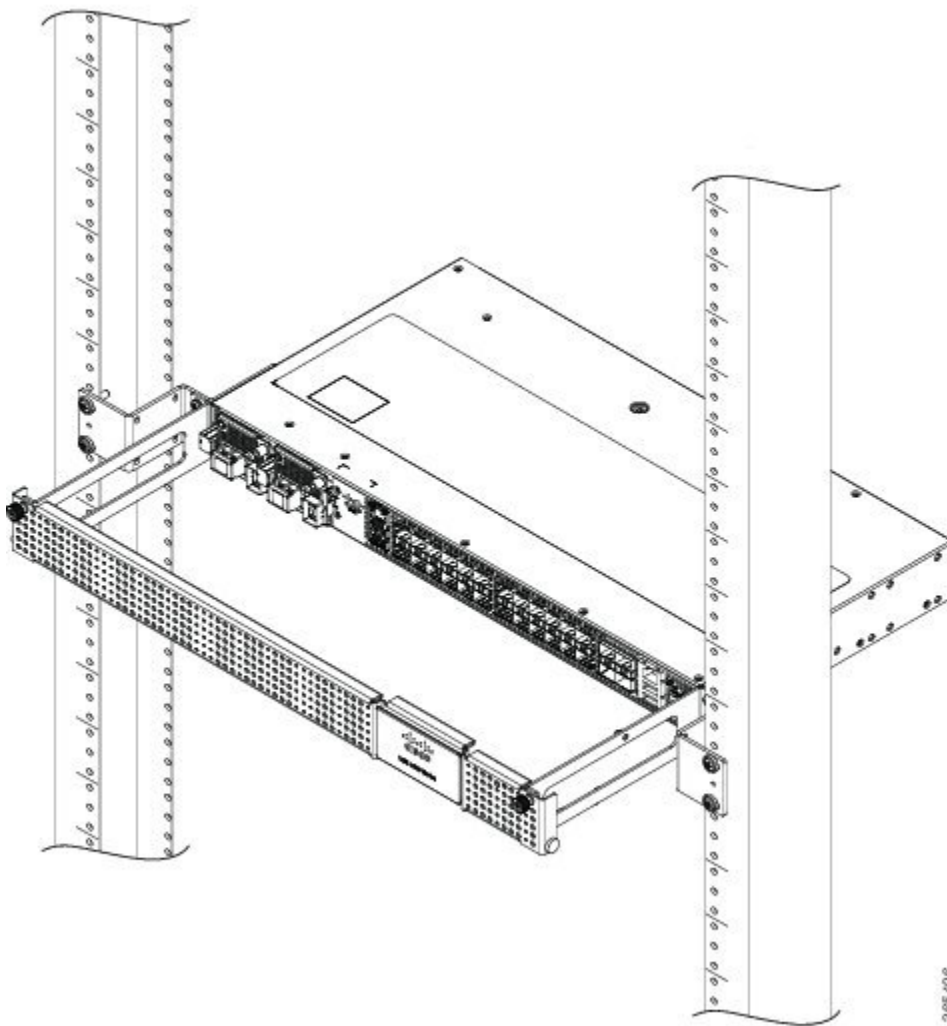
- If the front of the chassis (front panel) is at the front of the rack, insert the rear of the chassis between the mounting posts.
- If the rear of the chassis is at the front of the rack, insert the front of the chassis between the mounting posts.

Step 2

Align the mounting holes in the bracket with the mounting holes in the equipment rack.

The following figure shows how to install the Cisco NCS 4201 in a 23-inch EIA rack.

Figure 10: Installing the Cisco NCS 4201 in a 23-inch EIA Rack



- Step 3** Install the four M6x12mm zinc-plated steel screws through the holes in the bracket and into the threaded holes in the equipment rack posts.
- Step 4** Use a tape measure and level to verify that the chassis is installed straight and level.

Attaching the Cable Guides

You can guide the cables on the Cisco NCS 4201 through the cable bracket:

The cable bracket helps in routing the cables from all components on the front panel thereby enabling a proper cable-bending radius.

To install the cable guides, perform these steps:

- Step 1** Position the cable brackets (left and right) against the side of the chassis and align the four screw holes, as shown in figure below using standard kit.
- Step 2** Secure the cable brackets with the four M6x12mm screws supplied with the cable kit. The recommended maximum torque is 3N-m.

Figure 11: Installing the Cable Brackets on Cisco NCS 4201 (As Per the Standard Kit)

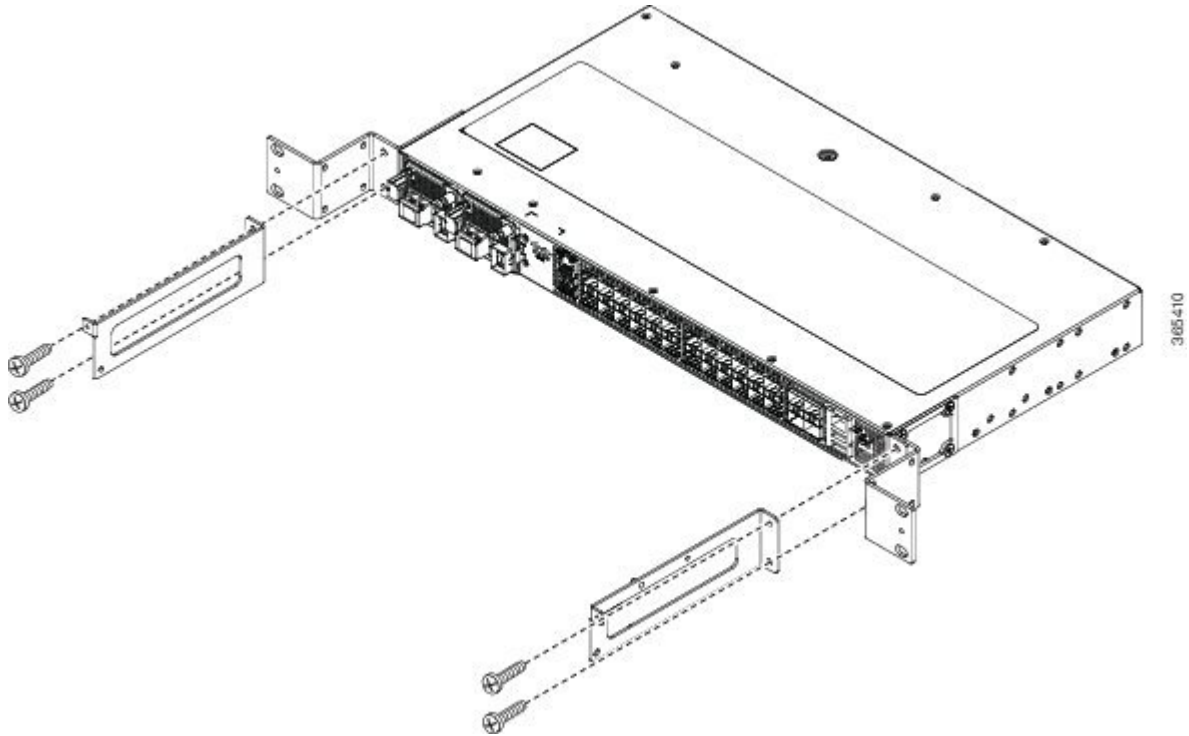
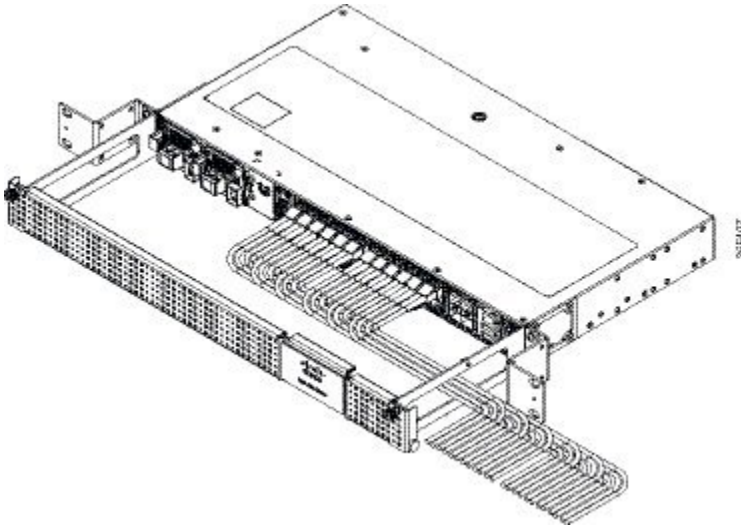


Figure 12: Guiding the Cables from the Front Panel through the Cable Brackets



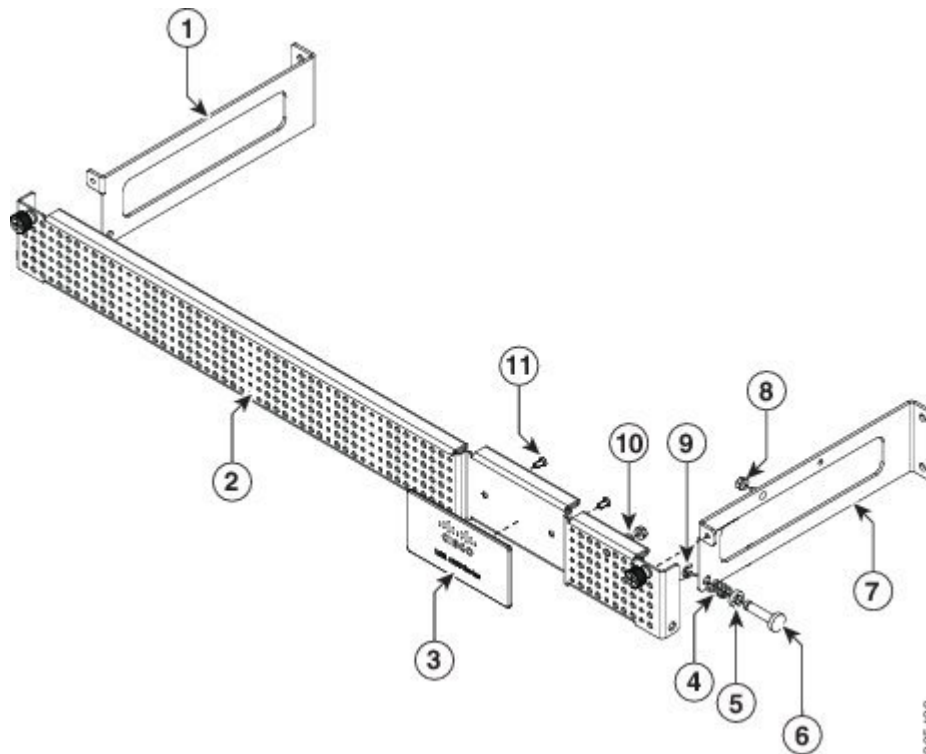
Installing and Removing the Front Door

The front door provides additional space in front of the Cisco NCS 4201 to accommodate cables. You can remove the door to provide unrestricted access to the front of the chassis.

Installing the Front Door

- Step 1** Align the door with the cable bracket as shown in the figure below.
- Step 2** Tighten the screws on both sides on the top and bottom.

Figure 13: Installing the Front Door

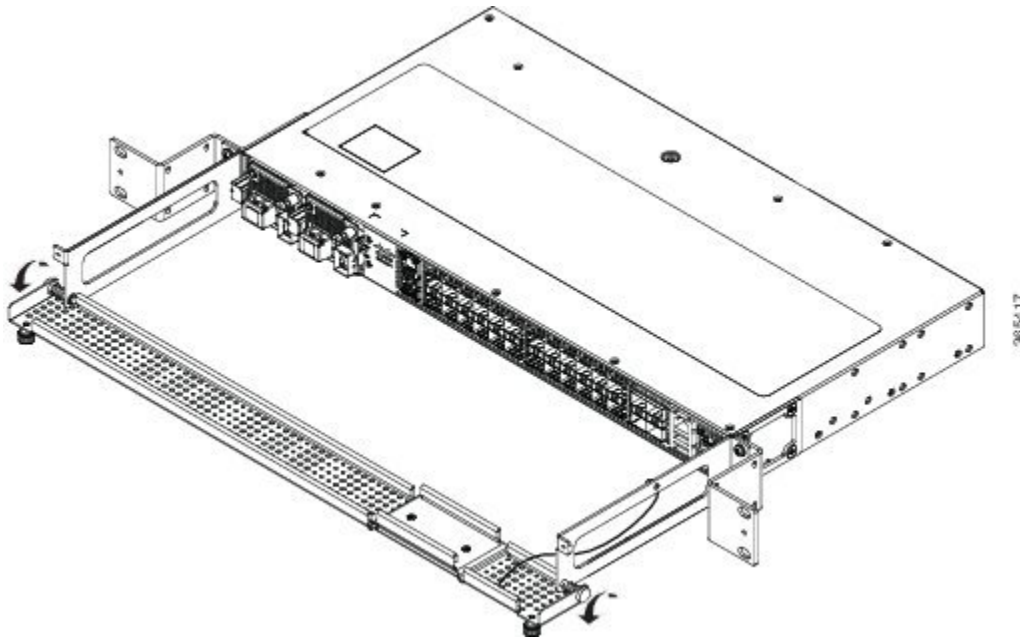


Removing the Front Door

The door is attached to the cable bracket through screws on both sides on the top and bottom. Loosen the screws on the top left and right corners of the door.

The door falls outwards, hinged to the cable bracket.

Figure 14: Removing the Front Door



Installing and Removing the Fan Tray

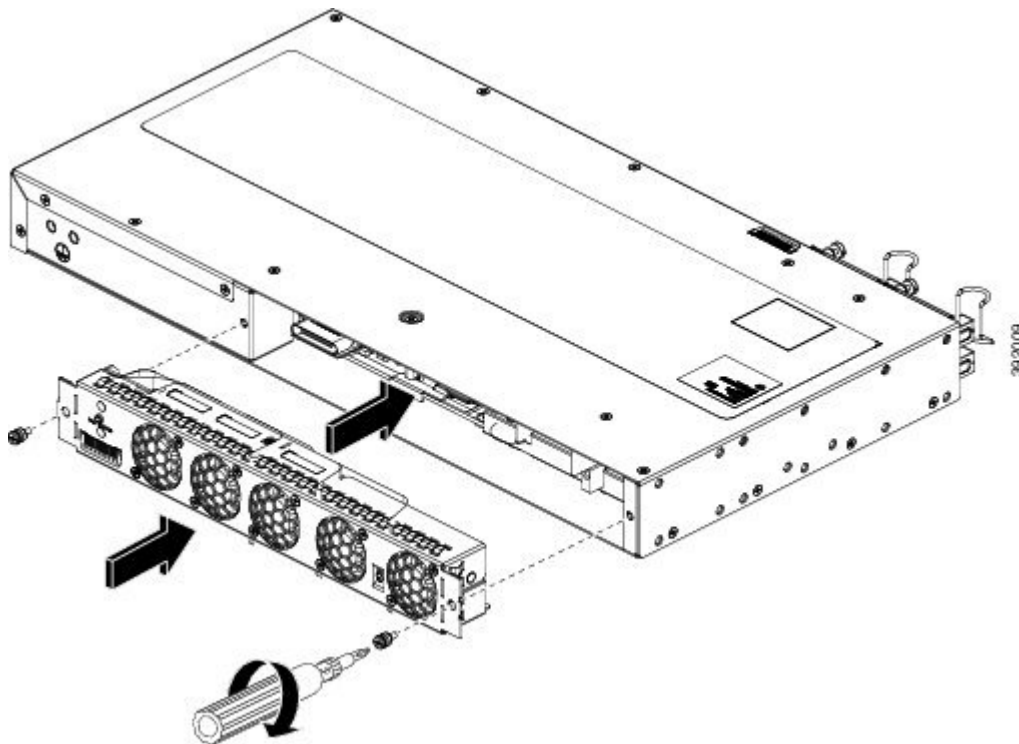
The following sections describe the installation and removal of fan tray on the Cisco NCS 4201:

Installing the Fan Tray

The fan tray is a modular unit that provides cooling to the Cisco NCS 4201. Follow these steps to install the fan tray in the chassis:

-
- Step 1** Guide the fan tray into the chassis until it is fully seated. The figure below show how to orient the fan tray for Cisco NCS 4201.
- Caution** Keep your fingers, clothing, and jewelry away from the fans. Always handle the fan tray by the handle.
- Step 2** Secure the fan tray to the chassis using the attached captive installation screws. The recommended maximum torque is 5.5 in.-lb (.62 N-m).

Figure 15: Installing the Fan Tray on Cisco NCS 4201



This completes the procedure for installing or replacing the fan tray in a Cisco NCS 4201.

For more information about air flow guidelines, see the [Air Flow Guidelines](#) section.

Removing the Fan Tray

The fan tray supports online insertion and removal (OIR). There is no need to power down the Cisco NCS 4201 to remove or replace the fan tray. However, the chassis will shut down if the fan tray is removed from the chassis for more than five minutes.



Caution

The chassis can stay active for up to 5 minutes if the temperature is below the ambient limit. However, in the event of an overtemperature alarm, the chassis can shut down in less than 5 minutes. In the event of a critical temperature alarm, the chassis shuts down immediately.



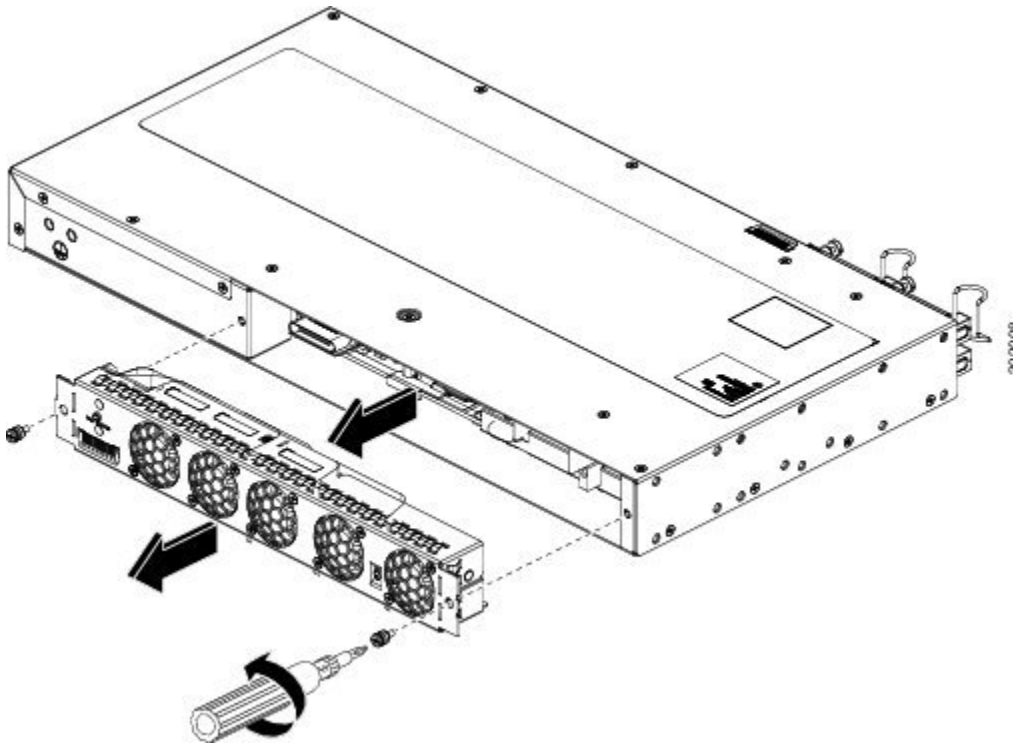
Caution

To avoid erroneous failure messages, allow at least 2 minutes for the system to reinitialize after the fan tray has been removed or replaced.

Follow these steps to remove and replace the fan tray on the Cisco NCS 4201:

- Step 1** Using a No. 2 Phillips screwdriver or your fingers, loosen the captive installation screws that secures the fan tray to the chassis. The figure below shows the front of the Cisco NCS 4201 fan tray, including the captive installation screws.

Figure 16: Removing the Fan Tray From Cisco NCS 4201



Caution Keep your fingers, clothing, and jewelry away from the fans. Always handle the fan tray by the handle.

- Step 2** Pull the fan tray towards you, no more than 1 inch, to disengage it from the power receptacle on the midplane.

Warning 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. Statement 263

- Step 3** Wait at least 5 seconds to allow the fans to stop spinning. Then, pull the fan tray backward towards you and out of the chassis.

Note As the fan tray slides out of the chassis, support the bottom of the fan tray with one hand and keep your other hand on the fan tray.

This completes the steps for removing the fan tray from the chassis.

To install a new fan tray, follow the steps in the [Installing the Fan Tray](#) section.

Installing the Power Supply

The Cisco NCS 4201 provides the choice of two different power supplies:

- DC power—48 V/60 Vdc or 24 Vdc

The DC power supply uses 2 position terminal block-style connector. The terminal block connector is of suitable size to carry the appropriate AWG wire size to handle the input current of the power supply. ON/OFF switch is provided.

- AC power—100 VAC to 240 VAC

The AC power supply has an IEC 320-type power receptacle and a 15-A service connector. You can use standard straight power cords with the AC power supply. The power supply includes a power cord retainer clip that can only accept straight power cords. No ON/OFF switch is provided.

Each power supply provides a single primary input power connection. You can install dual-power supplies for redundancy.



Warning Read the installation instructions before connecting the system to the power source. Statement 1004



Note Products that have an AC power connection are required to have an external surge protective device (SPD) provided as part of the building installation to comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety.



Caution Do not use interface module or power supply ejector handles to lift the chassis; using these handles to lift the chassis can deform or damage the handles.

The following sections provide more information on the Cisco NCS 4201 power supplies:

Preventing Power Loss

Use the following guidelines to prevent power loss to the chassis:

- To prevent loss of input power, ensure that the total maximum load on each circuit supplying the power supplies is within the current ratings of the wiring and breakers.
- In some systems, you can use an UPS to protect against power failures at your site. Avoid UPS types that use ferroresonant technology. These UPS types can become unstable with systems such as the Cisco NCS 4201, which can have substantial current-draw fluctuations due to bursty data traffic patterns.

Power Connection Guidelines

This section provides guidelines for connecting the Cisco NCS 4201 power supplies to the site power source.



Warning This equipment is intended to be grounded to comply with emission and immunity requirements. Ensure that the switch functional ground lug is connected to earth ground during normal use. Statement 1064



Warning The plug-socket combination must be accessible at all times, because it serves as the main disconnecting device. Statement 1019



Warning This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045

Guidelines for DC-Powered Systems

Basic guidelines for DC-powered systems include the following:

- Each chassis power supply should have its own dedicated input power source. The source must comply with the safety extra-low voltage (SELV) requirements in the UL 60950, CSA 60950, EN 60950, and IEC 60950 standards.
- The circuit must be protected by a dedicated two-pole circuit breaker. The circuit breaker should be sized according to the power supply input rating and local or national code requirements.
- The circuit breaker is considered the disconnect device and should be easily accessible.
- The system ground is the power supply and chassis ground.
- Do not connect the DC return wire to the system frame or to the system-grounding equipment.
- Use the grounding lug to attach a wrist strap for ESD protection during servicing.

Guidelines for AC-Powered Systems

Basic guidelines for AC-powered systems include the following:

- Each chassis power supply should have its own dedicated branch circuit.
- The circuit breaker should be sized according to the power supply input rating and local or national code requirements.
- The AC power receptacles used to plug in the chassis must be the grounding type. The grounding conductors that connect to the receptacles should connect to protective earth ground at the service equipment.

Installing a DC Power Supply

The following sections describe how to install a DC power supply in the Cisco NCS 4201:



Note This equipment is suitable for installation in Network Telecommunications Facilities and locations where the NEC applies. The equipment is suitable for installation as part of the Common Bonding Network (CBN).



Caution The grounding architecture of this product is DC-isolated (DC-I) for DC-powered products. DC-powered products have a nominal operating DC voltage of 48 VDC. Minimal steady state DC operating voltage is 19.2 VDC.

Installing a DC Power Supply Module

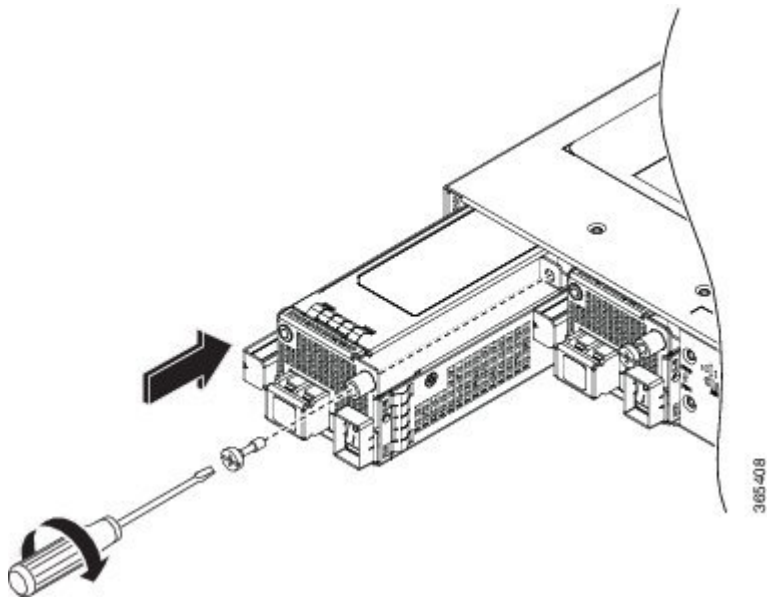


Note Open and remove the door before performing this procedure. See [Removing the Front Door](#) section.

Perform the following procedure to install a power supply module:

- Step 1** Ensure that the system (earth) ground connection has been made. For ground connection installation instructions, see the [Installing the Chassis Ground Connection](#) section.
- Step 2** If present, remove the blank power supply filler plate from the chassis power supply bay opening by loosening the captive installation screws.
- Step 3** Verify that power to the DC circuit connected to the power supply you are installing is off. To ensure that power has been removed from the DC circuits, locate the circuit breakers for the DC circuits, switch the circuit breakers to the OFF position, and tape the circuit-breaker switches in the OFF position.
- Step 4** Grasp the power supply metal tab with one hand. Place your other hand underneath the power supply. Slide the power supply into the power supply bay as shown in figure below. Make sure that the power supply is fully seated in the bay.

Figure 17: Installing a DC Power Supply



- Step 5** Tighten the captive installation screw of the power supply. The recommended maximum torque is 5.5 in.-lb (.62 N-m). If you are installing a redundant DC power supply, repeat these steps for the second power source too.

Attaching Cables to the DC Power Supply



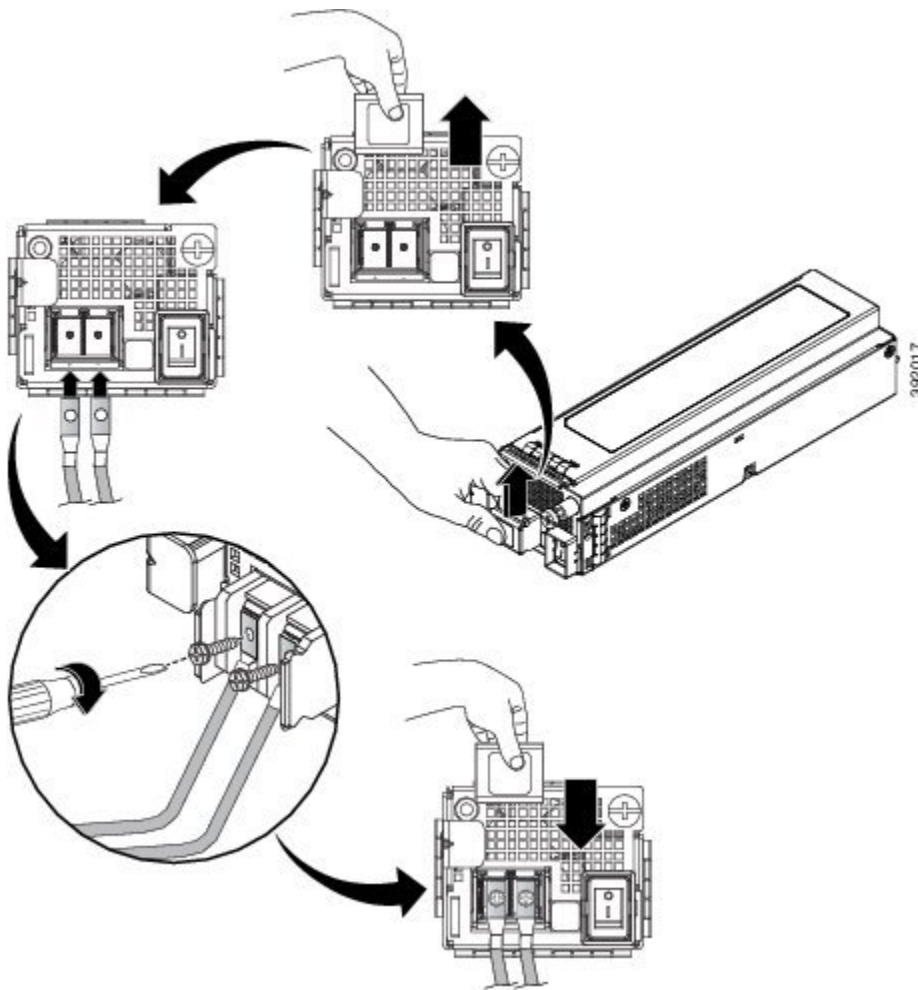
Note When installing DC power supply, use 14 AWG, 90°C wires. Always ensure that the building's installation for short-circuit (overcurrent) protection does not exceed 15A.

To attach the DC power supplies:

Step 1 Open the DC power supply guard.

Step 2 Attach the DC supply wires in the designated screws. See figure below.

Figure 18: Connecting the DC Power Supply Wires



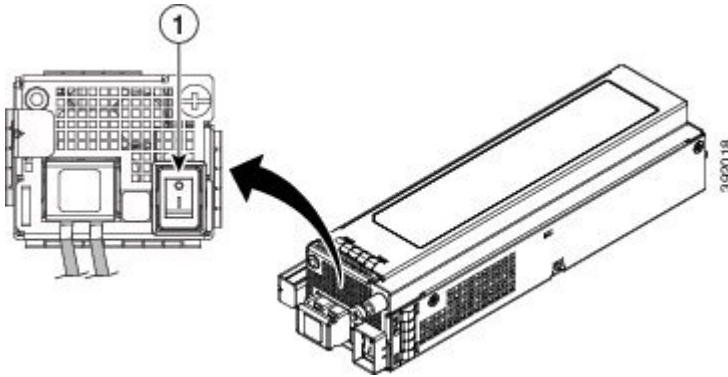
Step 3 Close the DC power supply guard.

Powering On the Chassis

After the chassis is either rack mounted or mounted on the wall, perform these tasks to complete the installation:

Step 1 Power on the chassis. See figure below.

Figure 19: Powering on the Chassis



1 power on/off switch

Step 2 Connect the front-panel ports. See the Connecting to SFP Modules section to complete the installation.

Removing and Replacing a DC Power Supply

This section provides information about removing and replacing a DC power supply in the Cisco NCS 4201.



Note The Cisco NCS 4201 power supplies are hot-swappable. If you have installed redundant power supplies, you can replace a single power supply without interrupting power to the chassis.



Caution To avoid erroneous failure messages, allow at least 2 minutes for the system to reinitialize after a power supply has been removed or replaced.



Warning When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046



Warning Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003



Warning Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030



Warning Installation of the equipment must comply with local and national electrical codes. Statement 1074

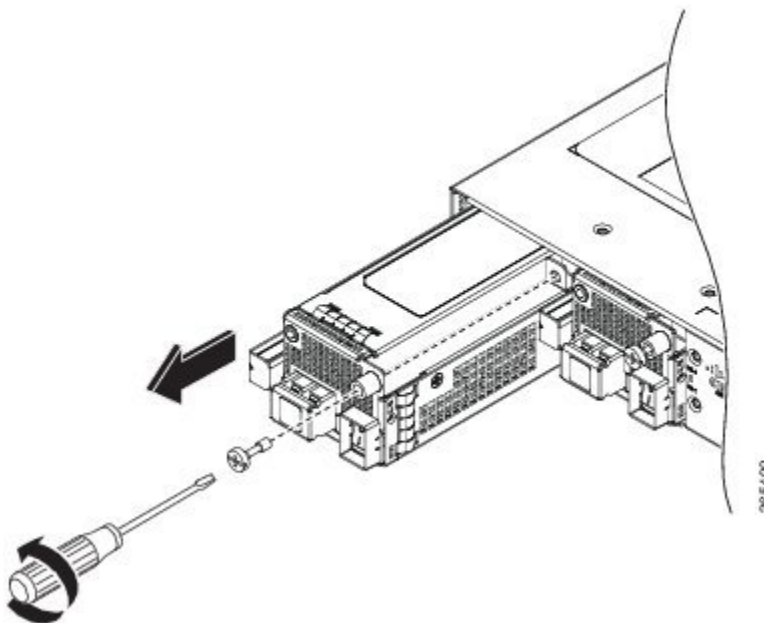


Note Open and remove the door before performing this procedure. See [Removing the Front Door](#) section.

Follow these steps to remove and replace the DC power supply on the Cisco NCS 4201:

- Step 1** Before servicing the power supply, switch off the circuit breaker in your equipment area. As an additional precaution, tape the circuit-breaker switch in the Off position.
- Step 2** Slip on the ESD-preventive wrist strap that was included in the accessory kit.
- Step 3** Switch the power supply circuit-breaker switch to the Off (O) position.
- Step 4** Pull the terminal block plug connector out of the terminal block head in the power supply.
- Step 5** Loosen the captive screw on the DC power supply. See figure below.

Figure 20: Removing a DC Power Supply



Caution Do not use the captive installation screw to pull out the power supply.

- Step 6** Grasping the power supply handle with one hand, pull the power supply out from the chassis while supporting it with the other hand.

- Step 7** Replace the DC power supply within 5 minutes. See figure Installing a DC Power Supply. If the power supply bay is to remain empty, install a blank filler plate (Cisco part number 800-39165-01) over the opening, and secure it with captive installation screws.
-

Installing an AC power Supply

The following sections describe how to install an AC power supply in the Cisco NCS 4201:



Warning

This product requires short-circuit (over current) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045

Installing an AC Power Supply Module



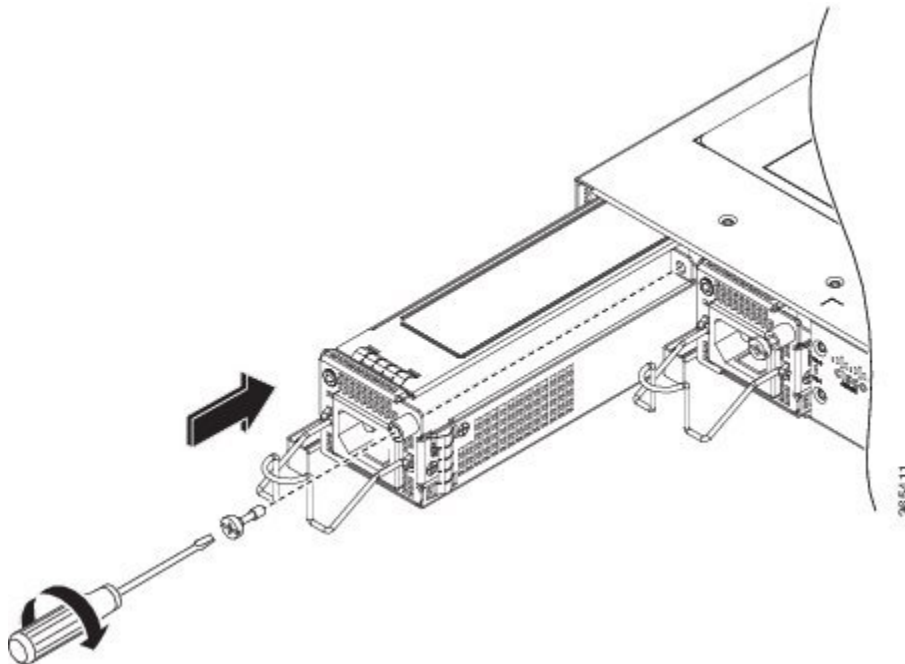
Note

Open and remove the door before performing this procedure. See [Removing the Front Door](#) section.

Follow these steps to install an AC power supply module:

- Step 1** Ensure that the system (earth) ground connection has been made. For ground connection installation instructions, see the [Installing the Chassis Ground Connection](#) section.
- Step 2** If necessary, remove the blank power supply filler plate from the chassis power supply bay opening, by loosening the captive installation screws.
- Step 3** Grasp the power supply handle with one hand. Place your other hand underneath the power supply, as shown in figure below. Slide the power supply into the power supply bay. Make sure that the power supply is fully seated in the bay.

Figure 21: Installing the AC Power Supply



Step 4 Tighten the captive installation screw of the power supply. The recommended maximum torque is 5.5 in.-lb (.62 N-m).

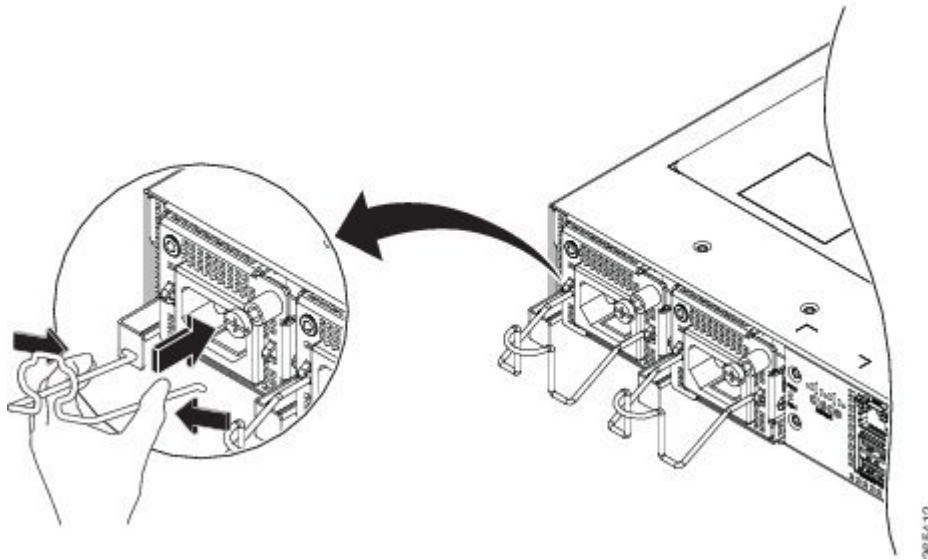
Warning Power supply captive installation screws must be tight to ensure protective grounding continuity. Statement 289

Activating an AC Power Supply

Follow these steps to activate an AC power supply:

Step 1 Attach the AC power retainer cord as shown in the figure below.

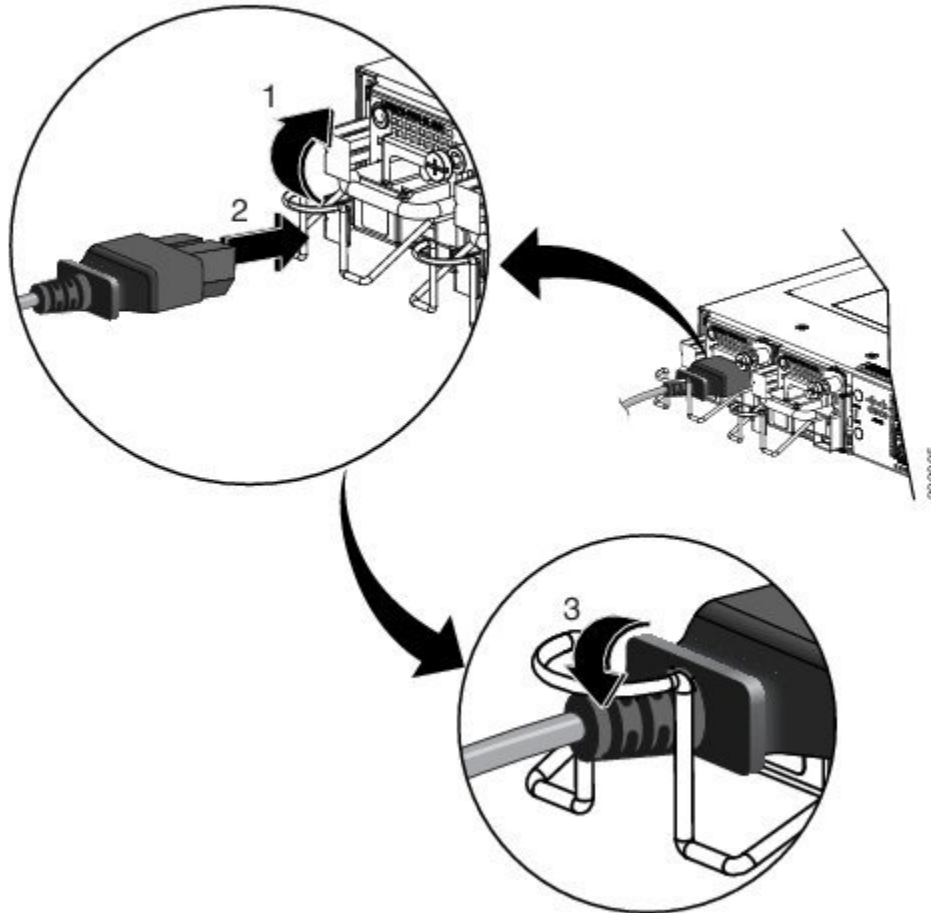
Figure 22: Attaching the AC Power Retainer Cord



Step 2 Lift the power retainer and plug in the AC power supply.

Step 3 Push the retainer cord towards the power supply cord to lock it in place as shown in the figure below.

Figure 23: Locking the Power Retainer Cord



- Step 4** Connect the other end of the power cord to an AC-input power source.
- Step 5** Verify power supply operation by checking that the power supply LED is green.
- Step 6** If the LEDs indicate a power problem, see [LED Indicators](#) section for troubleshooting information.
- Step 7** If you are installing a redundant power supply, repeat these steps for the second power source.

Note If you are installing a redundant AC power supply, ensure that each power supply is connected to a separate power source in order to prevent power loss in the event of a power failure.

Removing and Replacing an AC Power Supply

This section describes how to remove and replace an AC power supply.



Note The Cisco NCS 4201 power supplies are hot-swappable. If you have installed redundant power supplies, you can replace a single power supply without interrupting power to the chassis.



Caution To avoid erroneous failure messages, allow at least 2 minutes for the system to reinitialize after a power supply has been removed or replaced.



Warning When you install the unit, the ground connection must always be made first and disconnected last. Statement 1046



Warning Before performing any of the following procedures, ensure that power is removed from the DC circuit. Statement 1003



Warning Only trained and qualified personnel should be allowed to install, replace, or service this equipment. Statement 1030



Warning Installation of the equipment must comply with local and national electrical codes. Statement 1074

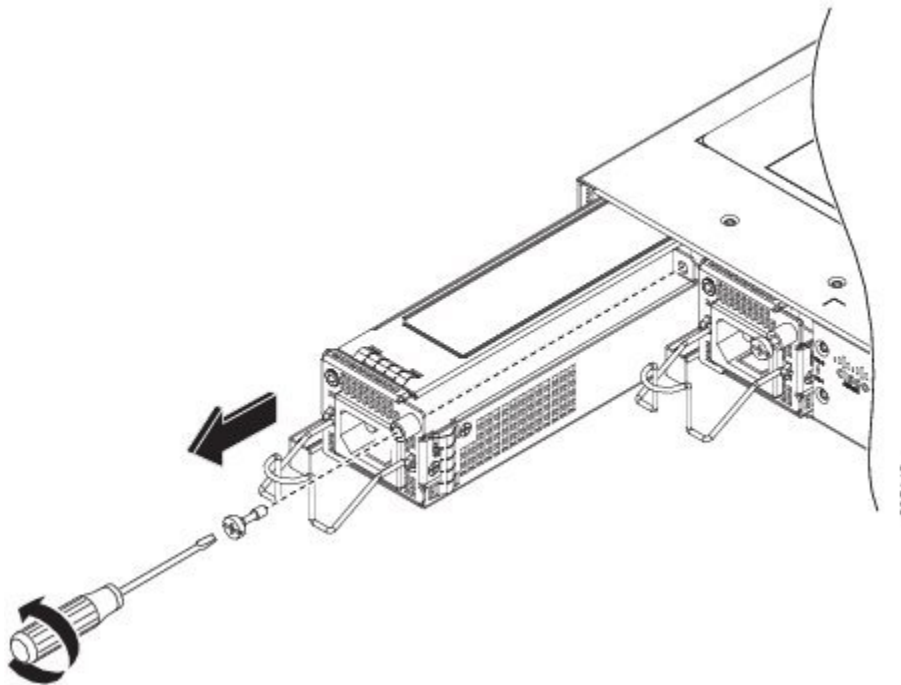


Note Open and remove the door before performing this procedure. See [Removing the Front Door](#) section.

Follow these steps to remove and replace an AC power supply:

-
- Step 1** Disconnect the power cord from the power source. Do not touch the metal prongs on the power cord when it is still connected to the power supply.
 - Step 2** Remove the power cord from the power connection on the power supply. Do not touch the metal prongs embedded in the power supply.
 - Step 3** Loosen the captive installation screw as shown in the figure below.

Figure 24: Removing the AC Power Supply



Caution Do not use the captive installation screw or the power retainer to pull out the power supply.

- Step 4** Grasp the AC power supply metal tab with one hand, and slide it part of the way out of the chassis. Place your other hand underneath the power supply, and slide it completely out of the chassis. See figure Installing the AC Power Supply.
- Step 5** Replace the AC power supply within 5 minutes. See figure Installing the AC Power Supply. If the power supply bay is to remain empty, install a blank filler plate (Cisco part number 800-39165-01) over the opening, and secure it with captive installation screws.

Installing and Removing SFP Modules

These sections describe how to install and remove SFP modules. The modules are inserted into the SFP module slots as depicted in figure Installing an SFP Module without a Bale-Clasp Latch into an SFP Module Slot on Cisco NCS 4201. These field-replaceable modules provide interfaces.

See the *Cisco NCS 4200 Datasheet* for the list of SFP modules that the chassis supports. Each port must match the wavelength specifications on the other end of the cable. For reliable communications, the cable must not exceed the stipulated cable length.

Use only Cisco SFP modules on the Cisco chassis. Each SFP module has an internal serial EEPROM that is encoded with security information. This encoding provides a way for Cisco to identify and validate that the SFP module meets the requirements for the chassis.

For detailed instructions on installing, removing, and cabling the SFP module, see the SFP module documentation.

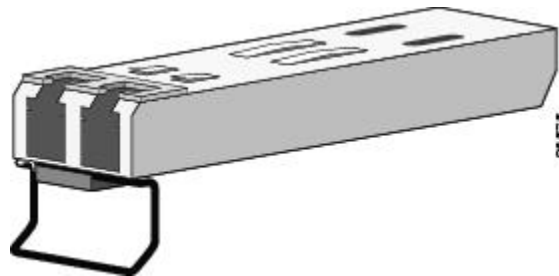
Installing SFP Modules

The figure below shows an SFP module that has a bale-clasp latch.



Caution We strongly recommend that you do not install or remove fiber-optic SFP modules with cables attached because of the potential damage to the cables, the cable connector, or the optical interfaces in the SFP module. Disconnect all cables before removing or installing an SFP module. Removing and installing an SFP module can shorten its useful life. Do not remove and insert SFP modules more often than is absolutely necessary.

Figure 25: SFP Module with a Bale-Clasp Latch



To insert an SFP module into the module slot, follow these steps:

-
- Step 1** Attach an ESD-preventive wrist strap to your wrist and to a bare metal surface on the chassis.
- Some SFP modules identify the top side of the module with send (TX) and receive (RX) markings or arrows that show the direction of the connection.
- Step 2** If the SFP module that you are using has the markings, use them to identify the top side of the module.
- Step 3** Align the SFP module in front of the slot opening.
- Step 4** Insert the SFP module into the slot until you feel the connector on the module snap into place in the rear of the slot. See figure Installing an SFP Module with a Bale-Clasp Latch into an SFP Module Slot on Cisco NCS 4201 for installing SFP Module with a Bale-Clasp Latch and figure Installing an SFP Module without a Bale-Clasp Latch into an SFP Module Slot on Cisco NCS 4201 for installing SFP Module without a Bale-Clasp Latch.

Figure 26: Installing an SFP Module with a Bale-Clasp Latch into an SFP Module Slot on Cisco NCS 4201

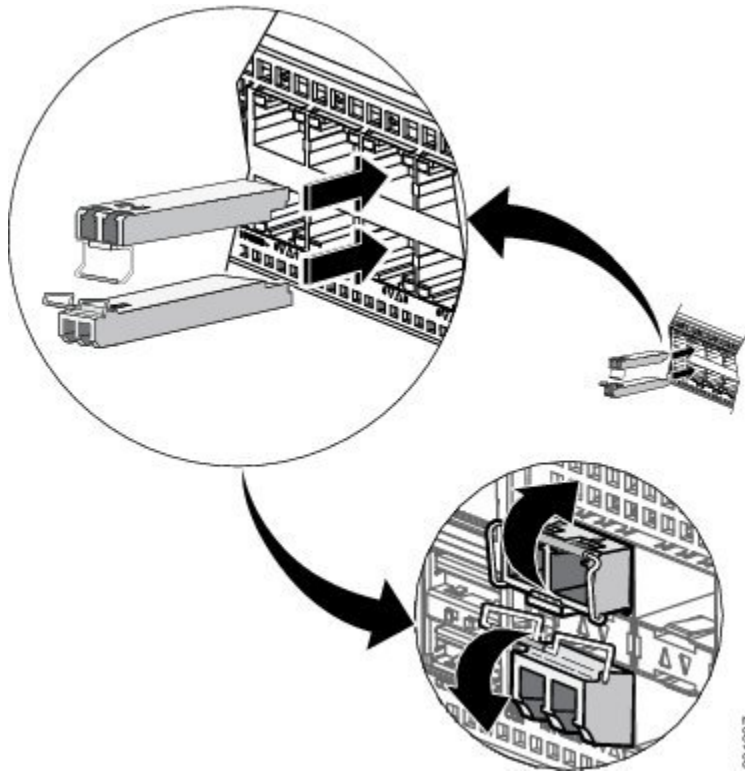
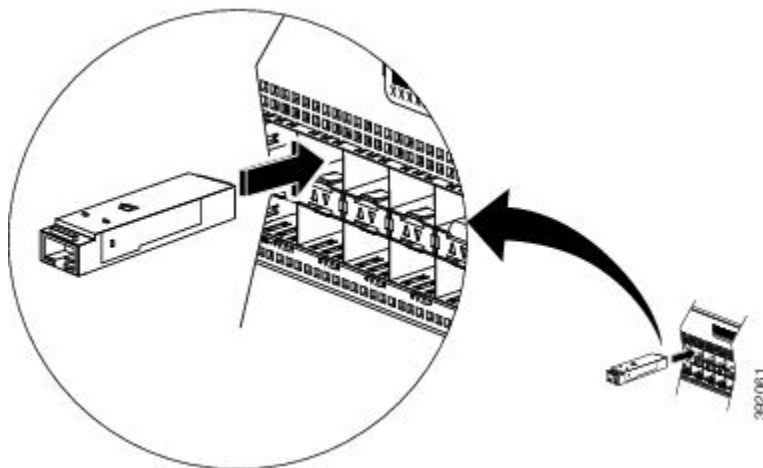


Figure 27: Installing an SFP Module without a Bale-Clasp Latch into an SFP Module Slot on Cisco NCS 4201



Caution Do not remove the dust plugs from the fiber-optic SFP module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP module ports and cables from contamination and ambient light. Store the dust plugs for later use.

Step 5 Insert the cable connector into the SFP module:

- For fiber-optic SFP modules, insert the LC cable into the SFP module.

- For copper 1000BASE-T SFP modules, insert the RJ-45 cable connector into the SFP module.

Removing SFP Modules

To remove an SFP module from a module receptacle, follow these steps:

- Step 1** Attach an ESD-preventive wrist strap to your wrist and to a bare metal surface on the chassis.
- Step 2** Disconnect the cable from the SFP module, and insert a dust plug into the cable end.
- Tip** For reattachment, note which cable connector plug is send (TX) and which is receive (RX).
- Step 3** **SFP module with Bale-Clasp Latch**—Pull the bale out and down to eject the module as shown in figure Removing a SFP Module with Bale-Clasp Latch From Cisco NCS 4201. If the bale-clasp latch is obstructed and you cannot use your index finger to open it, use a small, flat-blade screwdriver or other long, narrow instrument to open the bale-clasp latch.
- SFP module without Bale-Clasp Latch**—Use the extraction tool to remove the SFP by inserting the tool into the side of the SFP module and pulling it out of the module as shown in figure Removing a SFP Module without Bale-Clasp Latch From Cisco NCS 4201.

Figure 28: Removing a SFP Module with Bale-Clasp Latch From Cisco NCS 4201

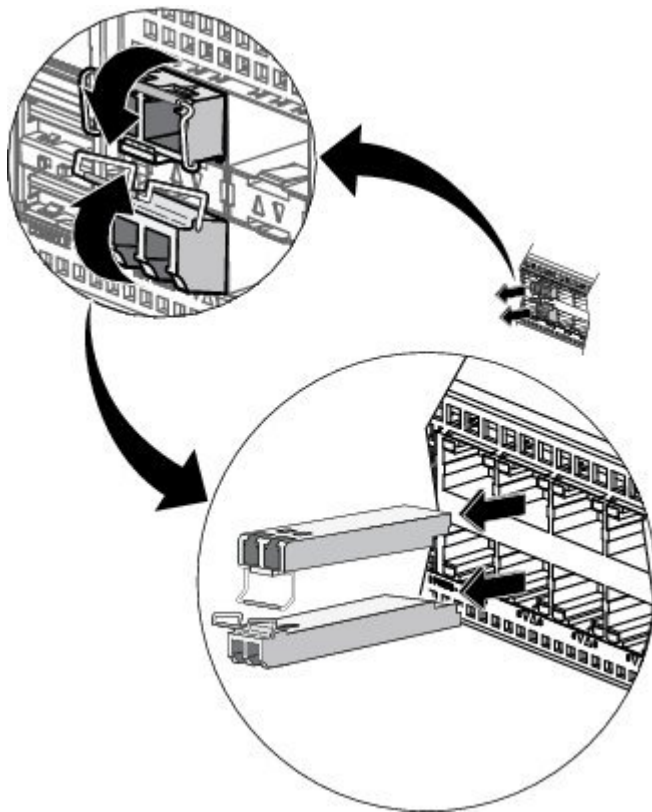
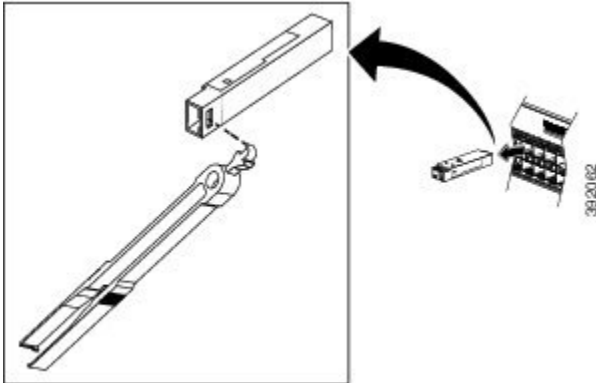


Figure 29: Removing a SFP Module without Bale-Clasp Latch From Cisco NCS 4201



- Step 4** Grasp the SFP module between your thumb and index finger, and carefully remove it from the module slot.
- Step 5** For fiber-optic SFP modules, insert a dust plug into the optical ports of the SFP module to keep the optical interfaces clean.
- Step 6** Place the removed SFP module in an antistatic bag or other protective environment.

Connecting to SFP Modules

This section describes how to connect to SFP modules. For instructions on how to connect to fiber-optic SFP modules, see the [Connecting to Fiber-Optic SFP Modules](#) section.

For instructions about how to install or remove an SFP module, see the [Installing and Removing SFP Modules](#) section.

Connecting to Fiber-Optic SFP Modules

Follow these steps to connect a fiber-optic cable to an SFP module:



Warning Class 1 laser product. Statement 1008



Caution Do not remove the rubber plugs from the SFP module port or the rubber caps from the fiber-optic cable until you are ready to connect the cable. The plugs and caps protect the SFP module ports and cables from contamination and ambient light.

- Step 1** Remove the rubber plugs from the module port and fiber-optic cable, and store them for future use.
- Step 2** Insert one end of the fiber-optic cable into the SFP module port.
- Step 3** Insert the other cable end into a fiber-optic connector on a target device.
- Step 4** Observe the port status LED.
- The LED turns green when the chassis and the target device have an established link.

If the LED is off, the target device might not be turned on, there might be a cable problem, or there might be problem with the adapter installed in the target device.

Step 5 If necessary, reconfigure and restart the chassis or target device.

Installing the Chassis Ground Connection

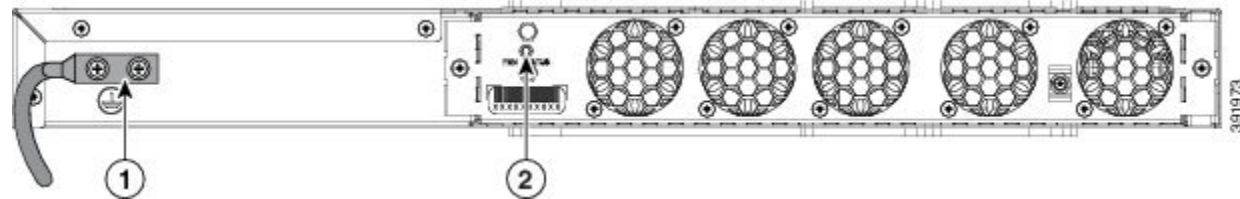
Before you connect the power or turn on the power to the Cisco NCS 4201, you must provide an adequate chassis ground (earth) connection to your chassis.

This section describes how to ground the Cisco NCS 4201 chassis. The grounding lug location is on the back panel of the chassis.



Tip Ensure that the grounding lug wire does not cover the fan opening.

Figure 30: Attaching a Grounding Lug to the Rear of the Cisco NCS 4201



1	Grounding lugs	2	Fan status LED
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To ensure that the chassis ground connection that you provide is adequate, you need the following parts and tools:

- Ratcheting torque screwdriver with Phillips head that exerts up to 15 in.-lb (1.69 N-m) of torque for attaching the ground wire to the chassis
- Crimping tool as specified by the ground lug manufacturer
- 6-AWG or larger copper wire for the ground wire
- Wire-stripping tools appropriate to the wire you are using



Caution Before making connections to the Cisco NCS 4201, ensure that you disconnect the power at the circuit breaker. Otherwise, severe injury to you or damage to the chassis may occur.



Warning This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available. Statement 1024



Warning Use copper conductors only. Statement 1025



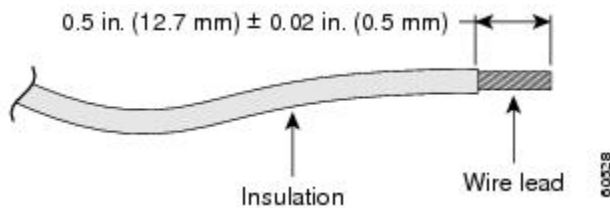
Warning When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046

This unit is to be installed in a restrictive access location and must be permanently grounded to a minimum 6-AWG copper ground wire.

Perform the following procedure to ground the Cisco NCS 4201 using a 2-hole lug and the corresponding mounting point. Most carriers require a minimum 6-AWG ground connection. Verify your carrier's requirements for the ground connection.

Step 1 If your ground wire is insulated, use a wire-stripping tool to strip the ground wire to 0.5 inch \pm 0.02 inch (12.7 mm \pm 0.5 mm) (the figure below).

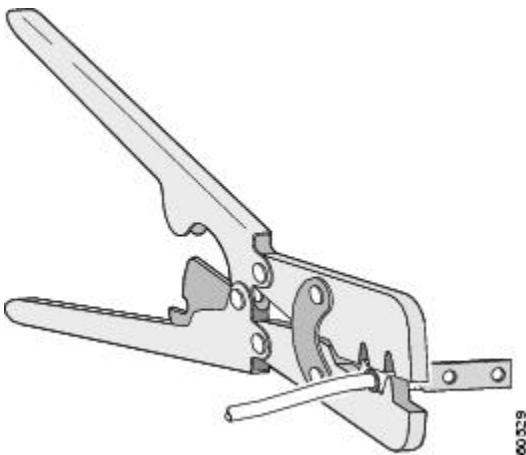
Figure 31: Stripping a Ground Wire



Step 2 Slide the open end of your 2-hole ground lug over the exposed area of the ground wire.

Step 3 Using a crimping tool (as specified by the ground lug manufacturer), crimp the ground lug to the ground wire as shown in figure below.

Figure 32: Crimping a Ground Lug on to the Ground Wire



Step 4 Use a Phillips head screwdriver to attach the 2-hole ground lug and wire assembly to the chassis with the 2 pan-head Phillips head screws.

Step 5 Connect the other end of the ground wire to a suitable grounding point at your site.

Power Connection Guidelines

This section provides guidelines for connecting the Cisco NCS 4200 Series power supplies to the site power source.



Warning This equipment is intended to be grounded to comply with emission and immunity requirements. Ensure that the switch functional ground lug is connected to earth ground during normal use. Statement 1064



Warning The plug-socket combination must be accessible at all times because it serves as the main disconnecting device. Statement 1019



Warning This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations. Statement 1045

Guidelines for DC-Powered Systems

Basic guidelines for DC-powered systems include the following:

- Each chassis power supply should have its own dedicated input power source. The source must comply with the safety extra-low voltage (SELV) requirements in the UL 60950, CSA 60950, EN 60950, and IEC 60950 standards.
- The circuit must be protected by a dedicated two-pole circuit breaker. The circuit breaker should be sized according to the power supply input rating and local or national code requirements.
- The circuit breaker is considered the disconnect device and should be easily accessible.
- The system ground is the power supply and chassis ground.
- Do not connect the DC return wire to the system frame or to the system-grounding equipment.
- Use the grounding lug to attach a wrist strap for ESD protection during servicing.
- Ensure the DC return is grounded at the source side.

Guidelines for AC-Powered Systems

Basic guidelines for AC-powered systems include the following:

- Each chassis power supply should have its own dedicated branch circuit.
- The circuit breaker should be sized according to the power supply input rating and local or national code requirements.
- The AC power receptacles used to plug in the chassis must be the grounding type. The grounding conductors that connect to the receptacles should connect to protective earth ground at the service equipment.

Preventing Power Loss

Use the following guidelines to prevent power loss to the chassis:

- To prevent loss of input power, ensure that the total maximum load on each circuit supplying the power supplies is within the current ratings of the wiring and breakers.
- In some systems, you can use an UPS to protect against power failures at your site. Avoid UPS types that use ferroresonant technology. These UPS types can become unstable with systems such as the Cisco NCS 4201, which can have substantial current-draw fluctuations due to bursty data traffic patterns.

Use the information in the table Cisco NCS 4201 Specifications to estimate the power requirements and heat dissipation of a Cisco NCS 4201 based on a given configuration of the chassis. Determining power requirements is useful for planning the power distribution system needed to support the chassis.

Activating a DC Power Supply

Perform the following procedure to activate a DC power supply:

-
- Step 1** Remove the tape from the circuit-breaker chassis handle, and restore power by moving the circuit-breaker chassis handle to the On (I) position.
- Step 2** Verify power supply operation by checking if the respective power supply front panel LED (PS0 or PS1) is green.
- Step 3** If the LEDs indicate a power problem, see [Troubleshooting](#) chapter.
- Step 4** If you are connecting a redundant DC power supply, repeat these steps for the second power source.
- Note** If you are connecting a redundant DC power supply, ensure that each power supply is connected to a separate power source in order to prevent power loss during a power failure.
-

Activating an AC Power Supply

Perform the following procedure to activate an AC power supply:

-
- Step 1** Plug the power cord into the power supply.
- Step 2** Connect the other end of the power cord to an AC-input power source.
- Step 3** Verify power supply operation by checking if the respective power supply front panel LED (PS0 or PS1) is green.
- Step 4** If the LEDs indicate a power problem, see [Troubleshooting](#) chapter for troubleshooting information.
- Step 5** If you are connecting a redundant AC power supply, repeat these steps for the second power source.
- Note** If you are connecting a redundant AC power supply, ensure that each power supply is connected to a separate power source in order to prevent power loss in the event of a power failure.
-

Connecting a Chassis to the Network

The following sections describe how to connect a Cisco NCS 4201 to the network:



Note Connect only SELV services to all the Cisco NCS 4201 ports.

Connecting Console Cables

The following sections describe how to connect to the Cisco NCS 4201 using console cables:

Connecting to the USB Serial Port Using Microsoft Windows

This procedure shows how to connect to the USB serial port using Microsoft Windows.



Note Install the USB device driver before establishing a physical connection between the chassis and the PC, by using the USB console cable plugged into the USB serial port. Otherwise, the connection will fail. For more information, see [Installing the Cisco USB Device Driver](#) section.

Step 1 Connect a USB Type A-to-Type A cable to the USB console port, as shown in figure below. If you are using the USB serial port for the first time on a Windows-based PC, install the USB driver now according to the instructions in the following sections:

- [Installing the Cisco USB Device Driver](#)
- [Uninstalling the Cisco USB Device Driver](#)

Note You cannot use the USB port and the EIA port concurrently. When the USB port is used, it takes priority over the EIA port.

Step 2 Connect the USB Type A cable to the PC.

Step 3 To communicate with the chassis, start a terminal emulator application, such as Microsoft Windows HyperTerminal. This software should be configured with the following parameters:

- 9600 baud
- 8 data bits
- no parity
- 1 stop-bit
- no flow control

Figure 33: Connecting the USB Console Cable to the Cisco NCS 4201

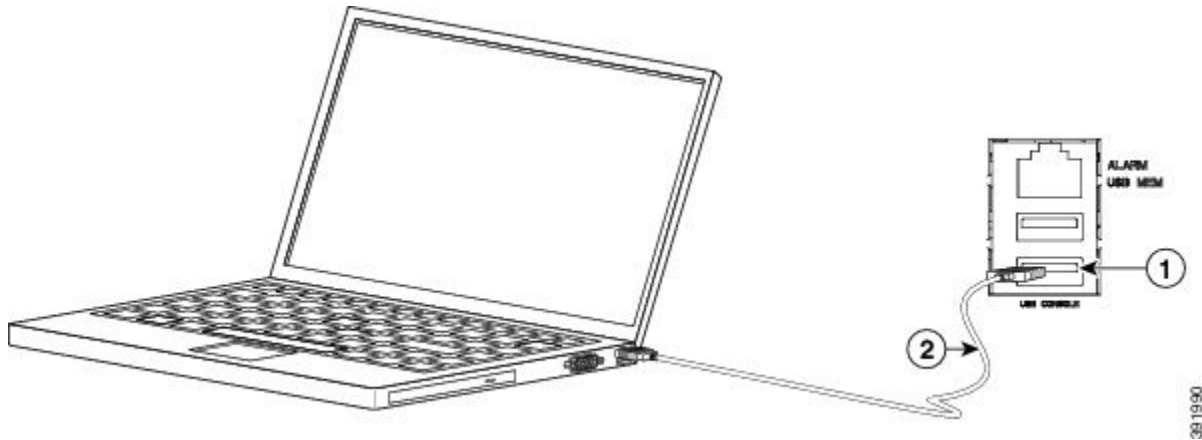


Table 16:

Label	Cable	Label	Cable
1	USB Type-A console port	2	USB USB Type-A to USB Type-A console cable

Connecting to the Console Port Using Mac OS X

This procedure describes how to connect a Mac OS X system USB port to the console using the built-in OS X terminal utility.

- Step 1** Use the Finder to choose **Applications > Utilities > Terminal**.
- Step 2** Connect the OS X USB port to the chassis.
- Step 3** Enter the following commands to find the OS X USB port number:

Example:

```
macbook:user$ cd /dev
macbook:user$ ls -ltr /dev/*usb*
crw-rw-rw- 1 root wheel 19, 6 Dec 9 16:25 /dev/tty.usbmodem1411
crw-rw-rw- 1 root wheel 19, 7 Dec 9 16:25 /dev/cu.usbmodem1411DT-macbook:dev user$
```

- Step 4** Connect to the USB port with the following command followed by the chassis USB port speed:

Example:

```
macbook:user$ screen /dev/tty.usbmodem1411 9600
```

To disconnect the OS X USB console from the terminal window, enter Ctrl-a followed by Ctrl-\

Connecting to the Console Port Using Linux

This procedure shows how to connect a Linux system USB port to the console using the built-in Linux terminal utility.

- Step 1** Open the Linux terminal window.
- Step 2** Connect the Linux USB port to the chassis.
- Step 3** Enter the following commands to find the Linux USB port number:

Example:

```
root@usb-suse# cd /dev
root@usb-suse /dev# ls -ltr *ACM*
crw-r--r--  1 root    root      188,   0 Jan 14 18:02 ttyACM0
root@usb-suse /dev#
```

- Step 4** Connect to the USB port with the following command, followed by the chassis USB port speed:

Example:

```
root@usb-suse /dev# screen /dev/ttyACM0 9600
```

To disconnect the Linux USB console from the terminal window, enter **Ctrl-a** followed by **:** then **quit**

Installing the Cisco USB Device Driver

A USB device driver must be installed the first time a Microsoft Windows-based PC is connected to the USB serial port on the chassis.

This procedure describes how to install the Microsoft Windows USB device driver in Microsoft Windows XP / Windows Vista / Windows 2000 / Windows 7 / Windows 8. Download the driver for your chassis model from the Tools and Resources Download Software site, USB Console Software category, at: [Download Software](#).



Note To Download the driver, you must have a valid service contract associated to your Cisco.com profile.

- Step 1** Unzip the file **asr-9xx_usbconsole_drivers.zip**.
- Step 2** Double-click **xrusbser_ver2100_installer.exe** in the XR21x141x-Win-DriversOnly-Vers2.1.0.0/EXE folder. Installation Wizard GUI is displayed.
- Step 3** Click **Next**. The InstallShield Wizard Completed window is displayed.
- Step 4** Click **Finish**.
- Step 5** Connect the USB cable to the PC and chassis USB console ports. Follow the on-screen instructions to complete the installation of the driver.
- Step 6** XR21V1401 USB UART Device driver successfully installed message is displayed.

The USB console is ready for use.

Uninstalling the Cisco USB Device Driver

This procedure describes how to uninstall the Microsoft Windows USB device driver in Microsoft Windows XP / Windows Vista / Windows 2000 / Windows 7 / Windows 8.



Note Disconnect the chassis console terminal before uninstalling the driver.

-
- Step 1** Choose **Start > Control Panel > Add or Remove Programs (Uninstall a program)**.
- Step 2** Scroll to **Windows Driver Package - Exar corporation (xrusbser) Ports** and click **Remove**. The Program Maintenance window is displayed.
- Step 3** Click **Yes** to uninstall the driver.
-

Connecting to the EIA Console Port



Note The US-to-RJ45 adapter cable and the DB9 console cable are not included with the Cisco NCS 4201; they can be ordered separately from Cisco.



Note The serial console cable kit is not included with the Cisco NCS 4201; it is ordered separately.

To connect a terminal to the EIA Console port on the chassis, follow these steps:

- Step 1** Connect the USB end of the USB-to RJ-45 cable to the EIA Console port.
- Step 2** Connect the RJ-45 end of the DB-9 adapter cable to the USB-to RJ-45 cable, as shown in figure below.

Figure 34: Connecting a Modem to the Cisco NCS 4201

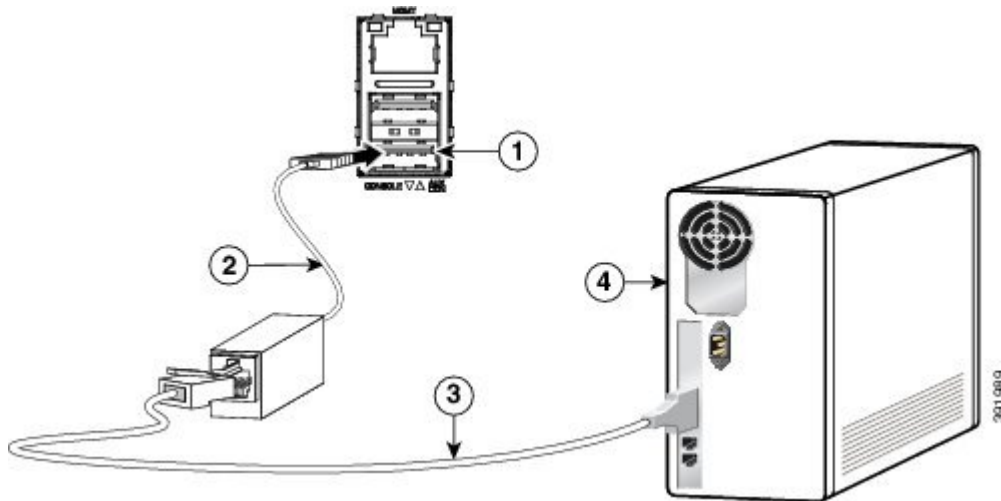


Table 17:

Label	Component	Label	Component
1	EIA Console port	3	RJ-45 to DB-9 cable
2	USB-to-RJ-45 adapter	4	Desktop or system

Step 3 Connect the DB-9 end of the console cable to the DB-9 end of the terminal.

Step 4 To communicate with the chassis, start a terminal emulator application, such as Microsoft Windows HyperTerminal. This software should be configured with the following parameters:

- 9600 baud
- 8 data bits
- no parity
- 1 stop-bit
- no flow control

Connecting a Management Ethernet Cable

When using the Ethernet Management port in the default mode (speed-auto and duplex-auto) the port operates in the auto-MDI/MDI-X mode. The port automatically provides the correct signal connectivity through the Auto-MDI/MDI-X feature. The port automatically senses a crossover or straight-through cable and adapts to it.

However, when the Ethernet Management port is configured to a fixed speed (10, 100, or 1000 Mbps) through command-line interface (CLI) commands, the port is forced to the MDI mode.

When in a fixed-speed configuration and MDI mode:

- Use a crossover cable to connect to an MDI port
- Use a straight-through cable to connect to an MDI-X port

**Warning**

To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the Management Ethernet ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be metallicly connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallicly to OSP wiring. Statement

Installing and Removing SFP and SFP+ Modules

The Cisco NCS 4201 supports a variety of SFP and SFP+ modules, including optical and Ethernet modules. For information on how to install and remove SFP and SFP+ modules, see the documentation for the SFP or SFP+ module at: [Install and Upgrade Guides](#).

For information about inspecting and cleaning fiber-optic connections, see: [Inspection and Cleaning Procedures for Fiber-Optic Connections](#).

**Caution**

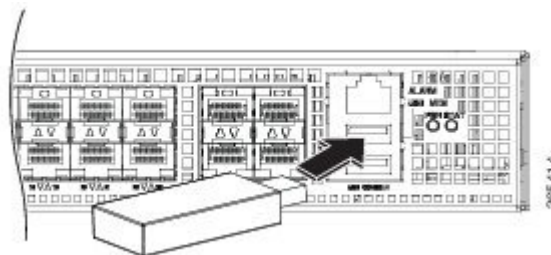
We recommend that you wait for 30 seconds between the removal and insertion of an SFP on an interface module. We recommend this to allow the transceiver software to initialize and synchronize with the Cisco NCS 4201. Changing an SFP quicker could result in transceiver initialization issues that disable the SFP.

Connecting a USB Flash Device

To connect a USB flash device to the Cisco NCS 4201, insert the memory stick in the USB port labeled USB MEM. The Flash memory module can be inserted only one way, and can be inserted or removed regardless of whether the chassis is powered up or not.

The figure below shows the USB port connector on the Cisco NCS 4201.

Figure 35: Cisco NCS 4201 Flash Token Memory Stick



Removing a USB Flash Device



Note If the USB flash device is abruptly removed, the constant sync operations of the file system in progress fail due to the USB device removal. These errors occur with ext2 or ext3 or ext4 file systems and are not seen with fat32 file system. This is a default behavior on any Linux platform.

The following error messages are displayed when you remove the USB device:

```
*Jun 24 10:29:45.766: %IOSXE-3-PLATFORM: R0/0: kernel: EXT2-fs (sda1): previous I/O error
to superblock detected
*Jun 24 10:29:45.878: %IOSXE-3-PLATFORM: R0/0: kernel: EXT2-fs (sda1): previous I/O error
to superblock detected
*Jun 24 10:29:46.012: %IOSXE-3-PLATFORM: R0/0: kernel: EXT2-fs (sda1): previous I/O error
to superblock detected
*Jun 24 10:29:46.013: %IOSXE-3-PLATFORM: R0/0: kernel: EXT2-fs (sda1): previous I/O error
to superblock detected
```

To remove and replace a USB flash token memory stick from and into a Cisco NCS 4201, follow these steps:

- Step 1** Pull the memory stick from the USB port.
- Step 2** To replace the Cisco USB Flash memory stick, simply insert the module into the USB port labeled USB MEM, as shown in figure Cisco NCS 4201 Flash Token Memory Stick. The Flash memory module can be inserted only one way, and can be inserted or removed regardless of whether the chassis is powered up or not.

This completes the USB Flash memory installation procedure.

Connecting Ethernet Cables

The Cisco NCS 4201 interface modules support RJ-45 and Ethernet SFP ports. For instructions on how to connect cables to Ethernet SFP ports, see the [Connecting Console Cables](#) section.

The RJ-45 port supports standard straight-through and crossover Category 5 unshielded twisted-pair (UTP) cables. Cisco does not supply Category 5 UTP cables; these cables are available commercially.



Warning To comply with the Telcordia GR-1089 NEBS standard for electromagnetic compatibility and safety, connect the Gigabit Ethernet ports only to intra-building or unexposed wiring or cable. The intrabuilding cable must be shielded and the shield must be grounded at both ends. The intra-building port(s) of the equipment or subassembly must not be metallicly connected to interfaces that connect to the OSP or its wiring. These interfaces are designed for use as intra-building interfaces only (Type 2 or Type 4 ports as described in GR-1089-CORE) and require isolation from the exposed OSP cabling. The addition of Primary Protectors is not sufficient protection in order to connect these interfaces metallicly to OSP wiring.

Follow these steps to connect a cable to a copper Gigabit Ethernet port:

- Step 1** Confirm that the chassis is powered off.
- Step 2** Connect one end of the cable to the Gigabit Ethernet port on the chassis.

Step 3 Connect the other end to the BTS patch or demarcation panel at your site.

Connecting Cables to SFP Modules

For information on connecting cables to Cisco optical and Ethernet SFP interfaces, see: [Install and Upgrade Guides](#).

Connector and Cable Specifications

For more information on cable specifications and pinouts, see [Troubleshooting](#) chapter.



CHAPTER 4

Initial Configuration

This chapter guides you through a basic chassis configuration, which is sufficient for you to access your network. Complex configuration procedures are beyond the scope of this publication and can be found in the modular configuration and modular command reference publications in the Cisco IOS software configuration documentation set that corresponds to the software release installed on your Cisco hardware.

To configure a Cisco NCS 4201 from a console, connect a terminal to the chassis console port.

This chapter contains the following sections:

- [Checking Conditions Prior to System Startup](#) , on page 71
- [Powering Up the Chassis](#), on page 71
- [Configuring the Chassis at Startup](#), on page 73
- [Safely Powering Off the Chassis](#), on page 75
- [Automatic Shutdown of the Chassis](#), on page 76

Checking Conditions Prior to System Startup

Ensure that the following conditions are addressed before starting up the chassis:

- The optional Gigabit Ethernet Management port cable is installed.
- The chassis is securely mounted and grounded.
- The power and interface cables are connected.
- Your PC with terminal emulation program (HyperTerminal or equivalent) is connected to the console port and powered up.
- Your PC terminal emulation program is configured for 9600 baud, 8 data bits, 1 stop-bit, no parity, and no flow control is set to none.
- You have selected passwords for access control.
- Captive installation screws are tight on all the removable components.
- The console terminal is turned on.
- You have determined the IP addresses for the Ethernet and serial interfaces.

Powering Up the Chassis

After installing your Cisco NCS 4201 and connecting cables, start the chassis and follow these steps:

Step 1 Switch on the power supply.

Caution Do not press any keys on the keyboard until the messages stop and the PWR LED is solid green. Any keys pressed during this time are interpreted as the first command typed when the messages stop, which might cause the chassis to power off and start over. It takes a few minutes for the messages to stop.

Step 2 Observe the initialization process. When the system boot is complete (the process can take a few minutes), the Cisco NCS 4201 begins to initialize.

During the boot process, observe the system LEDs. After the chassis has booted, the green STAT LED comes on and stays on.

Verifying the Front Panel LEDs

The front-panel indicator LEDs provide power, activity, and status information useful during bootup. For more detailed information about the LEDs, see the [LED Indicators](#) section.

Verifying the Hardware Configuration

To display and verify the hardware features, enter the following commands:

- **show version**—Displays the system hardware version, the installed software version, the names and sources of configuration files, the boot images, and the amount of installed DRAM, NVRAM, and flash memory.
- **show diag slot**—Displays the IDPROM information for the assemblies in the chassis.

Checking Hardware and Software Compatibility

To check the minimum software requirements of Cisco IOS-XE software with the hardware installed on your Cisco NCS 4201, Cisco maintains the **Software Research** tool on Cisco.com. The tool provides the minimum Cisco IOS-XE requirements for individual hardware modules and components.



Note To access this tool, you must have a Cisco.com login account.

To access the **Software Research** tool:

To access the Software Advisor:

1. Click **Login** at Cisco.com. The login page with fields for User Name and Password is displayed.
2. Type your registered User Name and Password and click the **Login** button.
3. Type **Software Advisor** in the search box, and click the **magnifying lens** icon next to the search box.
4. From the displayed search result, click the link for the Software Advisor Tool.
5. Choose a product family or enter a specific product number to search for the minimum supported software needed for your hardware.

Configuring the Chassis at Startup

This section explains how to create a basic running configuration for your Cisco NCS 4201.



Note You must acquire the correct network addresses from your system administrator or consult your network plan to determine the correct addresses before you can complete the chassis configuration.

Before continuing the configuration process, check the current state of the chassis by entering the **show version** command. This command displays the release of Cisco IOS software that is available on the chassis.

For information on modifying the configuration after you create it, see the Cisco IOS configuration and [Cisco IOS Master Command List, All Releases](#) guides.

To configure a Cisco NCS 4201 from the console, you must connect a terminal or terminal server to the console port on the Cisco NCS 4201. To configure the Cisco NCS 4201 using the management Ethernet port, you must have the chassis's IP address.

Accessing the CLI Using the Console

To access the command line interface using the console, follow these steps:

Step 1 When your system is booting, type No at the prompt.

Example:

```
--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]: no
```

Step 2 Press Return to enter the user EXEC mode.

The following prompt is displayed:

Example:

```
Router>
```

Step 3 From the user EXEC mode, enter the enable command, as shown in the following example:

Example:

```
Router> enable
```

Step 4 At the password prompt, enter your system password, as shown in the following example. If an enable password has not been set on your system, you can skip this step.

Example:

```
Password: enablepass
```

When your password is accepted, the privileged EXEC mode prompt is displayed:

Example:

```
Router#
```

You now have access to the CLI in the privileged EXEC mode. You can enter the necessary commands to complete the required tasks.

Step 5 To exit the console session, enter the quit command, as shown in the following example:

Example:

```
Router# quit
```

Configuring Global Parameters

When you first start the setup program, configure the global parameters. These parameters are used for controlling system-wide settings. Perform the following steps to enter the global parameters:

Step 1 Connect a console terminal to the console port, and then boot the chassis. For more information on connecting a console terminal, see Connecting Console Cables section.

Note The following is only an example of the output display; prompts may vary.

When you see this information, it means that you have successfully booted your chassis:

Example:

```
Restricted Rights Legend
```

```
Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.
```

```
        cisco Systems, Inc.
        170 West Tasman Drive
San Jose, California 95134-1706
```

```
.
.
.
```

```
--- System Configuration Dialog ---
```

```
Would you like to enter the initial configuration dialog? [yes/no]: yes
```

```
Press RETURN to get started!
```

Step 2 The first sections of the configuration script appear only at an initial system startup. On subsequent uses of the setup facility, the script begins with a System Configuration Dialog as shown below: When you are prompted about whether you want to enter the initial configuration dialog, enter yes.

Example:

```
Would you like to enter the initial configuration dialog? [yes/no] yes
At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
```

Default settings are in square brackets '['].

Basic management setup configures only enough connectivity for management of the system, extended setup will ask you to configure each interface on the system.

Basic management setup configures enough connectivity for managing the system; extended setup will ask you to configure each interface on the system.

Checking the Running Configuration Settings

To check the value of the settings you have entered, enter the **show running-config** command at the Router# prompt:

```
Router# show running-config
```

To review the changes you have made to the configuration use the **show startup-config** command in the user EXEC mode to see the changes and copy run-start stored in the NVRAM.

Saving the Running Configuration to NVRAM

To store the configuration or changes to your startup configuration in NVRAM, enter the **copy running-config startup-config** command at the prompt:

```
Router# copy running-config startup-config
```

Using this command saves the configuration settings that you created in the chassis using the configuration mode and the setup facility. If you fail to do this, your configuration will be lost, and will not be available when you reload the chassis next.

Safely Powering Off the Chassis

This section explains how to shut down the Cisco NCS 4201. We recommend that before turning off all power to the chassis, you issue the **reload** command. This ensures that the operating system cleans up all the file systems. After the reload operation is complete, the Cisco NCS 4201 can be powered off safely.

To power off the Cisco NCS 4201 safely:

Step 1 Slip on the ESD-preventive wrist strap included in the accessory kit.

Step 2 Enter the **reload** command.

Step 3 Confirm the reload command.

Example:

```
Rmcp-6ru-1#reload
Proceed with reload? [confirm]
Aug 17 00:06:47.051 R0/0: %PMAN-5-EXITACTION: Process manager is exiting: prs exit with reload chassis
code
```

Step 4 After confirming the reload command, wait until the system bootstrap message is displayed before powering off the system:

Example:

```
Current image running: Boot ROM0
Last reset cause: RSP-Board
UEA platform with 2097152 Kbytes of main memory
```

Step 5 Remove power cables, if any, from the Cisco NCS 4201:

- For power supplies with a circuit breaker switch, position the switch to the Off (O) position.
- For power supplies with a standby switch, place the standby switch in the Standby position.

Note After powering off the chassis, wait for a minimum of 30 seconds before powering it on again.

Automatic Shutdown of the Chassis

This section lists the scenarios in which the Cisco NCS 4201 shutdown is automatically initiated by software:

1. After removal, if fan tray is not re-inserted within stipulated time period. For more information on shutdown time, see table Cisco NCS 4201 Shut Down Time Table.
2. The on-board or the PSU temperature sensors detect the shutdown limit.
3. Multiple fan failures (two or more than two) fans fail.

After the chassis shutdown, the PSU LED turns red to indicate that the PSU is switched off.



Note To restart the chassis, you must power cycle AC/DC input. Before powering on the PSU, switch off the PSU input for 30 seconds.



CHAPTER 5

Troubleshooting

This chapter provides information about troubleshooting issues, if any, on the Cisco NCS 4201.

- [Pinouts, on page 77](#)

Pinouts

The following sections describe the pinouts for the Cisco NCS 4201 interfaces:

Alarm Port Pinouts

The table below summarizes the external alarm input pinouts.

Table 18: External Alarm Input Pinouts

Pin	Signal Name	Description
1	ALARM0_IN	Alarm input 0
2	ALARM1_IN	Alarm input 1
3	—	No connect
4	ALARM2_IN	Alarm input 2
5	ALARM3_IN	Alarm input 3
6	—	No connect
7	—	No connect
8	COMMON	Alarm common

Management Ethernet Port Pinouts

The table below summarizes the Management Ethernet port pinouts.

Table 19: Fan Alarm Port Pinout

Pin	Signal Name
1	TRP0+
2	TRP0-
3	TRP1+
4	TRP2+
5	TRP2-
6	TRP1-
7	TRP3+
8	TRP3-

USB Console Port Pinouts

The table below summarizes the USB console port pinouts.

Table 20: Single USB Console Port Pinouts

Pin	Signal Name	Description
A1	Vcc	+5VDC
A2	D-	Data -
A3	D+	Data +
A4	Gnd	Ground



Note The USB console port +5VDC is input, and operates as an USB peripheral device.

USB Flash or MEM Port Pinouts

The table below summarizes the USB flash or MEM port pinouts.

Table 21: Single USB Flash or MEM Port Pinouts

Pin	Signal Name	Description
A1	Vcc	+5VDC (500mA)
A2	D-	Data -
A3	D+	Data +
A4	Gnd	Ground



Note USB TYPE-A receptacle is used.



Note The USB flash or MEM port +5VDC is output. Cisco NCS 4201 provides power for USB flash or MEM port. This port operates as a USB host device.

Optical Fiber Specifications

The specification for optical fiber transmission defines two types of fiber: single mode and multimode. Within the single-mode category, three transmission types are defined: short reach, intermediate reach, and long reach. Within the multimode category, only short reach is available. For information about optical SFP modules, see the documentation for the SFP module at:

http://www.cisco.com/en/US/partner/products/hw/modules/ps5455/prod_installation_guides_list.html.

Alarm Conditions

The table below summarizes the meaning of the alarm conditions on the Cisco NCS 4201.

Table 22: Alarm Condition Summary

Alarm Type	Alarm Meaning
Critical	Port in down state. Environmental sensor threshold exceeded critical level (voltage, temperature)
Major	Environmental sensor threshold exceeded major level (voltage, temperature)
Info	Port administratively shut down.

