



Cisco Network Convergence System 6000 Series Routers Site Planning Guide

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Preface

This document describes how to plan and prepare your site facilities for the installation of a Cisco Network Convergence System (NCS) 6000 Series Router.

The Cisco NCS 6000 Series Routers include the Cisco NCS 6008 Line Card Chassis (LCC) and the Cisco NCS 6000 Fabric Card Chassis (FCC). The site planning information for both chassis are included in this guide.

This document describes all the power, cooling, and environmental specifications to consider before ordering and installing the chassis. This document also describes each chassis, its components, site facilities requirements (such as floor space, weight requirements, receiving and staging), and installation to help you plan the site where the system will be installed. The Cisco product IDs (PIDs) are listed in *System Product IDs* chapter.



Note

The installation of a Cisco NCS 6000 Series Router may require space, floor loading, power, and cooling modifications to a facility. Therefore, you should plan the site well in advance of the delivery of the system.

- [Audience, page vii](#)
- [Documentation Conventions, page viii](#)
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Audience

This document is intended for those who must plan the facilities for the site where the Cisco NCS 6000 Series Router is to be installed. It should be used with Cisco site planning coordinators and site inspections, well in advance of the delivery of the system.

Documentation Conventions

This document uses the following conventions:

Convention	Description
bold font	Commands and keywords and user-entered text appear in bold font.
<i>Italic</i> font	Document titles, new or emphasized terms, and arguments for which you supply values are in <i>italic</i> font.
[]	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.
<code>courier</code> font	Terminal sessions and information the system displays appear in <code>courier</code> font.
	Indicates a variable for which you supply values, in context where italics cannot be used.
<>	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.

**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

Related Documentation

For complete planning, installation, and configuration information, see the following documents:

- *Cisco Network Convergence System 6000 Series Routers Unpacking, Moving, and Securing Guide*
- *Cisco Network Convergence System 6000 Series Routers Hardware Installation Guide*
- *Cisco Network Convergence System 6000 Fabric Card Chassis Installation Guide*
- *Regulatory Compliance and Safety Information for the Cisco Network Convergence System 6000 Series Routers*

Changes to This Document

This table lists the technical changes made to this document since it was first created.

Table 1: Changes to This Document

Date	Summary
September 2013	Initial release of this document. This document introduces the Cisco NCS 6008 8-Slot Line Card Chassis.
January 2014	Updated Appendix B to include 60-Port 10Gbps Line Card with SFP+ Optics Module (Lean Core [NC6-60X10GE-L-S] and Multi-Service Core [NC6-60X10GE-M-S]). Updated content and graphics based on documentation feedback from the September release.
July 2014	This release adds the Cisco NCS 6000 Fabric Card Chassis to this document.

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*, at: <http://www.cisco.com/c/en/us/td/docs/general/whatsnew/whatsnew.html>.

Subscribe to *What's New in Cisco Product Documentation*, which lists all new and revised Cisco technical documentation as an RSS feed and delivers content directly to your desktop using a reader application. The RSS feeds are a free service.



Overview

This chapter provides an overview of the Cisco NCS 6000 Series Routers and a summary of the installation process.



Note

The installation of a Cisco NCS 6000 Series Router may require space, floor loading, power, and cooling modifications to a facility. Therefore, you should plan the site well in advance of the scheduled delivery of the chassis system.

- [Overview of the Cisco NCS 6000 Series Routers](#) , page 1
- [Front and Rear Views of the Cisco NCS 6000 Series Chassis](#) , page 2
- [Chassis Components](#), page 8
- [Chassis Slot Numbers](#), page 11
- [Overview of Site Planning Steps](#), page 14

Overview of the Cisco NCS 6000 Series Routers

The Cisco NCS 6000 Series Router is a highly scalable core routing platform designed for service providers to build next generation multi-service networks that provide video, data and voice services. The Cisco NCS 6000 Series Routers include the Cisco NCS 6008 Line Card Chassis (LCC) and the Cisco NCS 6000 Fabric Card Chassis (FCC).

- The Cisco NCS 6008 LCC is a single-chassis system that provides eight Tbps of full-duplex network bandwidth through eight line cards. Each card delivers up to 1 Tbps throughput using a mix of 10-Gbps, 40-Gbps, or 100-Gbps interfaces per card. The Cisco NCS 6008 LCC also provides modular optics options to meet a wide range of distance requirements. In a multi-chassis configuration, the LCC can be expanded to support up to 128 Tbps of full-duplex forwarding throughput.
- The Cisco NCS 6000 FCC is a switch fabric chassis. The switch fabric is implemented through switch fabric cards installed in the chassis. The Cisco NCS 6000 FCC is part of the Cisco NCS 6000 Multi-Chassis system that also includes the Cisco NCS 6008 LCC. The system can expand from a single chassis to various multi-chassis configurations for increased routing capacity and is capable of supporting up to 16 LCCs interconnected to 4 FCCs. For information on the fabric system and multi-chassis cabling

configurations, see the [Cisco Network Convergence System 6000 Fabric Card Chassis Hardware Installation Guide](#).

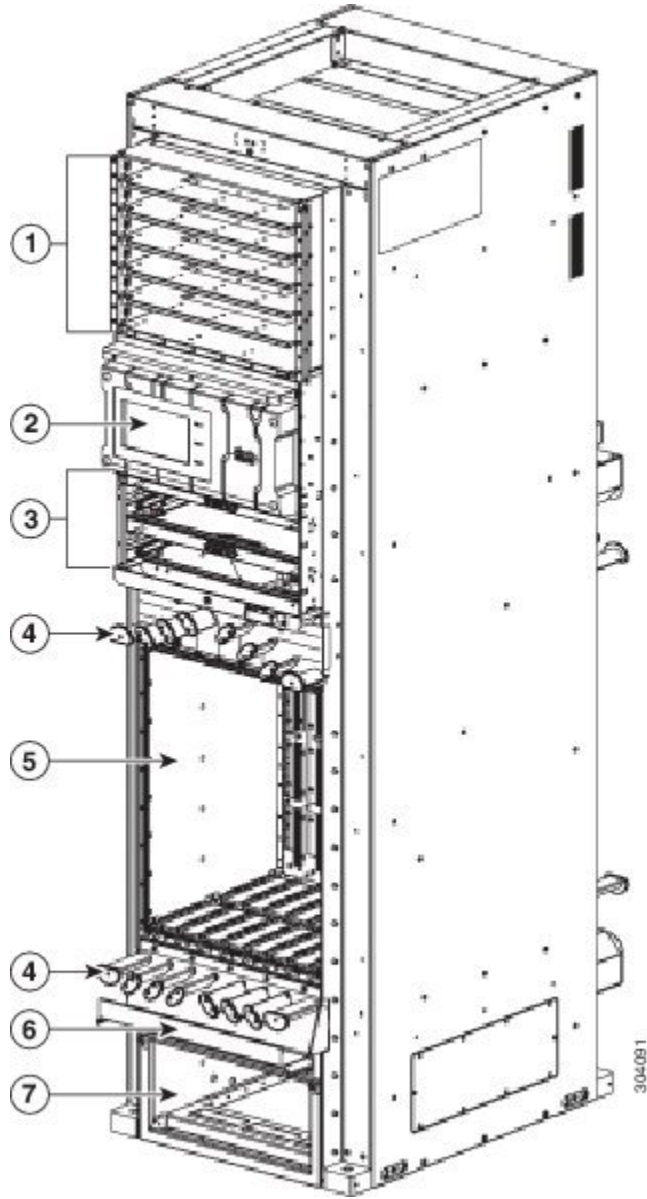
The LCC and FCC each have an integrated rack. An external rack is not required. The chassis is bolted to the facility floor. Each chassis has its own power and cooling systems. Power systems are available using either AC or DC power. [Main Components of the Cisco NCS 6008 LCC, on page 8](#) lists the main components of the LCC. [Main Components of the Cisco NCS 6000 FCC, on page 9](#) lists the main components of the FCC.

Front and Rear Views of the Cisco NCS 6000 Series Chassis

[Cisco NCS 6008 LCC Front View, on page 3](#) and [Cisco NCS 6008 LCC Rear View, on page 4](#) show the front and rear views of the Cisco NCS 6008 LCC. [Cisco NCS 6000 FCC Front View, on page 5](#) and [Cisco NCS 6000 FCC Rear View, on page 7](#) show the front and rear views of the Cisco NCS 6000 FCC.

Cisco NCS 6008 LCC Front View

Figure 1: Front View of the Cisco NCS 6008 LCC

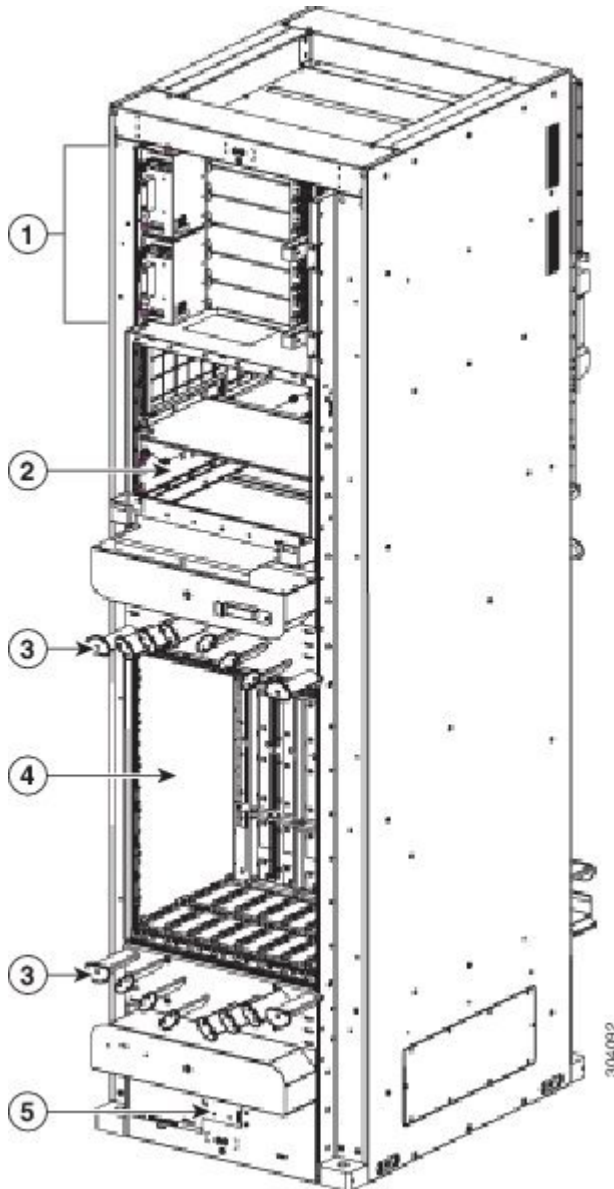


1	Six power trays	5	One card cage with eight LC slots
2	Craft panel display	6	Air filter access
3	Two fan trays	7	Air inlet plenum

4	Cable management brackets	
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Cisco NCS 6008 LCC Rear View

Figure 2: Rear View of the Cisco NCS 6008 LCC

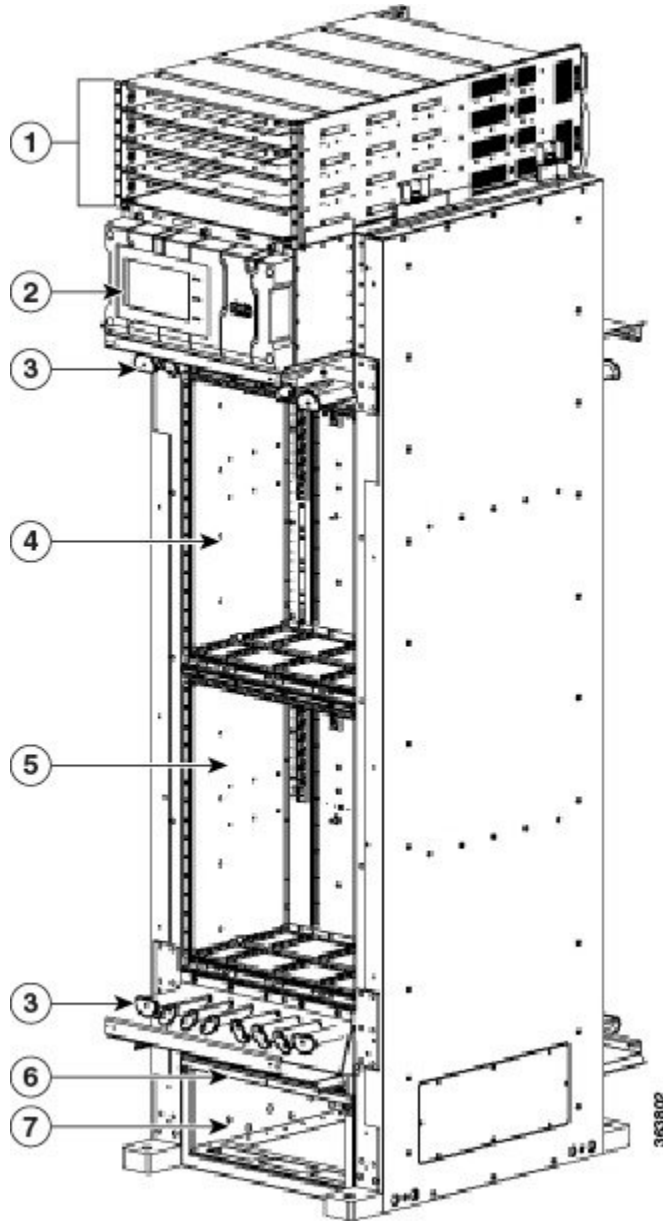


1	Power input feeds (AC or DC)	4	One card cage with slots for FCs and RP cards
2	Air exhaust plenum	5	Temperature sensor

3	Cable management bracket	
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Cisco NCS 6000 FCC Front View

Figure 3: Front View of the Cisco NCS 6000 FCC

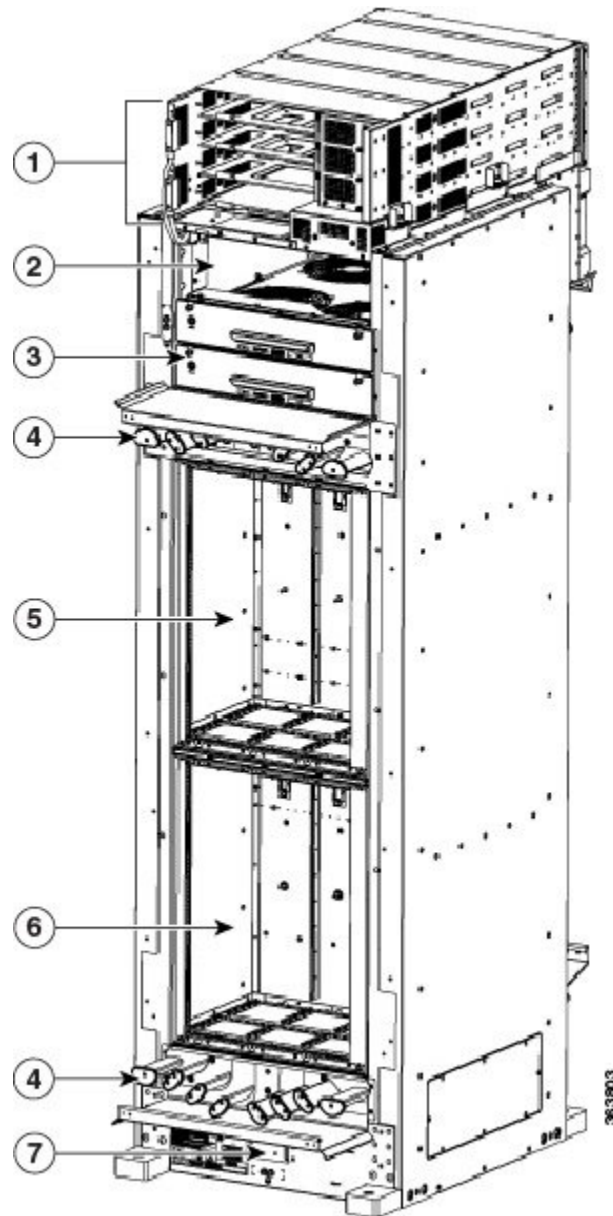


1	Power enclosure	5	Lower card cage
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2	Craft panel display	6	Removable air filter
3	Two cable management brackets	7	Air inlet plenum
4	Upper card cage		

Cisco NCS 6000 FCC Rear View

Figure 4: Rear View of the Cisco NCS 6000 FCC



1	Power enclosure	5	Upper card cage
2	Air exhaust plenum	6	Lower card cage
3	Two fan trays	7	Temperature sensor

4	Cable management brackets		
---	---------------------------	--	--

Chassis Components

Main Components of the Cisco NCS 6008 LCC

This table lists the main components of the Cisco NCS 6008 LCC.

Table 2: Main Components of the Cisco NCS 6008 LCC

Component	Description
Chassis midplane	The chassis midplane distributes power and provides management, control, and data interconnections for other components in the system. Each LC is connected through the midplane to the FCs. The midplane is not field replaceable by the user.
Route Processor (RPs) Card	Two RP cards (RP0/RP1) are inserted into the rear of the LCC (Cisco NCS 6008 LCC Rear View, on page 4). These cards provide the intelligence of the system by functioning as the system controller and providing route processing and chassis management. The RP cards also monitor system alarms and control the system fans. The LEDs on the front panel indicate active alarm conditions.
Fabric Cards (FCs)	Six FCs are inserted into the rear of the LCC (Cisco NCS 6008 LCC Rear View, on page 4). The FCs provide the switch fabric for the routing system and performs the cross-connect function of the routing system, connecting every LC to each other. The switch fabric receives ingress user data from one LC slot and performs the switching necessary to route the data to the appropriate egress LC slot.
Line Cards (LCs)	As many as eight LCs can be inserted into the front of the LCC (Cisco NCS 6008 LCC Front View, on page 3). These cards provide the physical interfaces and optical connections for the user data.
Fan Trays	Two redundant fan trays are inserted into the front of the LCC (Cisco NCS 6008 LCC Front View, on page 3). Each fan tray contains six axial fans. The fans pull cooling air through the chassis from the front to rear.
Air Filter	A removable air filter is located at the bottom of the LCC, below the card cage, and inside the front air intake (Cisco NCS 6008 LCC Front View, on page 3).
Power Trays	Six power trays provide redundant power to the LCC (Cisco NCS 6008 LCC Front View, on page 3). Both AC and DC power trays are available. Each AC power tray has three slots for AC PMs. Each DC power tray has four slots for DC PMs. Mixing AC and DC power supplies is not supported. The power trays are field-replaceable (after power down). The PMs are hot-swappable.

Component	Description
Cable management brackets	The LCC has cable management features on the front and rear sides of the chassis. These brackets organize the interface cables entering and exiting the different cards, keeping them out of the way and free of sharp bends that may damage the cables. Four horizontal cable management brackets are preinstalled on the LCC (two on the front side and two on the rear side of the LCC (Cisco NCS 6008 LCC Front View, on page 3 and Cisco NCS 6008 LCC Rear View, on page 4).
Cable troughs	Four vertical cable troughs for cable management (two on the front-side and two on the rear-side of the LCC) Cisco NCS 6008 LCC Front View, on page 3 and Cisco NCS 6008 LCC Rear View, on page 4 .
Temperature sensor assembly	A temperature sensor is located on the lower rear side of the LCC (Cisco NCS 6008 LCC Rear View, on page 4).
Craft panel display	A craft panel display, located on the front of the LCC (Cisco NCS 6008 LCC Front View, on page 3), consists of an LCD touch-screen display and LEDs used to indicate system alarms. The craft panel has a basic interface used to monitor the operation of the LCC.

Main Components of the Cisco NCS 6000 FCC

This table lists the main components of the Cisco NCS 6000 FCC.

Table 3: Main Components of the Cisco NCS 6000 FCC

Component	Description
Chassis midplane	The chassis midplane distributes power and provides interconnections for other components in the system. Each S2 FC is connected through the midplane to the FCC. The midplane is not a field-replaceable unit (FRU).
S2 Fabric Cards (FCs)	The FCC has 12 FC slots: Six FC slots on the front side of the FCC (3 slots on the upper cage and three slots on the lower cage), and six FC slots on the rear side of the FCC (three slots on the upper cage and three slots on the lower cage). FCC Slot Numbers—Front and Rear Side, on page 13 .
CXP optical modules and connectors	The connections between the LCC and the FCC are implemented through a number of bi-directional optical links. Pluggable CXP form-factor optics are used for these interconnects. CXP optical modules are used on the S2 FC and S13 FC to connect the two cards together. The CXP module uses a 24-fiber MPO connector that supports 12 bi-directional optical links up to 100 meters of OM-4 multi-mode fiber.

Component	Description
Shelf Controller Cards	<p>The Cisco NCS 6000 FCC offers two types of shelf controller cards: the SC card and the SC-SW card.</p> <ul style="list-style-type: none"> • The SC-SW card is a 56-port combination card that integrates a shelf controller and switch for the NCS 6000 Control Ethernet into one physical card. The shelf controller (SC) portion controls the route processing and management functions for the FCC and its components. The switch (SW) portion interconnects all the route processors (RPs) and SCs in a multi-chassis system. The LEDs on the SC-SW indicate active alarm conditions. • The SC card is a shelf-controller-only card. <p>The FCC ships with two shelf controller cards, either two SC-SW cards or a combination SC-SW card and SC card pre-installed in the FCC. The cards are inserted into two dedicated slots on the front of the FCC. One SC-SW or SC card installs into slot SC0 on the upper card cage and the other SC-SW or SC card installs into slot SC1 on the lower card cage (FCC Slot Numbers—Front and Rear Side, on page 13). Both the upper and lower card slots are identical. The secondary card is installed for redundancy, so that the loss or removal of a single card does not bring down the FCC. At least one SC-SW or SC card must be operational for the FCC to function.</p> <p>Note In a multi-chassis system with more than one FCC, we recommend that the SC-SW cards are not installed in the same FCC.</p>
Power enclosure	<p>The power enclosure is a separate unit that is installed at the top of the FCC (Cisco NCS 6000 FCC Front View, on page 5). The enclosure has four slots for AC or DC power trays, and two power control modules (PCMs). Each set of power trays has a power control module (PCM) with its own I/O power switch.</p> <ul style="list-style-type: none"> • Each AC power tray has three slots for PMs. Each DC power tray has four slots for PMs. • Mixing AC and DC power supplies is not supported. <p>The AC and DC power trays are (after power down). The PMs are hot-swappable.</p>
Fan trays	<p>Two redundant fan trays are inserted into the rear of the FCC (Cisco NCS 6000 FCC Rear View, on page 7). Each fan tray contains four axial fans. The fans pull cooling air through the chassis from the front to the rear.</p>
Air filter	<p>A removable air filter is located below the lower cable management bracket and inside the front air intake on the front of the FCC (Cisco NCS 6000 FCC Front View, on page 5).</p>
Cable management brackets	<p>The FCC has cable management features on the front and rear sides of the FCC. These brackets organize the interface cables entering and exiting the different cards, keeping them out of the way and free of sharp bends that may damage the cables.</p> <p>Four horizontal cable management brackets are preinstalled on the FCC (two on the front side and two on the rear side of the FCC (Cisco NCS 6000 FCC Front View, on page 5 and Cisco NCS 6000 FCC Rear View, on page 7). Each side of the FCC has one cable management bracket above the upper card cage and one cable management bracket below the lower card cage.</p>
Cable troughs	<p>Four vertical cable troughs are supplied for cable management, two on the front side of the FCC and two on the rear side of the FCC (Cisco NCS 6000 FCC Front View, on page 5 and Cisco NCS 6000 FCC Rear View, on page 7).</p>

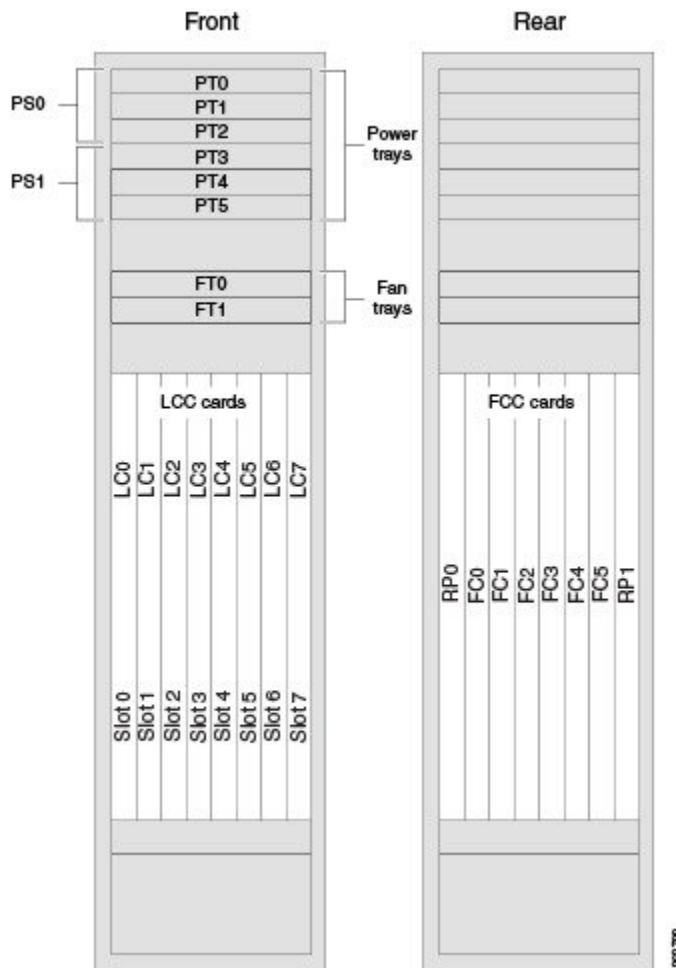
Component	Description
Temperature sensor assembly	A temperature sensor is located on the lower rear side of the FCC (Cisco NCS 6000 FCC Rear View, on page 7).
Craft panel display	A craft panel display, located on the front of the FCC (Cisco NCS 6000 FCC Front View, on page 5), consists of an LCD touch-screen display and LEDs used to indicate system alarms. The craft panel has a basic interface used to monitor the operation of the FCC.

Chassis Slot Numbers

LCC Slot Numbers--Front and Rear Side

This figure shows the slot numbers on the front (LC) side and rear (RP and FC) side of the LCC.

Figure 5: Cisco NCS 6008 LCC Slot Numbers—Front and Rear Side



Front of the LCC

The front (LC) side of the LCC has the following card slots:

- Eight LC slots (left to right: 0, 1, 2, 3, 4, 5, 6, 7).
- Two fan trays for redundancy. The fan trays are accessed from the front side of the chassis.
- Six power trays for redundancy.

The upper two power trays (0–2) are contained within power shelf 0 (PS0), and the lower two power trays (3–5) are contained within power shelf 1 (PS1).

Rear of the LCC

The rear side of the LCC has the following card slots:

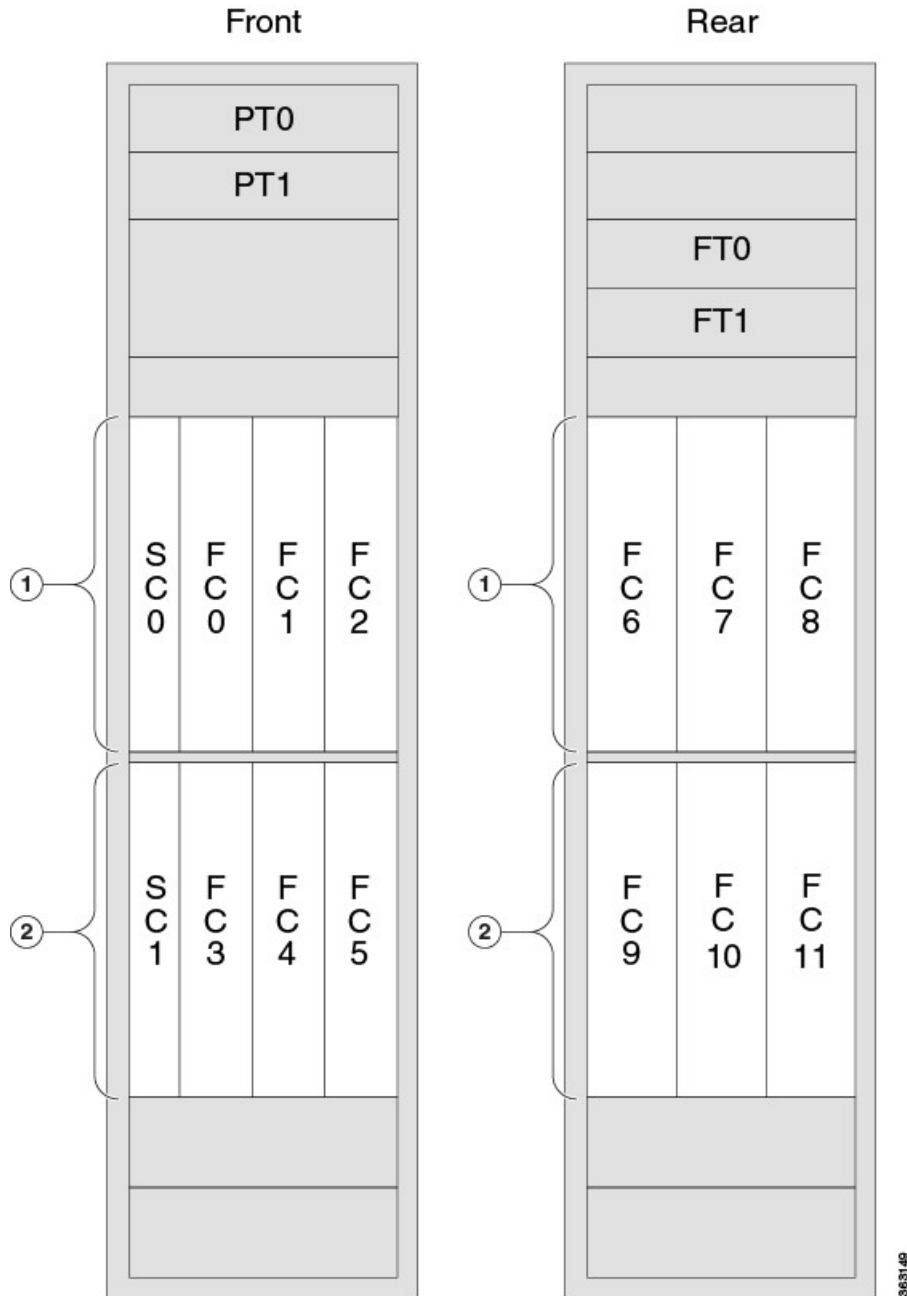
- Two RP card slots (RP0 on the far left of the chassis and RP1 on the far right)
- Six FC slots (left to right: 0, 1, 2, 3, 4, 5)

The FC slots can be populated with FCs for a standalone or a multi-chassis configuration. See the *Components Product IDs* section for fabric card product information.

FCC Slot Numbers—Front and Rear Side

This figure shows the slot numbers on the front and rear side of the FCC.

Figure 6: Cisco NCS 6000 FCC Slot Numbers—Front and Rear Sides



Front of the FCC

- Four power trays for redundancy. The upper two power trays (0–1) are contained within power shelf 0 (PS0) and the lower two power trays (2–3) are contained within power shelf 1 (PS1).
- Two SC slots for redundancy (for SC and SC-SW cards) and six FC slots.
 - Upper card cage: (left to right: SC0, FC0, FC1, FC2)
 - Lower card cage: (left to right: SC1, FC3, FC4, FC5)

Rear of the FCC

- Two fan trays for redundancy.
 - Upper fan tray: FT0
 - Lower fan tray: FT1
- Six FC slots
 - Upper card cage: (left to right: FC6, FC7, FC8)
 - Lower card cage: (left to right: FC9, FC10, FC11)

Overview of Site Planning Steps

This table lists the sequence of tasks to perform as you plan the installation of the routing system. Use the table as a checklist for all aspects of the installation. For information about a particular task, see the appropriate section of this site planning guide. After completing the checklist, consult your Cisco installation coordinator for a site-readiness inspection.

Table 4: Site Planning Checklist

Site Planning Steps	See	Check
1. Consider equipment arrival, storage, and transport to the installation site.	Basic Site and Installation Planning	
2. Consider the space where the routing system will be installed.	Aisle Spacing and Maintenance Access Floor Plan	
3. Plan for power (AC or DC).	<i>Power and Cooling</i> chapter. LCC Power Specifications or FCC Power Specifications	
4. Consider cooling and airflow requirements.	Chassis Cooling System Facility Cooling Requirements LCC Chassis Specifications or FCC Chassis Specifications	

Site Planning Steps	See	Check
5. Consider cable management.	Cable Management	
6. Consider Cisco installation services.	Cisco Installation Services	



Power and Cooling

This chapter describes the Cisco NCS 6000 Series Routers power and cooling systems. It also provides the power, grounding, and cooling requirements for the installation site to help you plan the site facilities for the system.

- [Chassis Power System, page 17](#)
- [General Power and Grounding Requirements, page 18](#)
- [Bonding and Grounding Guidelines, page 18](#)
- [DC Power Systems, page 21](#)
- [AC Power Systems, page 25](#)
- [Chassis Cooling System, page 34](#)
- [Facility Cooling Requirements, page 36](#)

Chassis Power System

The Cisco NCS 6000 Series chassis can be either AC-powered or DC-powered. Each type of power system supports N+N redundancy for all feeds and power system components.

The Cisco NCS 6008 LCC has six AC or DC power trays. The Cisco NCS 6000 FCC has four AC or DC power trays. The AC power tray has three slots for power modules (PMs). The DC power tray has four slots for PMs.

The power modules (PMs) will load-share across input power feeds. The load is balanced across all input feeds.

Each AC PM requires its own single-phase AC input power feed. If you have 3-phase AC-Delta or AC-Wye at your equipment, a *Cisco NCS 3-Phase AC PDU* is required to convert a 3-phase AC input power feed to three single-phase AC input power feeds. See the [Converting 3-Phase AC to Single-Phase AC, on page 31](#).

General Power and Grounding Requirements

This section describes the power and grounding requirements to consider when planning the site facilities for the routing system. In addition, see the [DC Power Systems, on page 21](#) or the [AC Power Systems, on page 25](#) for information about the power requirements for your chassis type.

**Note**

A qualified electrician should review the information in these sections to ensure that the installation site meets these requirements. For larger system configurations, consult a facilities electrical expert to understand the load that the routing system may put on the facility power plant.

- Installation of the routing system must follow national and local electrical codes:
 - In the United States: United States National Fire Protection Association (NFPA) 70 and United States National Electrical Code (NEC).
 - In Canada: Canadian Electrical Code, part I, CSA C22.1.
 - In other countries: International Electrotechnical Commission (IEC) 60364, parts 1 through 7.
- Two separate and independent AC or DC power sources are needed to provide N+N redundancy for system power. Each power source requires its own circuit breaker.
- Each power source must provide clean power to the site (free of spikes and noise). If necessary, install a power conditioner.
- The site must provide short-circuit (over-current) protection for devices.
- Proper grounding is required at the site to ensure that equipment is not damaged by lightning and power surges:
 - AC-powered systems require chassis grounding. A grounding-type AC power outlet is required.
 - DC-powered systems require chassis grounding only.
- When planning the power for the site, be sure to include the power requirements for any external terminals and test equipment you will use with your system.

**Note**

Be sure to review the safety warnings in [Regulatory Compliance and Safety Information for the Cisco Network Convergence System 6000 Series Routers](#) before installing the routing system.

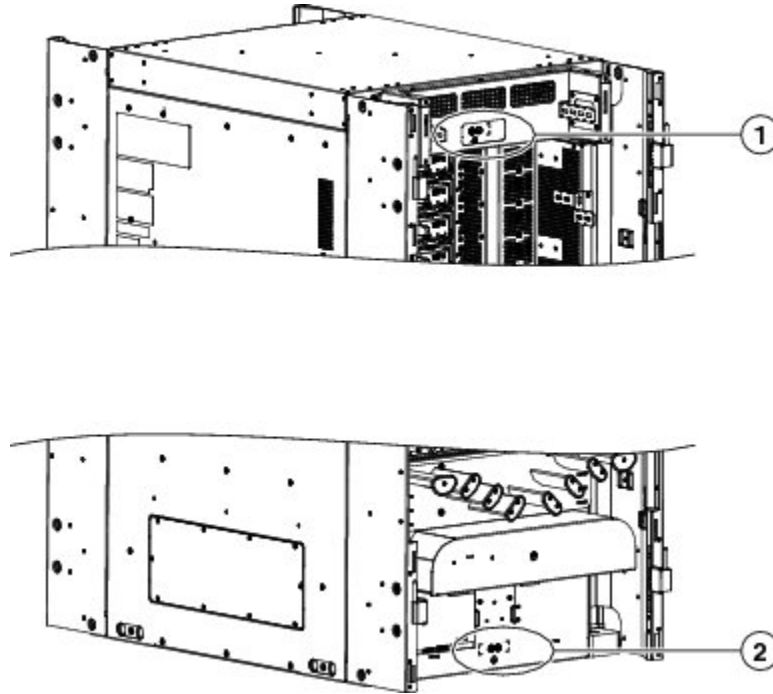
Bonding and Grounding Guidelines

The Cisco NCS 6008 LCC and Cisco NCS 6000 FCC have two safety earth ground connections. These grounding points are also referred to as Network Equipment Building System (NEBS) bonding and grounding points, and are provided to satisfy the Telcordia NEBS safety requirements.

You can connect the central office ground system or interior equipment grounding system to either of the two grounding points on the rear side of the chassis. Threaded ground inserts are located on a rear panel

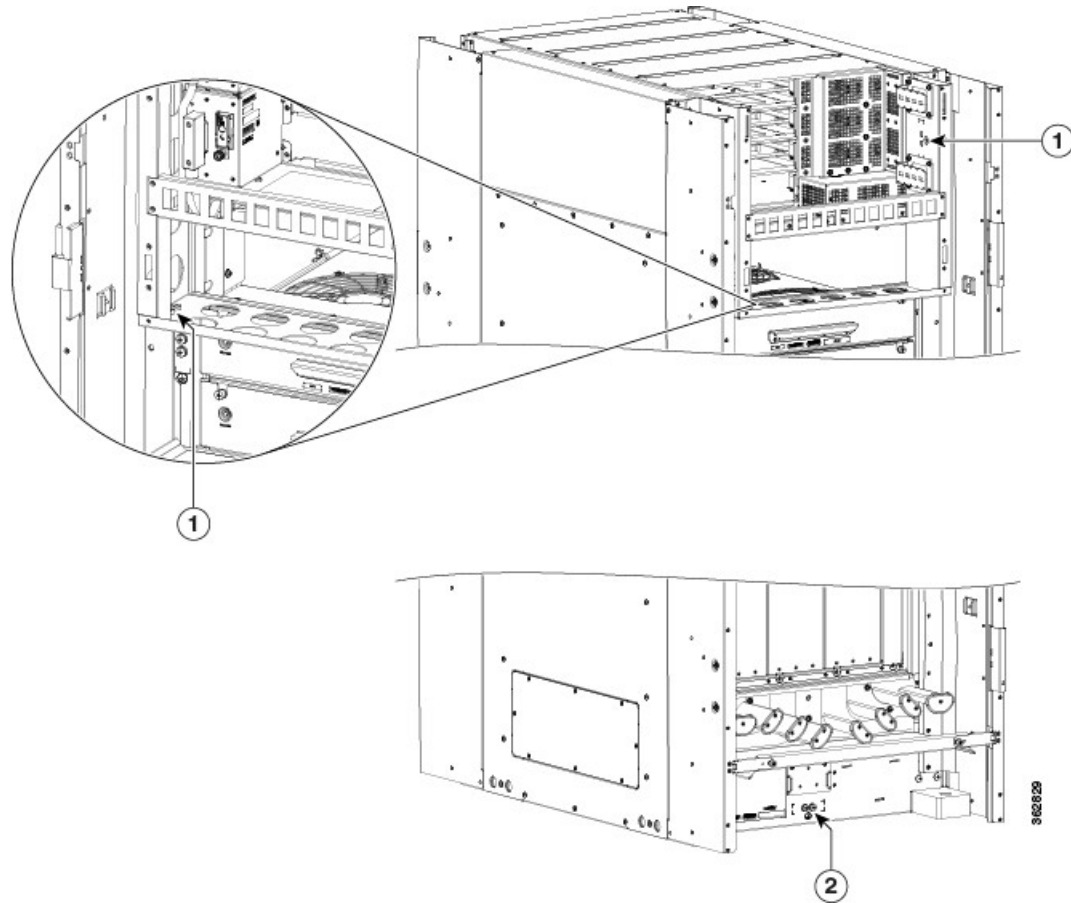
near the top of the chassis and near the bottom of the chassis on both the LCC and FCC (see the following figures).

Figure 7: LCC NEBS Bonding and Grounding Points—Rear Side of Chassis



1	NEBS bonding and grounding points (upper)	2	NEBS bonding and grounding point (lower)
---	---	---	--

Figure 8: FCC NEBS Bonding and Grounding Points—Rear Side of Chassis



1	NEBS bonding and grounding points (upper)	2	NEBS bonding and grounding point (lower)
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To connect the chassis to a NEBS-compliant bonding and grounding system at your site, you must have the following:

- One 180-degree angle (straight) grounding lug that has two M6 bolt holes with 0.63 inch spacing center to center between them, and a wire receptacle able to accept a 6-AWG copper wire (see the following figure).
- Four M6 bolts with integrated square cone locking washers (shipped pre-installed on the chassis, two at each grounding point).



Note

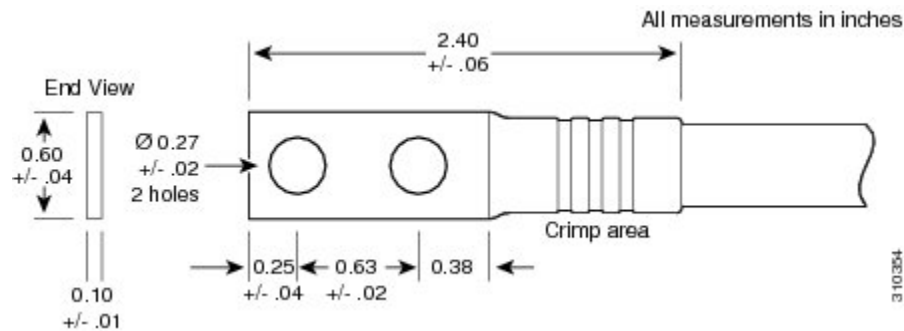
The chassis ground wire connectors have a torque value of 30 in-lb (3.39 N-m).

- Cisco recommends 2-6-AWG multistrand copper ground cable. This cable is not available from Cisco; it is available from any commercial cable vendor. The cable should be sized according to local and national installation requirements.

**Caution**

The DC Return of the Cisco NCS 6000 Series chassis should remain isolated from the system frame and chassis (DC-I: Isolated DC Return).

Figure 9: 180-Degree Angle Straight Barrel Grounding Lug



DC Power Systems

The DC input power system provides the necessary power for all chassis components. Site power requirements differ, depending on the source voltage used.

DC Power Requirements

The Cisco NCS 6008 LCC and Cisco NCS 6000 FCC each contain DC power trays.

- The LCC has six DC power trays.

The upper three DC power trays (0–2) are contained within power shelf 0 (PS0), and the lower three DC power trays (3–5) are contained within power shelf 1 (PS1). Each power shelf has a power control module (PCM) with its own I/O power switch. Each DC power tray has four slots for DC PMs.

- The FCC has four power trays.

The upper two power trays (0–1) are contained within power shelf 0 (PS0), and the lower two power trays (2–3) are contained within power shelf 1 (PS1). Each set of power trays has a power control module (PCM) with its own I/O power switch. Each DC power tray has four slots for DC PMs.

**Note**

The DC power trays for the LCC and FCC are field-replaceable. The PMs are hot-swappable.

In addition to the requirements described in the [General Power and Grounding Requirements](#), on page 18, DC input power requirements are as follows:

- Each DC power tray requires up to four DC input feeds of either –48 VDC (nominal), 50 A or –60 VDC (nominal), 40 A. The power tray accepts input DC power in the range –40 to –72 VDC.
- To operate the system with N+N DC power redundancy requires access to the "A" and "B" power busses at the Central Office (CO). This dual connectivity provides N+N power redundancy in case a power source fails.
 - CO "A" power connected to power trays 0, 1, and 2, with up to four –48/–60 VDC inputs per power tray.
 - CO "B" power connected to power trays 3, 4, and 5, with up to four –48/–60 VDC inputs per power tray.
- Required input current is as follows:
 - 50 A at –48 VDC nominal input voltage.
 - 40 A at –60 VDC nominal input voltage.
 - 60 A at minimum input voltage (–40 VDC).
- An "allpole" separation of the power source is not required. The DC PM is an isolated DC/DC converter with no galvanic connection between "L+" and the chassis. In addition, the "L+" potentials of each PM are isolated from each other.
- All power connection wiring must conform to the rules and regulations in the National Electrical Code (NEC) and any local codes. In addition, make sure that the wiring conforms to any internal requirements at the installation site.
- Each DC power source must comply with the safety extra-low voltage (SELV) requirements in UL 60950-1, CSA-C22.2 No. 60950-1, EN60950-1, AS/NZS 60950, and IEC60950-1.
- A DC-powered system should be installed in a restricted access area in accordance with the National Electric Code, ANSI/NFPA 70.
- All components in the area where DC input power is accessible must be properly insulated.

DC Input Power Cables

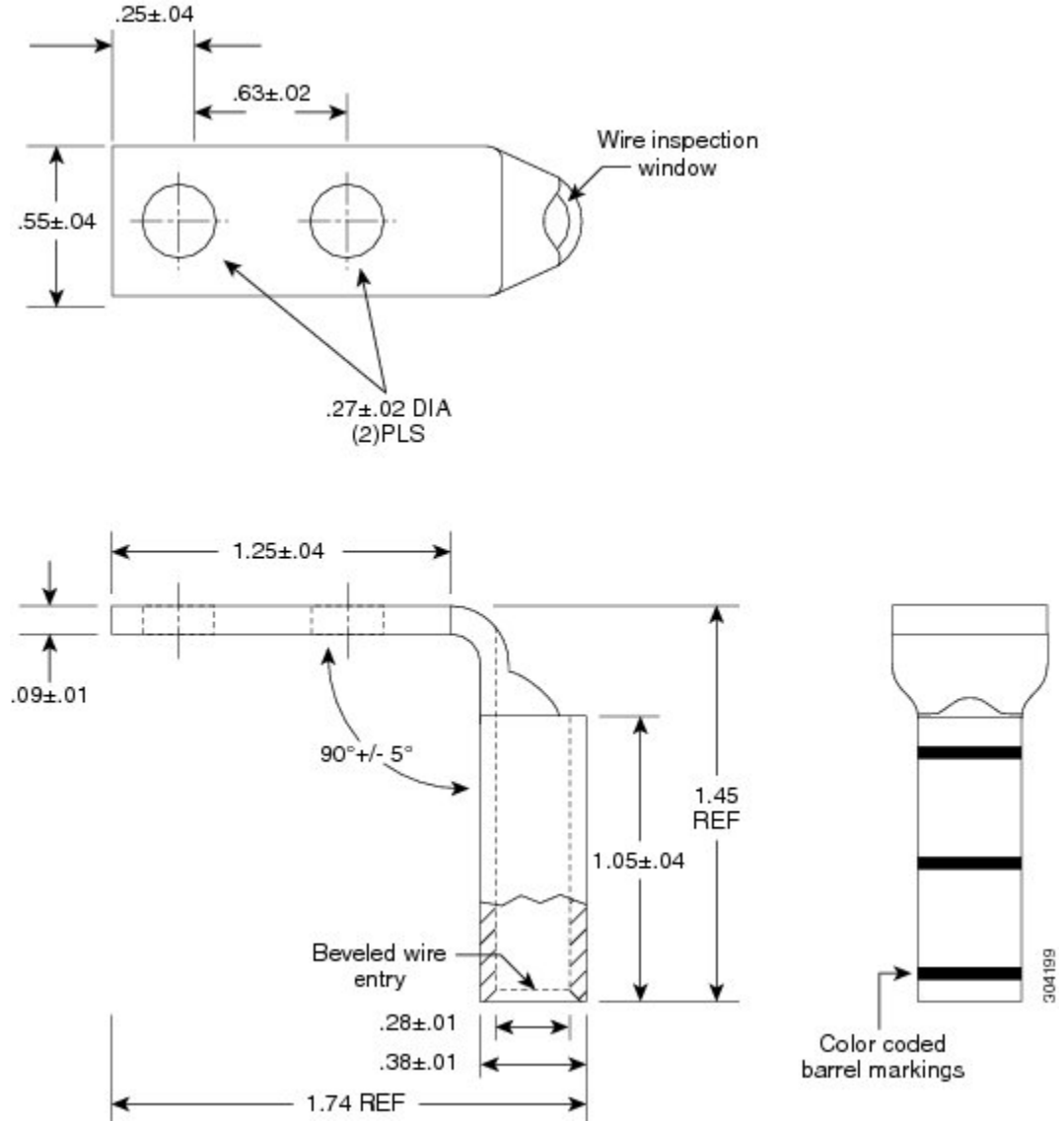
Each power tray contains four pairs of double-stud terminals (RTN, –48V/–60V) for connecting DC input power. Each power tray contains up to four PMs.

The requirements for the DC input power connections are as follows:

- For DC input power cables, select the appropriate wire gauge based on the National Electrical Code (NEC) and local codes for –48 VDC (nominal), 50 A DC input voltage, or –60 VDC (nominal), 40 A DC input voltage. Up to four pairs of cable leads, source DC (–) and source DC return (+), are required for each power tray, depending on the number of DC PMs installed. These cables are available from any commercial cable vendor. All input power cables for the chassis should have the same wire gauge and cable lengths should match within 10 percent of deviation.
- Each DC input power cable is terminated at the power tray by a 90 degree cable lug. The terminal block lug opening width is 0.62 inches (15.75 mm). The terminal posts are centered 0.63 inches (16 mm) apart and are 1/4-20 thread.

We recommend that you use a 90-degree angle, industry-standard, dual-hole, standard barrel compression lug. See figure below.

Figure 10: 90-Degree DC Input Power Cable Lug



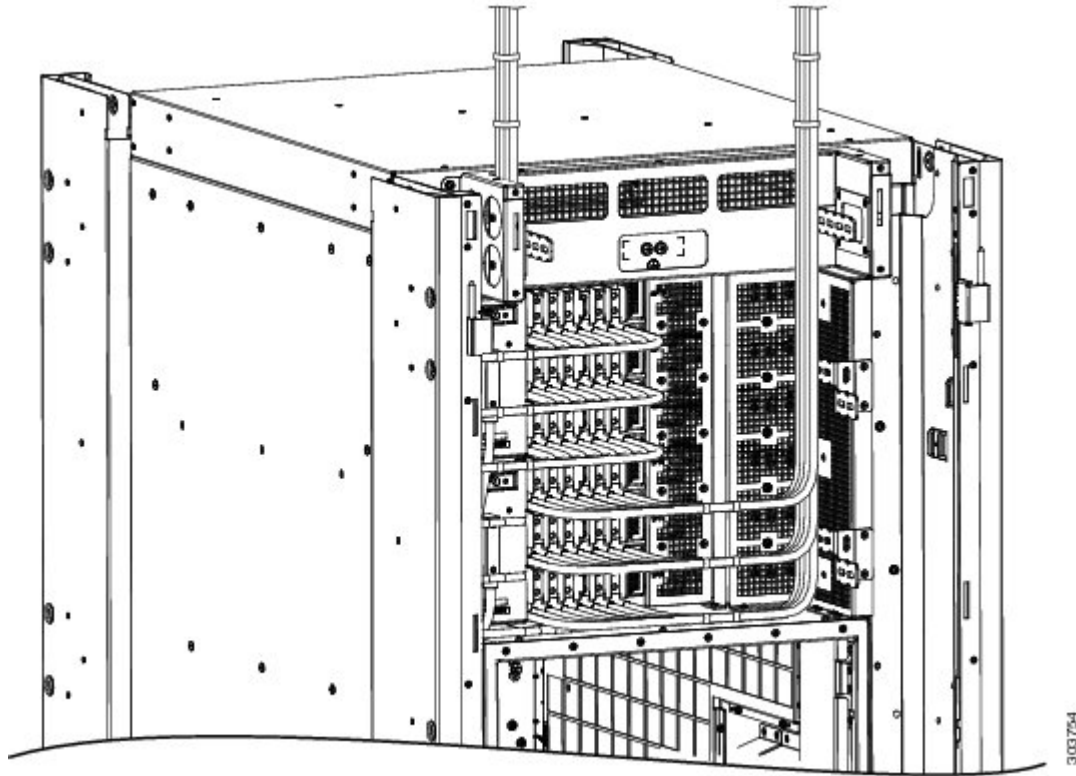
Note Use local electrical codes for clearance requirements when using power lugs to ensure safe operation.



Note In the DC power system, the power wire connectors have a torque value of 45 to 55 in-lb (5.1 to 6.2 N-m).

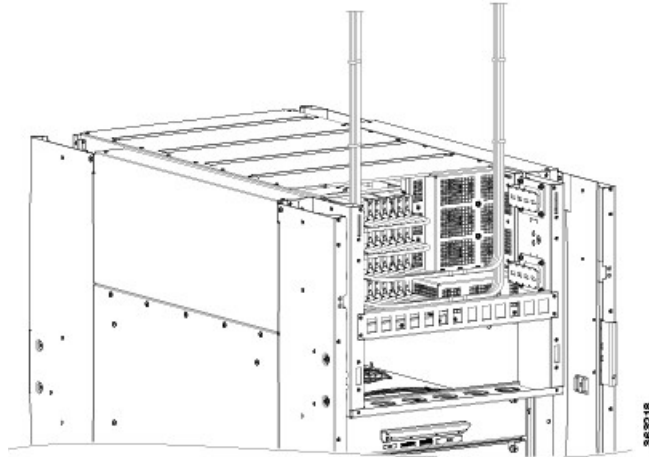
The following figure shows the DC input power cables connected to the DC power tray terminal block on the LCC.

Figure 11: DC Power Tray Power Cable Connections (LCC)



The following figure shows the DC input power cables connected to the DC power tray terminal block on the FCC.

Figure 12: DC Power Tray Power Cable Connections (FCC)



AC Power Systems

The AC input power system provides the necessary power for all chassis components. Site power requirements differ, depending on the source voltage used.

AC Power Requirements

An AC-powered LCC has six AC power trays. The upper three AC power trays (0–2) are contained within power shelf 0 (PS0), and the lower three AC power trays (3–5) are contained within power shelf 1 (PS1). Each power shelf has a PCM with its own I/O power switch. Each AC power tray has three slots for PMs.

An AC-powered FCC has four power trays. The upper two power trays (0–1) are contained within power shelf 0 (PS0), and the lower two power trays (2–3) are contained within power shelf 1 (PS1). Each AC power tray has three slots for PMs.

In addition to the requirements in the [General Power and Grounding Requirements](#), on page 18, AC input power requirements are as follows:

- Two separate and independent AC power sources are required to provide N+N power redundancy in case a power source fails.
- Each AC PM requires its own single-phase AC input power feed, with its own circuit breaker.
- 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.
- AC single-phase input:
 - Single-phase, 200 to 240 VAC nominal, 50 to 60 Hz.

- Each AC power tray contains three IEC-320-C22 receptacles, which can accept up to three IEC-320-C21 connector female plugs, depending on how many AC PMs are installed in the tray.
- The AC power system requires single-phase AC input power to each PM. If you have 3-phase AC Delta or AC Wye at your equipment, a *Cisco NCS 3-phase AC PDU* is required to convert 3-phase AC input power to single-phase AC input power (Cisco PID NCS-PDU-DELTA or NCS-PDU-WYE). For more information, refer to the [Cisco 3-Phase AC Power Distribution Unit Installation Guide](#) on Cisco.com.

**Note**

If you have a 3-Phase AC PDU installed, we recommend you install three AC PMs in each AC power tray to maintain a balanced 3-phase power load.

For detailed AC power specifications, see the [LCC Power Specifications](#) and the [FCC Power Specifications](#).

AC Power Tray Wiring

The AC power tray is shipped with AC power cords. Each AC power tray accepts up to three power cords. Each AC power cord has a different plug type, depending on locale. AC power cords are available for the locales listed in the table.

Table 5: AC Input Power Cord Options

Locale	Cisco PID	Plug Rating	Reference Illustration
North America	PWR-CAB-AC-USA=	20 A/250 VAC	<i>North America-AC Input Power Cord</i>
Europe	PWR-CAB-AC-EU=	16 A/250 VAC	<i>Europe-AC Input Power Cord</i>
United Kingdom	PWR-CAB-AC-UK=	16 A/250 VAC	<i>United Kingdom-AC Input Power Cord</i>
Italy	PWR-CAB-AC-ITA=	16 A/250 VAC	<i>Italy-AC Input Power Cord</i>
Australia	PWR-CAB-AC-AUS=	15 A/250 VAC	<i>Australia-AC Input Power Cord</i>
Japan	PWR-CAB-AC-JPN=	20 A/250 VAC	<i>Japan-AC Input Power Cord</i>
Switzerland	PWR-CAB-AC-SUI=	16 A/250 VAC	<i>Switzerland-AC Input Power Cord</i>
South Africa	PWR-CAB-AC-SA=	16 A/250 VAC	<i>South Africa-AC Input Power Cord</i>
Israel	PWR-CAB-AC-ISRL=	16 A/250 VAC	<i>Israel-AC Input Power Cord</i>
China	PWR-CAB-AC-CHN=	16 A/250 VAC	<i>China-AC Input Power Cord</i>
Brazil	PWR-CAB-AC-BRA=	20 A/250 VAC	<i>Brazil-AC Input Power Cord</i>

Figure 13: North America—AC Input Power Cord

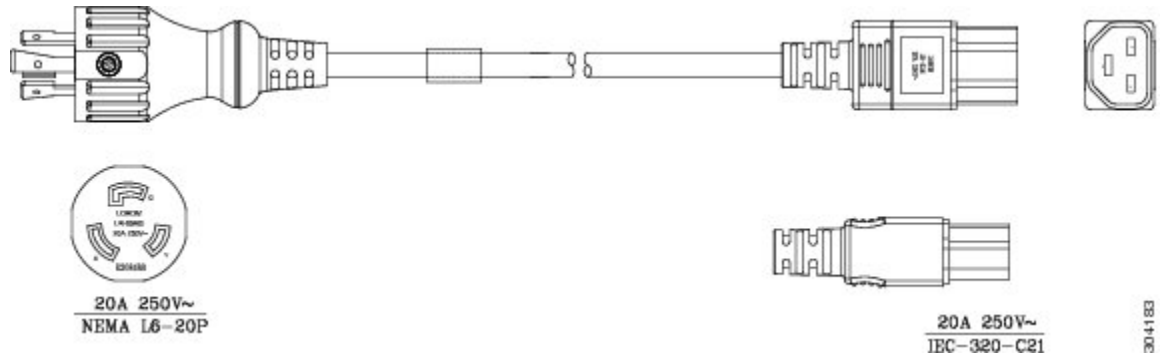


Figure 14: Europe—AC Input Power Cord

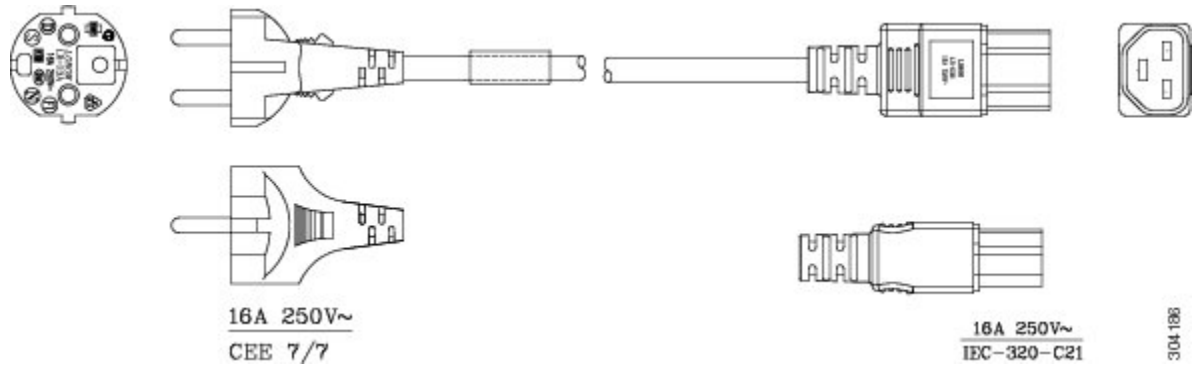


Figure 15: United Kingdom—AC Input Power Cord

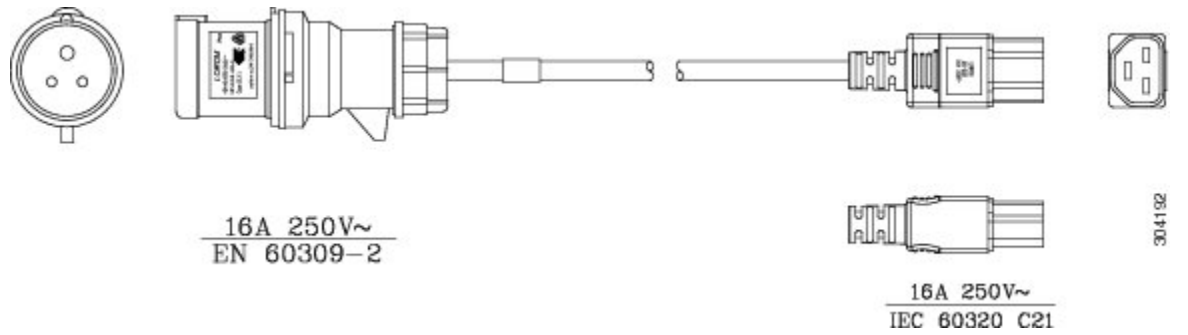


Figure 16: Italy—AC Input Power Cord

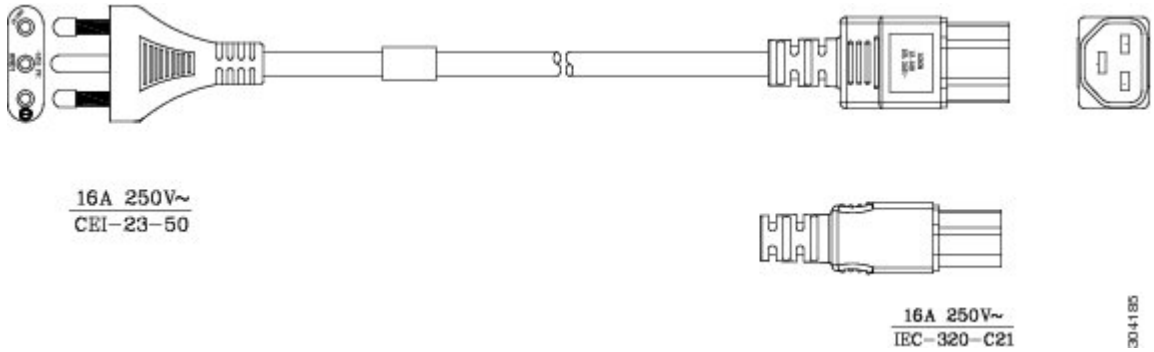
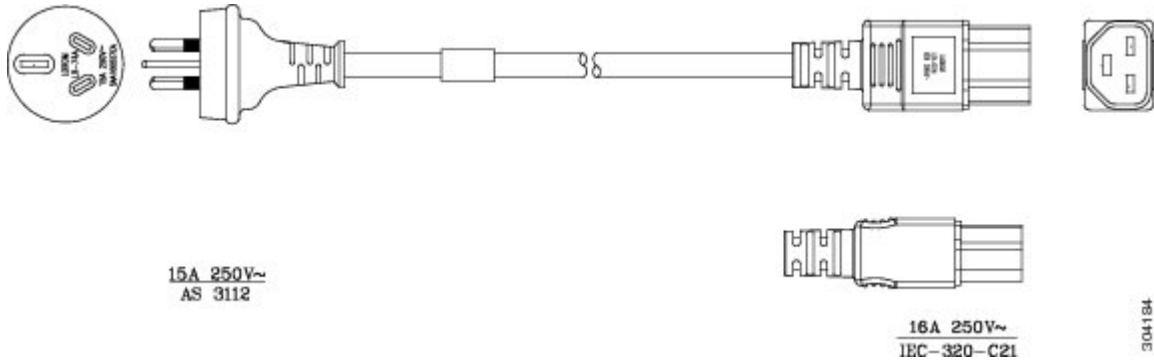


Figure 17: Australia—AC Input Power Cord





Note

The AS 3112 standard rates cord sets up to a maximum of 15 A, 250 VAC for the C21 plug. Therefore the building circuit breaker must be 15-A maximum. Installation of the Cisco NCS 6000 Series chassis must follow national and local electrical codes.

Figure 18: Japan—AC Input Power Cord

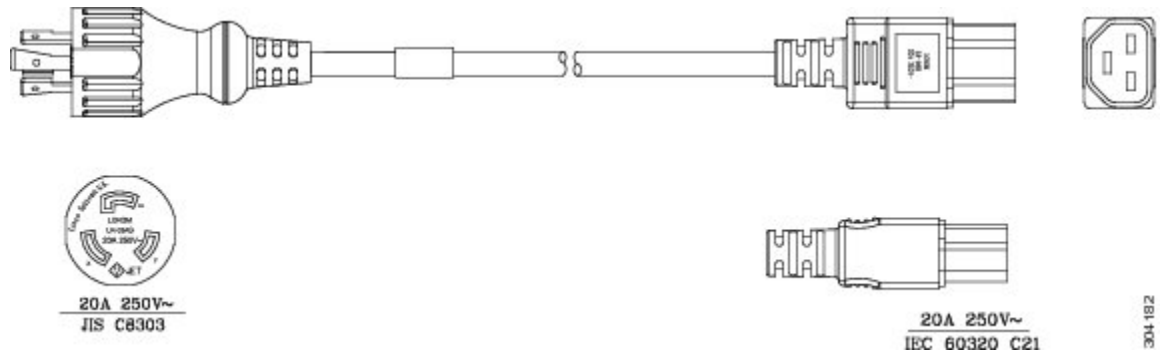


Figure 19: Switzerland—AC Input Power Cord

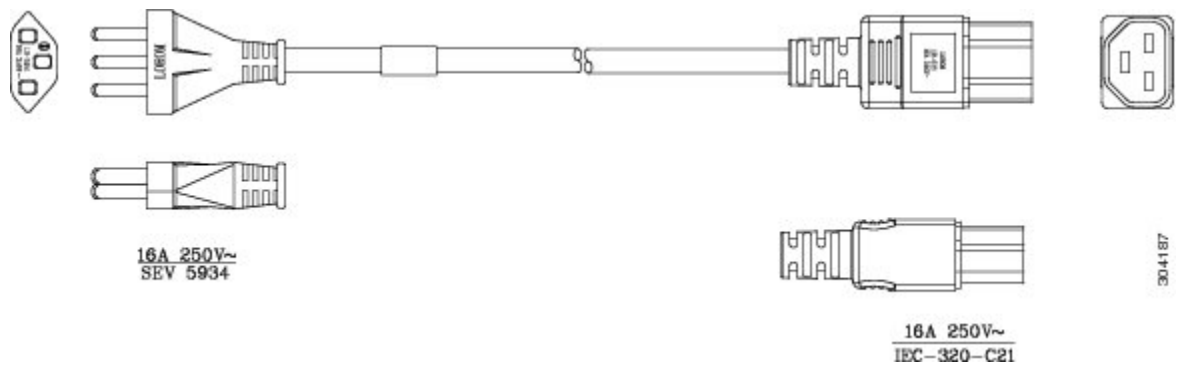


Figure 20: South Africa—AC Input Power Cord

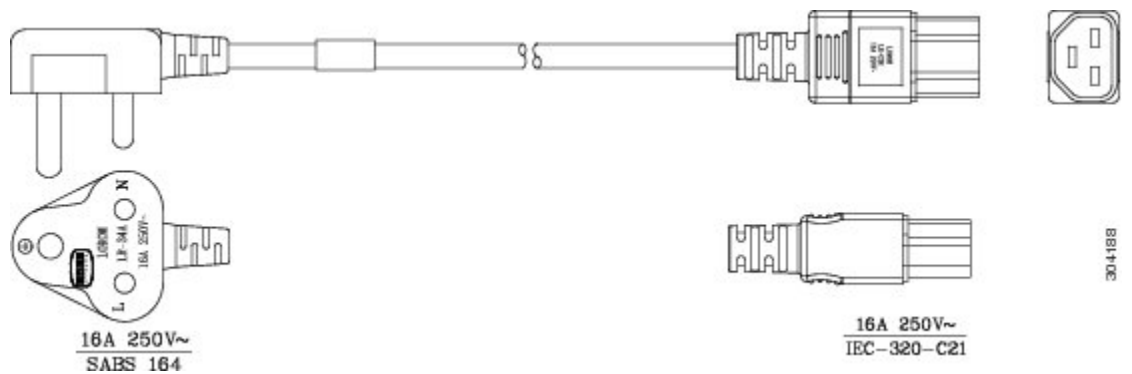


Figure 21: Israel—AC Input Power Cord

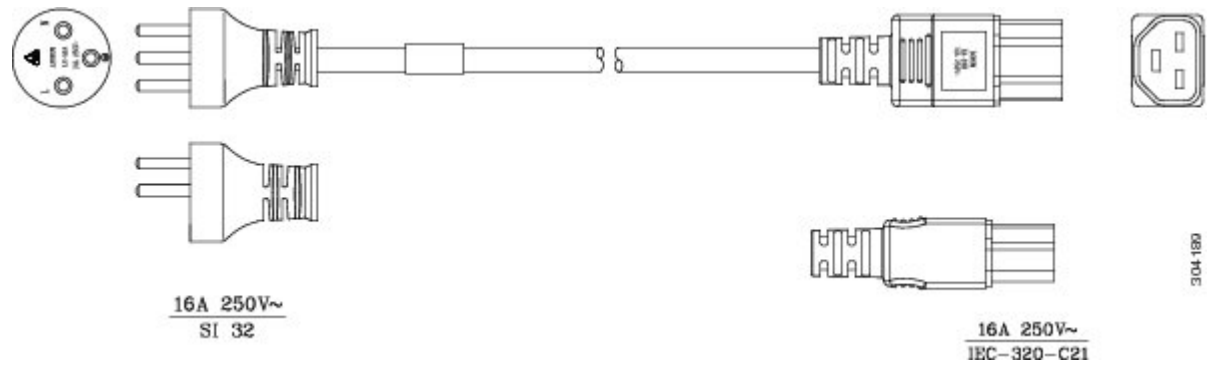


Figure 22: China—AC Input Power Cord

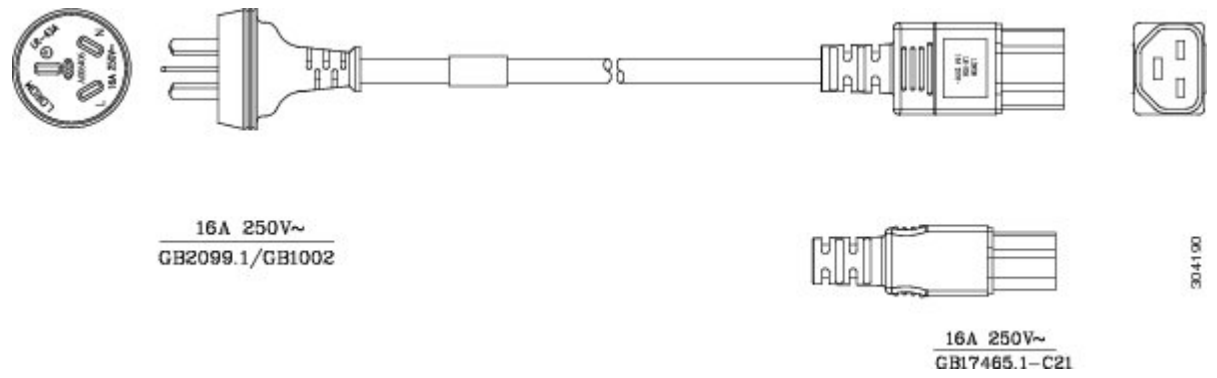
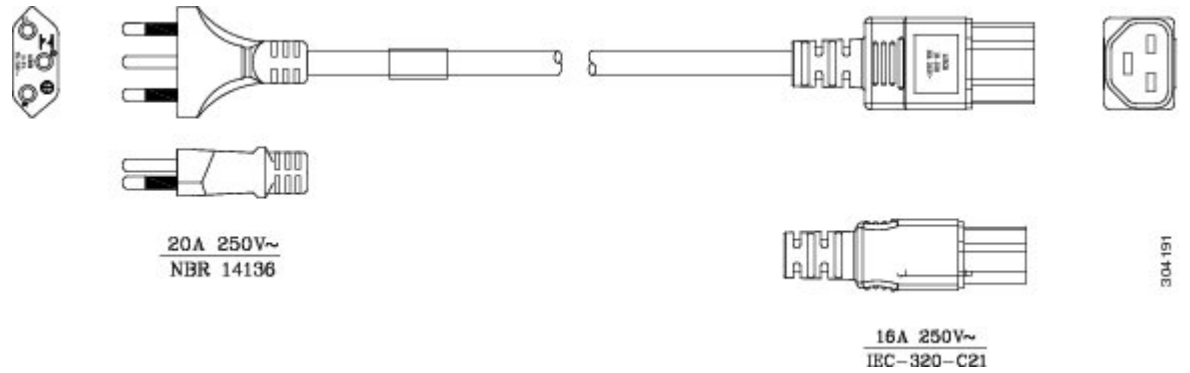
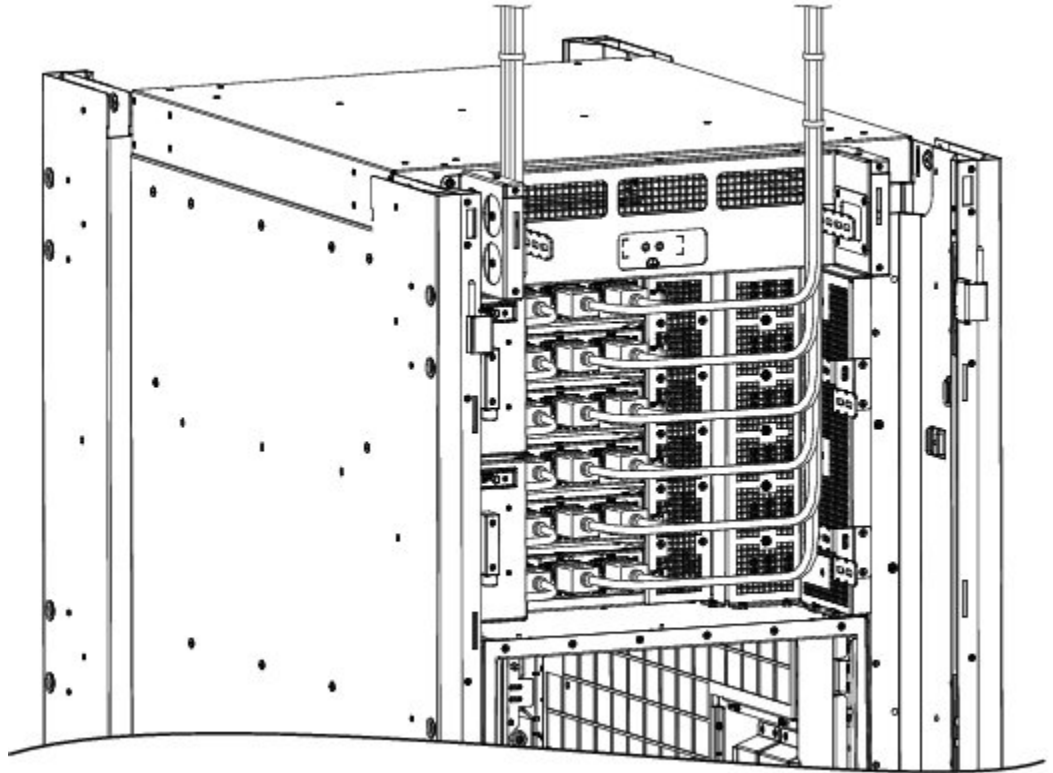


Figure 23: Brazil—AC Input Power Cord



This figure shows the AC input power cables plugged into the AC power trays.

Figure 24: AC Power Tray Power Cable Connections—LCC Shown



Converting 3-Phase AC to Single-Phase AC

If you have 3-phase AC Delta or AC Wye input power at your equipment, a *Cisco NCS 3-phase AC PDU* is required to convert 3-phase AC Delta or AC Wye input power to single-phase AC input power that connects directly to the rear of each PM. The Cisco NCS PDU includes either an AC Delta (Cisco PID NCS-PDU-DELTA) or AC Wye (Cisco PID NCS-PDU-WYE) power interface, and has power input and power output cords entering and exiting the box (*Single AC PDU—Front and Rear*). An optional mounting bracket is available for mounting the PDUs on both sides of the chassis.



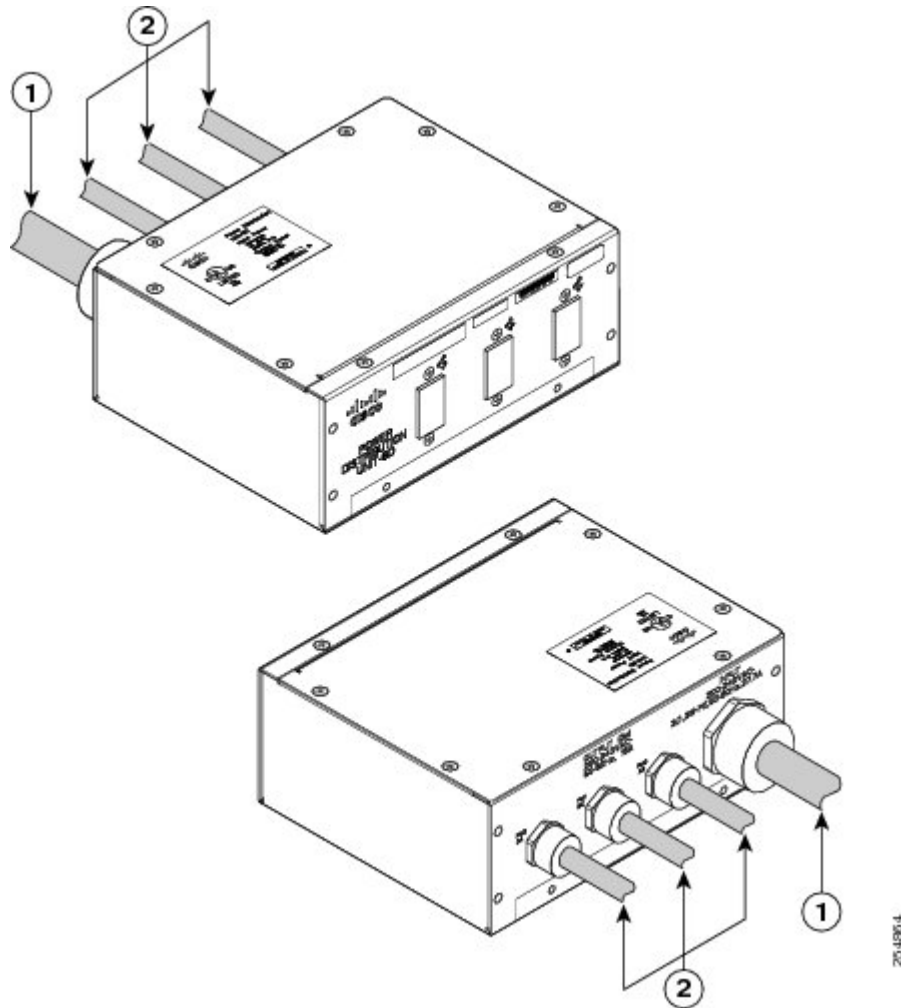
Note

The overall width of both the LCC and FCC with the AC PDU brackets installed is 35.3 in. (89.7 cm).

For more information on AC PDUs, refer to the [Cisco CRS 3-Phase AC Power Distribution Unit Installation Guide](#) on Cisco.com.

This figure shows a single AC Delta PDU. The single AC Wye PDU is similar.

Figure 25: Single AC PDU—Front and Rear



1	3-phase AC input cord	2	Single-phase AC output cords
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AC Input Power Requirements

In addition to the requirements in the [General Power and Grounding Requirements](#), on page 18, AC input power requirements are as follows:

- Two separate and independent AC power sources are required to provide N+N power redundancy. One, two, or three 3-phase feeds can be used from that source according to how many PMs are being powered; one feed for one PDU, which feeds up to three PMs. The first three power trays are fed from the first AC power source (through the AC PDUs), and the other three power trays are fed from the other AC power source (through the other AC PDUs).

- Each 3-phase AC power source must provide its own circuit breakers.
- AC Delta input:
 - 3-phase, 200 to 240 VAC (phase-to-phase), 50 to 60 Hz.
 - Input current: 27.7 A.
 - The Delta input power cord has a 4-pin IEC 60309 plug (3 wire + protective earthing [3W+PE]). The power cord is rated for 250 VAC, 60 A, and plugs into a similarly rated IEC 60309 receptacle.
- AC Wye input:
 - 3-phase, 200 to 240 VAC (phase-to-neutral), 50 to 60 Hz.
 - Input current: 16 A (International) or 20 A (North America). The PDU is rated for 16-A service.
 - The Wye power cord has a 5-pin IEC 60309 plug (3 wire + neutral + protective earthing conductor (ground wire) [3W+N+PE]). The cord is rated for 415 VAC, 16 A, and plugs into a similarly rated IEC 60309 receptacle.
- Each single PDU has three single-phase output cords, each with a 90-degree IEC-320-C21 plug that plugs into an IEC-320-C22 inlet on the rear of the AC power tray.
- A grounding-type AC power outlet is required. The PDUs are shipped with AC power cords that have a grounding-type plug. As a safety feature, the plugs fit only a grounding-type AC power outlet.

These figures show the plugs for the power cords on the AC Delta and Wye PDUs.

Figure 26: AC Delta Power Cord Plug



Figure 27: AC Wye Power Cord Plug



Chassis Cooling System

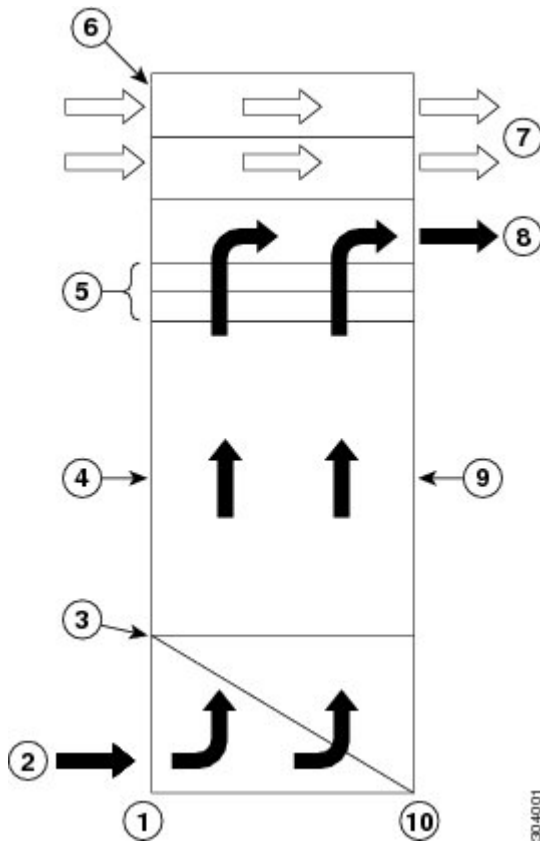
The Cisco NCS 6000 Series Routers have two fan trays, with six variable-speed fans each, that cool the chassis card cages. Cool air flows in at the bottom front of the chassis, up through the chassis card cages, through the fans in the fan trays, and exhausts out the top rear of the chassis. In addition, each AC or DC PM at the top of the chassis has self-contained fans that pull in cool air from the front of the chassis and exhaust warm air out the rear.

A replaceable air filter is located on the front of the LCC and FCC. We recommend that you check the air filter once a month. How often you should replace the air filter depends on the facility environment. In a dirty environment, or if frequent temperature alarms occur, always check the intake grills for debris, and then check the air filter to see if it needs to be replaced.

Line Card Chassis Airflow

This figure shows the airflow through the LCC.

Figure 28: Airflow Through the Cisco NCS 6008 LCC



1	Front side of chassis	6	Air flow through PMs
---	-----------------------	---	----------------------

2	Air inlet plenum	7	Exhaust air from PMs
3	Air filter	8	Air exhaust plenum
4	Front cage for LCs	9	Rear cage for FCs and RP cards
5	Fan trays	10	Rear side of chassis

LCC Airflow Volumes

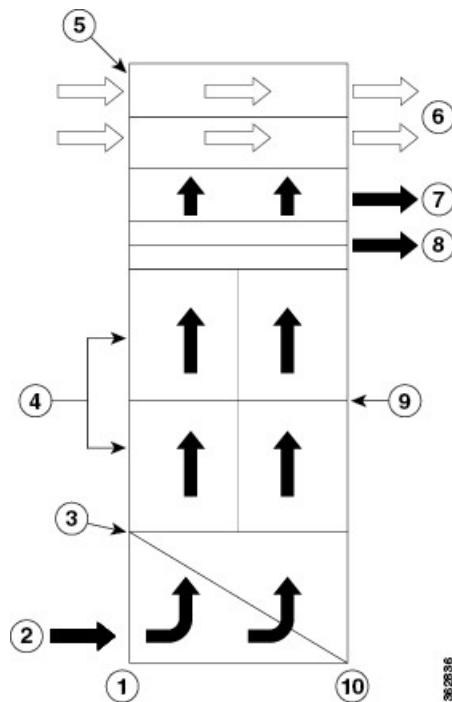
The airflow volumes for a fully loaded Cisco NCS 6008 LCC are as follows:

- Chassis airflow: Up to 2500 cubic feet (70,792 liters) per minute
- DC power system airflow: Up to 240 cubic feet (6796 liters) per minute
- AC power system airflow: Up to 180 cubic feet (5097 liters) per minute

Fabric Card Chassis Airflow

This figure shows the airflow through the FCC.

Figure 29: Airflow Through the Cisco NCS 6000 FCC



1	Front side of the FCC	6	Exhaust air from PMs
---	-----------------------	---	----------------------

2	Air inlet plenum	7	Air exhaust plenum
3	Air filter	8	Fan trays (rear)
4	Upper and lower card cages	9	Upper and lower card cages
5	Air flow through PMs	10	Rear side of the FCC

FCC Airflow Volumes Airflow

The airflow volumes for a fully loaded Cisco NCS 6000 FCC are as follows:

- Chassis airflow: Up to 1980 cubic feet (56,6000 liters) per minute
- DC power system airflow: Up to 120 cubic feet (3400 liters) per minute
- AC power system airflow: Up to 88 cubic feet (2500 liters) per minute

Facility Cooling Requirements

The Cisco NCS 6000 Series Routers consume considerable power, which dissipates much heat.

When there is one or more fan failures, the system monitors the temperature sensors mounted on the critical components within the various boards and increases fan throughput to hold temperatures below their critical threshold. The system does this monitoring even when all the fans are operating correctly (so that it protects the components if the air intake is blocked for example). If temperatures exceed the critical threshold, the associated cards are shut down to avoid permanent damage.

If either fan tray is removed from the chassis, the other fan tray will immediately spin up to maximum speed in order to provide sufficient cooling performance. Although the system can operate indefinitely at full capacity with just one operational fan tray up to an ambient room temperature of 104°F (40°C) without overheating, there is no longer any redundancy offered, so immediate replacement of the missing fan tray is advised.

When both fan trays are removed, a critical alarm is generated along with a system message warning you to install a fan tray or the entire chassis will shutdown in approximately 45 seconds.

To ensure that the site provides the proper air circulation for the system:

- Make certain that the site is as dust free as possible. Dusty environments can clog the air filter or power supply intake vents, reducing the cooling airflow through the system.
- Allow sufficient airflow by maintaining a minimum of 6 inches (15.2 cm) of clearance at both the inlet and exhaust openings on the chassis and PMs. If airflow is blocked or restricted, or if inlet air is too warm, an over-temperature condition can occur. Under extreme conditions, the environmental monitoring system shuts down the power to protect the routing system components.



Cisco NCS 6000 Series Routers System Specifications

This chapter provides the system specifications for the Cisco NCS 6000 Series Routers.

- [Cisco NCS 6008 Line Card Chassis System Specifications, page 37](#)
- [Cisco NCS 6000 Fabric Card Chassis System Specifications, page 40](#)

Cisco NCS 6008 Line Card Chassis System Specifications

This section includes the system specifications for the Cisco NCS 6008 Line Card Chassis (LCC).

LCC Chassis Specifications

Table 6: Cisco NCS 6008 LCC Specifications

Supported Cards and Modules	Up to eight line cards, six fabric cards (FCs), two route processor (RP) cards, and two fan trays
Chassis Dimensions	
Height	81.0 in. (205.7 cm) as shipped 84.0 in. (213.4 cm) as installed with the top cap (The top cap in the cosmetic package attaches to the top of the chassis)
Width	23.6 in. (59.9 cm) 35.3 in. (89.7 cm) as installed with optional AC PDU brackets on each side of the chassis.
Depth	39.0 in. (99.1 cm) without exterior cosmetics 42.0 in. (106.7 cm) with all exterior cosmetics

Aisle spacing	To install the LCC (front): 48 in. (122 cm) To service FRUs (front): 31.7 in. (80.5 cm) To service FRUs (rear): 14.0 in. (35.6 cm)
Weights	
LCC as shipped	775 lb (352 kg)
LCC in shipping crate with pallet	1025 lb (466 kg)
LCC, fully loaded with power, fan trays, cards, and cosmetics	1450 lb (658 kg)
Floor Loading	
Chassis in rack footprint(floor contact area)	Chassis: 6.9 sq ft (0.64 sq m)
Maximum floor loading	210 lb/sq ft
Chassis Cooling	Two fan trays. Up to 1980 cubic feet (56,6000 liters) per minute
Chassis airflow	Up to 2472 cubic feet (70,792 liters) per minute
DC power system airflow	Up to 2400 cubic feet (6796 liters) per minute
AC power system airflow	Up to 1800 cubic feet (5097 liters) per minute

LCC Power Specifications

Table 7: Cisco NCS 6008 LCC Power Specifications

Power trays	Either six AC or six DC power trays (cannot mix AC and DC power trays)
AC power tray	The AC power tray has three slots for AC PMs.
DC power tray	The DC power tray has four slots for DC PMs.
Power Redundancy (N+N)	
AC	Up to 18 power modules can be installed, and only 9 are needed to be active at any time. This allows support for 9+9 power redundancy by using two independent AC power sources (9 feeds each).

DC	Up to 24 power modules can be installed, and only 12 are needed to be active at any time. This allows support for 12+12 power redundancy through "A" and "B" battery plant feeds.
DC Input	
Nominal input voltage	–48 VDC or –60 VDC (tolerance range: –40 to –72 VDC)
Input current	50 A max at –48 VDC 40 A max at –60 VDC 60 A at –40 VDC (maximum)
AC Input	Single-phase
Nominal input voltage	200 to 240 VAC (range 180 to 264 VAC)
Nominal line frequency	50/60 Hz (range 47 to 63 Hz)
Recommended AC service	20-A (North America) dedicated branch circuit 16-A (International) dedicated branch circuit
AC Power Cord Length	167 in. (4.25 m)

LCC Environmental Specifications

Table 8: Cisco NCS 6008 LCC Environmental Specifications

Temperature	Operating, nominal: 41 to 104°F (5° to 40°C) Operating, short-term: 23 to 122°F (–5° to 50°C) ¹ Nonoperating: –40 to 158°F (–40° to 70°C)
Humidity	Operating, nominal: 5 to 85%, noncondensing Operating, short-term: 5 to 90%, noncondensing Nonoperating: 5 to 93%, noncondensing
Altitude	Operating: –200 to 13,800 ft (–61 to 4206 m) at 104°F (40°C) Nonoperating: Up to 16,000 ft (4877 m) at –13°F (–25°C), short-term
Chassis airflow	Up to 70,792 liters per minute
Power system airflow	Up to 6800 liters per minute

Air exhaust temperature	140°F (60°C)—at room temperatures of 95 to 102°F (35 to 39°C) 158°F (70°C)—maximum exhaust temperature on a fully loaded system during worst-case operating conditions (50°C and 6000 ft altitude) The air temperature rise is 68°F (20°C) on a fully loaded system with fans running at maximum speed.
Air velocity (at exhaust)	1000 ft/min (5.1m/s) under typical conditions 27°C 2250 ft/min(11.4m/s) at maximum speed The software controls the speed of the fans based on measurements from the chassis thermal sensors.
Sound power level(AC and DC power)	76.4 dBA declared
Shock and vibration	Designed and tested to meet the NEBS shock and vibration standards defined in GR-63 Issue 4 2012.

¹ Short-term refers to a period of not more than 96 consecutive hours and a total of not more than 15 days in 1 year. This refers to a total of 360 hours in any given year, but no more than 15 occurrences during that 1-year period.

LCC Regulatory, Compliance, and Safety Specifications

For information about the regulatory, compliance, and safety standards to which the Cisco NCS 6008 chassis conforms, see: [Regulatory Compliance and Safety Information for the Cisco Network Convergence System 6000 Series Routers](#).

Cisco NCS 6000 Fabric Card Chassis System Specifications

This section includes the system specifications for the Cisco NCS 6000 Fabric Card Chassis (LCC).

FCC Chassis Specifications

Table 9: Cisco NCS 6000 FCC Chassis Specifications

Supported Cards and Modules	Up to 12 S2 fabric cards (FCs), two SC or SC-SW shelf controller cards, and two fan trays.
Fabric Chassis Dimensions	
Height	76.60 in. (205.7 cm) as shipped 84.0 in. (213.4 cm) as installed with the power shelf

Width	23.6 in. (59.9 cm) 35.3 in. (89.7 cm) as installed with optional AC PDU brackets on each side of the FCC
Depth	39.0 in. (99.1 cm) without exterior cosmetics 42.0 in. (106.7 cm) with all exterior cosmetics
Aisle spacing	To install the FCC (front): 48 in. (122 cm) To service FRUs (front): 31.7 in. (80.5 cm) To service FRUs (rear): 14.0 in. (35.6 cm)
Weights	
FCC as shipped	708 lb (321 kg)
FCC in shipping crate with pallet	925 lb (420 kg)
FCC, fully loaded with power enclosure, cards, and cosmetics	1130 lb (513 kg)
Floor Loading	
FCC in rack footprint(floor contact area)	FCC: 6.9 sq ft (0.64 sq m)
Maximum floor loading	164 lb/sq ft
Fabric Chassis Cooling	Two fan trays
FCC airflow	Up to 1980 cubic feet (56,6000 liters) per minute
DC power system airflow	Up to 120 cubic feet (3400 liters) per minute
AC power system airflow	Up to 88 cubic feet (2500 liters) per minute

FCC Power Specifications

Table 10: Cisco NCS 6000 FCC Power Specifications

Power Enclosure Components	
Power Trays	Either four AC or four DC power trays. AC and DC power trays cannot be mixed.
Power modules (PMs)	The AC power tray has three slots for AC PMs. The DC power tray has four slots for DC PMs.
Power control modules (PCMs)	Two PCMs are preinstalled in the power enclosure (one per each set of power trays).

Power Enclosure Components	
Power Redundancy (N+N)	AC: Up to 12 power modules can be installed, and only 6 are needed to be active at any time. This allows support for 6+6 power redundancy by using two independent AC power sources (6 feeds each). DC: Up to 16 power modules can be installed, and only 8 are needed to be active at any time. This allows support for 8+8 power redundancy through "A" and "B" battery plant feeds.
DC Input	
Nominal input voltage	-48 VDC or -60 VDC (tolerance range: -40 to -72 VDC)
Input current	50 A max at -48 VDC 40 A max at -60 VDC 60 A at -40 VDC (maximum)
AC Input	
Nominal input voltage	200 to 240 VAC (range 180 to 264 VAC)
Nominal line frequency	50/60 Hz (range 47 to 63 Hz)
Recommended AC service	20-A (North America) dedicated branch circuit 16-A (International) dedicated branch circuit
AC Power Cord Length	167 in. (4.25 m)

FCC Environmental Specifications

Table 11: Cisco NCS 6000 FCC Environmental Specifications

Temperature	Operating, nominal: 41 to 104°F (5° to 40°C) Operating, short-term: 23 to 122°F (-5° to 50°C) ² Nonoperating: -40 to 158°F (-40° to 70°C)
Humidity	Operating, nominal: 5 to 85%, noncondensing Operating, short-term: 5 to 90%, noncondensing Nonoperating: 5 to 93%, noncondensing
Altitude	Operating: -200 to 13,800 ft (-61 to 4206 m) at 104°F (40°C) Nonoperating: Up to 16,000 ft (4877 m) at -13°F (-25°C), short-term

FCC airflow	2000 CFM (Cubic Feet per Minute) Up to 56,600 liters per minute
Power system airflow	Up to 3400 liters per minute
Air exhaust temperature	122°F (50°C)—at room temperatures of 95 to 102°F (35 to 39°C) 140°F (60°C)—maximum exhaust temperature on a fully loaded system during worst-case operating conditions (50°C and 6000 ft altitude)
Air velocity (at exhaust)	1000 ft/min (5.1m/s) under typical conditions 27°C 2250 ft/min(11.4m/s) at maximum speed Note Software controls the speed of the fans based on measurements from the fabric chassis thermal sensors.
Sound power level(AC and DC power)	76.6 dBA declared
Shock and vibration	Designed and tested to meet the NEBS shock and vibration standards defined in GR-63 Issue 4 2012.

² Short-term refers to a period of not more than 96 consecutive hours and a total of not more than 15 days in 1 year. This refers to a total of 360 hours in any given year, but no more than 15 occurrences during that 1-year period.

FCC Regulatory, Compliance, and Safety Specifications

For information about the regulatory, compliance, and safety standards to which the Cisco NCS 6000 Fabric Card Chassis conforms, see: [Regulatory Compliance and Safety Information for the Cisco Network Convergence System 6000 Series Routers](#).



Site Planning Considerations

This chapter describes the general considerations for planning the installation of the Cisco NCS 6000 Series Routers. For complete instructions on mounting and securing the chassis, see the [Cisco Network Convergence System 6000 Series Routers Unpacking, Moving, and Securing Guide](#).

- [Basic Site and Installation Planning](#), page 45
- [Aisle Spacing and Maintenance Access Floor Plan](#), page 46
- [Power and Cooling Requirements](#), page 48
- [System Console](#), page 48
- [Cable Management](#), page 48
- [Cisco Installation Services](#), page 50
- [System Testing, Certification, and Warranties](#), page 50

Basic Site and Installation Planning

As you plan for basic site and installation requirements, consider the following:

- Does the installation site have adequate power for the routing system?
- Can the routing system be positioned close to the AC or DC power source, and are the power receptacles easy to reach?
- Does the site have appropriate floor space available in which to install the rack-integrated chassis? See the [LCC Chassis Specifications](#) or [FCC Chassis Specifications](#) for more information.
- Is there a scissor lift or similar lifting device available to lift the rack-integrated chassis?

In addition, make sure that the installation site meets the following access requirements:

- At least 48 inches (122 cm) of clearance exist between rows of equipment. This space is needed to access components in the chassis. Additional clearance may be necessary for installation.
- If a physical console terminal is desired near the system, make sure enough room exists for the console terminal and the console cable is long enough to reach the system from the terminal.

- Chassis exhaust vents are not blocked, and input airflow at the bottom of the chassis is not blocked.

When planning the site, you should think about potential expansion of the system. Consider the following:

- Expanding from a single-chassis standalone system to a multichassis system requires you to replace the original FCs with a different type of FC that has optical connectors for connecting the multiple chassis to each other. The LCC requires six S13 FCs for multi-chassis configurations. The FCC requires S2 FCs for multi-chassis configurations.
- Floor space for additional chassis.
- Proximity of chassis to each other.
- Power and cooling requirements for additional chassis.
- Cable management for routing system cables.

The following are required to move the Cisco NCS 6000 Series chassis at the site:

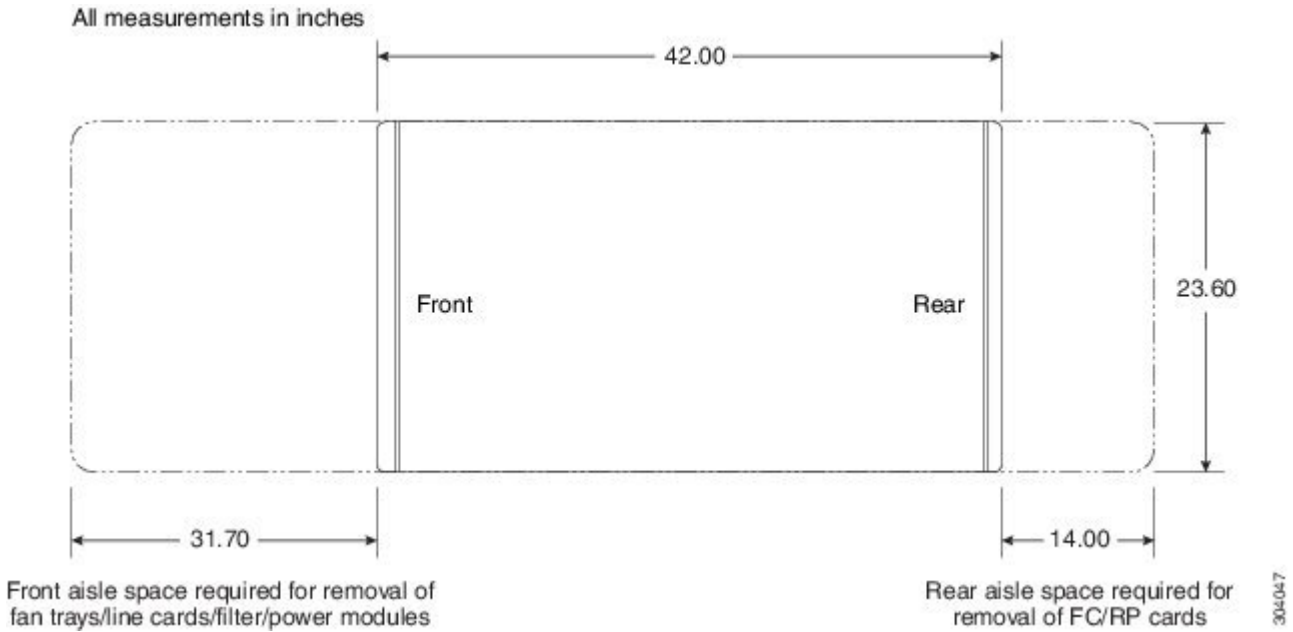
- Moving device such as a safety hand truck, pallet jack, or forklift to move the equipment to the installation site. Make sure that the device is capable of preventing the chassis from tipping. For example, you could use a safety hand truck with retractable safety leg wheels and a security strap, such as the Stevens Appliance Truck Company “Escort” Model STEV SRT-M-66 (distributed by McMaster-Carr as Model 2654T6).
- We recommend that you use the Cisco chassis lift dolly (“jumbo jack”) to move the chassis. The dolly product ID is: NCS 6008 Lift Dolly (PID NCS-LIFT). You can use this same dolly for both the Cisco NCS 6008 LCC and the Cisco NCS 6000 FCC. If you already have a CRS dolly, you can order PID NCS-LIFT-BRKT, which is the CRS Lift upgrade to NCS 6008 dolly.

Aisle Spacing and Maintenance Access Floor Plan

The floor plan for the Cisco NCS 6000 Series Routers must include enough space to install the chassis and allow sufficient airflow for the system. The floor plan must also provide enough room to access chassis components for maintenance (for example, to remove fan trays, power components, cables, and air filters).

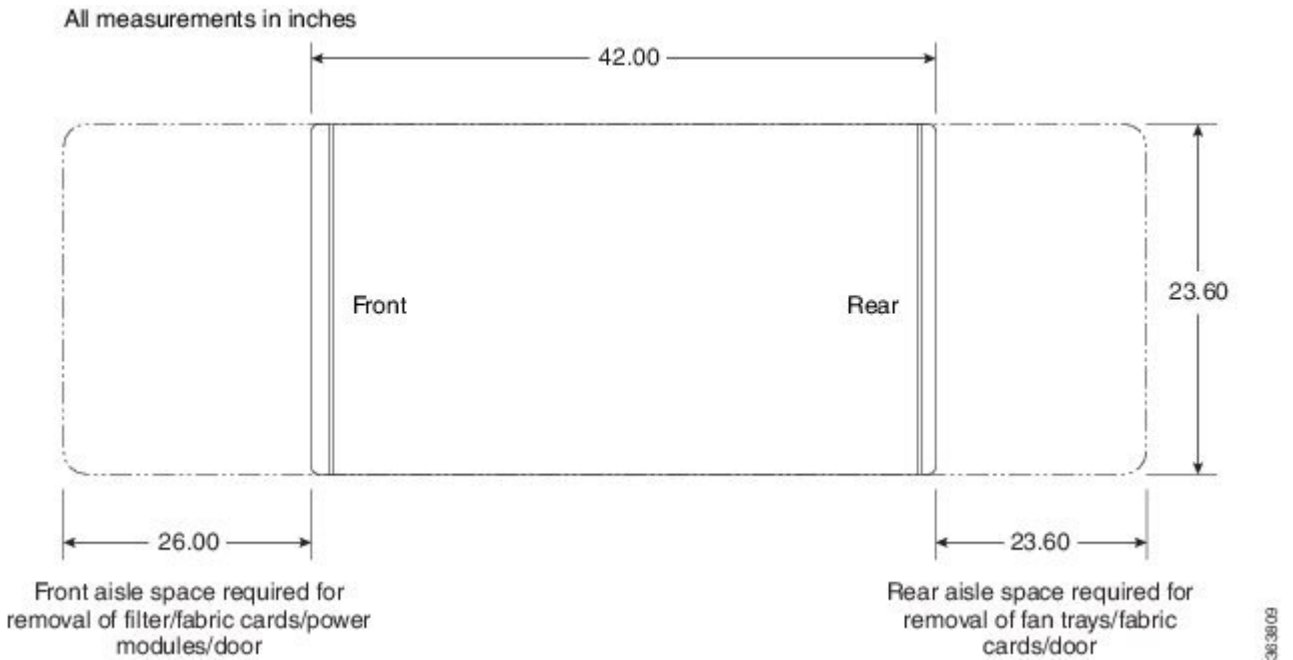
The following figure shows a top-down view of the LCC footprint required for installation.

Figure 30: LCC Footprint for Installation and Maintenance



The following figure shows a top-down view of the FCC footprint required for installation.

Figure 31: FCC Footprint for Installation and Maintenance



Drill Hole Template

Before moving the chassis into place and securing it, you must make sure that your site is prepared. Because of its size and weight, the chassis must be securely bolted to the floor. Several possible bolting configurations exist for the chassis. Cisco provides a drill hole template to identify the chassis footprint and the pattern of holes that must be drilled into the floor for the mounting hardware that secures the chassis to the floor.

Power and Cooling Requirements

See the *Power and Cooling* chapter for information about the power and cooling systems on the chassis and for information about the power and cooling requirements at the installation site.

System Console

A system console is required to configure the routing system for operation. As you plan your site facilities, make sure that the site has enough room for a system console and the console cable is long enough to reach the routing system.

**Note**

The console port does not support modem control or hardware flow control. The port requires a straight-through EIA/TIA-232 cable.

Cable Management

As the size of the routing system increases, the cabling required for the chassis increases. For example, a chassis fully loaded with eight line cards (LCs) or 12 fabric cards (FCs) has more cables connected to it than a partially loaded chassis.

The cabling runs must be carefully planned. The basic configurations for various routing systems should be arranged to minimize the complexity and length of the cable runs. Precut and terminated cables are considered part of the basic configuration.

The four cable management brackets on the Cisco NCS 6000 chassis are for organizing these interface cables to keep the front and rear of the chassis clear and to help eliminate sharp bends in the cables. Excessive bending can damage interface cables.

You must provide the cables from the Cisco NCS 6000 chassis to your facility interconnect. Because the type and number of components vary with each routing system site, plan these data cable runs in advance of the system installation. When planning the data cable runs, consider the following:

- Number and type of interface connections
- Vertical cable management
- Proper length and termination of cables
- Termination at the other end of the cables (patch panel, optical transport equipment, and so on)



Note For the LCC, contact your Cisco representative to obtain a Cisco short-reach, 100x10GE patch panel (PID NCS-PP-100X10-SR).



Note An optional but helpful insertion-extraction tool (IET) available from manufacturer Ripley Miller (part number 80860), can be used to expedite insertion and extraction of the fiber optic connectors in high-density patch panels.

Required Cables

See the *RP Card Cables for the LCC* table for the types of cables required to connect to the ports on the RP cards in the LCC. See the *SC and SC-SW Card Cables for the FCC* table for the types of cables required to connect to the ports on the SC and SC-SW cards in the FCC.

Table 12: RP Card Cables for the LCC

RP Card Port	Required Cable Type
Console port 0	RJ-45 port for straight-through EIA/TIA-232 cable.
Console port 1	RJ-45 port for straight-through EIA/TIA-232 cable.
Console port 2	RJ-45 port for straight-through EIA/TIA-232 cable.
Ethernet management port 0	RJ-45 port for shielded twisted-pair (STP) cable Cat5e or better.
Ethernet management port 1	Port for SFP+ optical module capable of up to 10-Gbps operation. For example: copper SFP-GE-T, 1GE SFP-GE-L, SFP-GE-S, 10G-SFP-SR and 10G-SFP-LR
Control plane expansion Ethernet port 0	Port for SFP+ optical module capable of up to 10-Gbps operation.
Control plane expansion Ethernet port 1	Port for SFP+ optical module capable of up to 10-Gbps operation.
Six interface shelf Ethernet ports	Port for SFP+ optical module capable of up to 10-Gbps operation.
Sync port for external BITS clock	Cat5 or better unshielded twisted-pair (UTP) cable.
Sync port 0 for BITS/J.211 time reference input	RJ-45 for STP cable Cat5 or better.
Sync port 1 for BITS/J.211 time reference input	RJ-45 for STP cable Cat5 or better.
GPS Time Transfer Interface (TTI) port	RJ-45 port for STP cable Cat5 or better, RF 1.0/2.3 coax connectors.
Cisco Time Expansion port	RJ-45 port for STP cable Cat5 or better.

RP Card Port	Required Cable Type
IEEE 1588 time synchronization port	RJ-45 port for STP cable Cat5 or better.
USB 2.0 port for external storage	—
Alarm port	Shielded 15-pin D-SUB cable with male connector.

Table 13: SC and SC-SW Card Cables for the FCC

SC and SC-SW Card Ports	Required Cable Type
Console port 0	RJ-45 port for straight-through EIA/TIA-232 cable.
Console port 1	RJ-45 port for straight-through EIA/TIA-232 cable.
RJ-45 Ethernet management port	RJ-45 port for shielded twisted-pair (STP) cable Cat5e or better.
Control plane expansion Ethernet port 0	Port for SFP+ optical module capable of up to 10-Gbps operation.
Control plane expansion Ethernet port 1	Port for SFP+ optical module capable of up to 10-Gbps operation.
Up to 56 SFP+ 10GE optical ports, depending on the multi-chassis configuration ³	Port for SFP+ optical module capable of up to 10-Gbps operation.
QSFP+ 40GE optical ports (two per SC-SW card) ¹	Port for QSFP+ 40GE optical module capable of up to 40-Gbps operation.
USB 2.0 port for external storage	—
Alarm port	Shielded 15-pin D-SUB cable with male connector.

³ Only applies to the SC-SW card.

Cisco Installation Services

Cisco or a Cisco partner can provide complete installation services, from planning to power up. For information about Cisco or Cisco partner installation services, see Cisco Services at: <http://www.cisco.com/web/services/index.html>

System Testing, Certification, and Warranties

After the routing system has been installed, it must be tested and certified.

- For information about testing and certification, refer to the product datasheets at: <http://www.cisco.com/c/en/us/products/routers/network-convergence-system-6000-series-routers/datasheet-listing.html>
- For product warranty information, see: <http://www.cisco.com/c/en/us/products/warranty-listing.html>



Preliminary Site Survey

This appendix contains a sample preliminary site survey that you should complete before planning a detailed site survey. This preliminary survey ensures that the basic system requirements have been completed or are underway before detailed site plans are completed.

- [Preliminary Site Survey, page 53](#)

Preliminary Site Survey

This table shows a sample preliminary site survey form.

Table 14: Sample Preliminary Site Survey

Preliminary Site Survey	
Order Information	
Sales order number	
Estimated shipping date	
Site ready date	
Installation date	
Site Location and Address	
Company name	
Site address	
Shipping address	
Building or computer room access	

Preliminary Site Survey	
Special instructions	
Hours and days of operation	
Primary Contact	
Name	
Title	
Phone number	
Mobile phone number	
Fax number	
Pager number	
Email address	
Secondary Contact	
Name	
Title	
Phone number	
Mobile phone number	
Fax number	
Pager number	
Email address	
Delivery and Installation Constraints	
Is there a loading dock available to unload the equipment at this site?	
Is the path to the installation area unobstructed? If not, can special arrangements be made to get the equipment to the installation area? Describe them.	

Preliminary Site Survey	
On what floor is the installation?	
If it is on a floor other than the ground floor, is there a freight elevator available? Note whether the equipment will have to be brought up a flight of stairs.	
Is there someone on site during working hours to accept delivery of the materials? If not, list the times this person would be available.	
Floor Mounting	
How many chassis will be installed? Is there floor space available for all of the chassis?	
Make a sketch of the area where the chassis is to be installed and note the chassis location.	
Power	
Is AC or DC power available for the chassis? How much power is required? Is there a connection point on the panel for the chassis?	
Is there a fuse access panel (FAP) available for the equipment? Provide a connection point on the FAP for each chassis.	
Will a fuse access panel be installed in time for the routing system installation? Provide a date when the FAP will be installed.	
Is the FAP in the same room as the chassis?	
Is there an AC power outlet (220 V or 110 V) located within 10 feet of each chassis for PCs and test equipment?	

Preliminary Site Survey	
Is there proper grounding for the equipment? If not, when will the grounding be available? Provide a connection point for the grounding.	
Are there any restrictions when the equipment can be powered on or when electrical work can be done? If so, describe them.	
Are there special requirements for power or power cables (for example, a different wire gauge)? If so, describe them.	
Air Conditioning	
Does the site have the air conditioning capacity to handle the routing system? If not, note what will be done to rectify the lack of adequate cooling.	
Describe the air conditioning at the site.	
Cable Plant	
Have the cables been pulled for all data interfaces? If not, list the outstanding cabling that needs to be installed and the scheduled completion dates.	
Are there connection points on the fiber distribution panel for all optical cables connecting to the routing system?	
Will fiber jumpers be provided? What length of fiber jumper is required to complete the installation?	
What type of fiber connector is used at the site?	
If attenuation is required, will attenuators be provided?	



System Product IDs

This appendix provides the product ID information for the Cisco NCS 6000 Series Routers. The following sections list the components that make up each chassis, the PIDs (part numbers used to order the components), and product ID descriptions.

- [System Product IDs, page 57](#)

System Product IDs



Note In the following tables, an equals sign (=) at the end of the PID indicates that the component can be ordered as a spare. For those components, be sure to include the equals sign as part of the PID.



Note Although this appendix provides PIDs for routing system components, the Cisco online ordering and pricing tool has the most up-to-date information on the routing system and PIDs. You can access the ordering tool at the following URL (Cisco login required), and enter a search term such as “NCS” to view a list of components: <https://cisco-apps.cisco.com/cisco/psn/commerce>.

Cisco NCS 6008 Line Card Chassis Product IDs

LCC Component Product IDs

Table 15: Cisco NCS 6008 LCC Component Product IDs

Component	Product ID	Description
8-slot line card chassis	NCS-6008 NCS-6008= (spare)	Cisco NCS 6008 chassis

Component	Product ID	Description
8-slot routing system	NCS-6008-SYS-S	Cisco NCS 6008 chassis system (includes two RPs, six FCs, two FTs, and six PTs)
Fabric card	NC6-FC NC6-FC= (spare)	Cisco NCS 6008 FC
Route processor card	NC6-RP NC6-RP= (spare)	Cisco NCS 6008 RP card
Fan tray	NC6-FANTRAY NC6-FANTRAY= (spare)	Cisco NCS 6008 FT
Power bus control module ⁴	NC6-PCM NC6-PCM= (spare)	Cisco NCS 6008 PCM
AC power tray	NCS-AC-PWRTRAY NCS-AC-PWRTRAY= (spare)	Cisco NCS AC PT
AC power module	PWR-3KW-AC-V2 PWR-3KW-AC-V2= (spare)	Cisco NCS AC PM
Power distribution unit bracket	NCS-PDU-BRKT NCS-PDU-BRKT= (spare)	Cisco NCS PDU bracket
Delta power distribution unit	NCS-PDU-DELTA NCS-PDU-DELTA= (spare)	Cisco NCS redundant 3-to-1 Phase Delta PDU
Wye power distribution unit	NCS-PDU-WYE NCS-PDU-WYE= (spare)	Cisco NCS redundant 3-to-1 Phase Wye PDU
AC power cord	NC6-AC-CAB-NA NC6-AC-CAB-AU NC6-AC-CAB-UK NC6-AC-CAB-EU NC6-AC-CAB-IT	AC power cord—North America AC power cord—Australia AC power cord—United Kingdom AC power cord—Europe AC power cord—Italy Note Length of each power cord is 4.25 m.
DC power tray	NCS-DC-PWRTRAY NCS-DC-PWRTRAY= (spare)	Cisco NCS DC PT
DC power module	PWR-2KW-DC-V2 PWR-2KW-DC-V2= (spare)	Cisco NCS DC PM

Component	Product ID	Description
100x10GE patch panel SR	NCS-PP-100X10-S NCS-PP-100X10-SR= (spare)	Cisco NCS 100x10GE patch panel short reach

⁴ The PCM can be serviced in the field by Cisco personnel or with proper guidance from Cisco technical support.

LCC Line Card Product IDs

Table 16: Cisco NCS 6008 LCC Product IDs

Component	Product ID	Description
10x100GE MS CPAK	NC6-10X100G-M-K NC6-10X100G-M-K= (spare) Transceiver Models: <ul style="list-style-type: none"> • CPAK-100G-LR4 • CPAK-100G-SR10 	Cisco NCS 6000 Series 10x100GE multi-service CPAK
10x100GE LSR CPAK	NC6-10X100G-L-K NC6-10X100G-L-K= (spare) Transceiver Models: <ul style="list-style-type: none"> • CPAK-100G-LR4 • CPAK-100G-SR10 	Cisco NCS 6000 Series 10x100GE LSR CPAK
10x100GE MS CXP	NC6-10X100G-M-P NC6-10X100G-M-P= (spare) Transceiver Model <ul style="list-style-type: none"> • CXP-100G-SR10 	Cisco NCS 6000 Series 10x100GE multi-service CXP
10x100GE LSR CXP	NC6-10X100G-L-P NC6-10X100G-L-P= (spare) Transceiver Model: <ul style="list-style-type: none"> • CXP-100G-SR10 	Cisco NCS 6000 Series 10x100GE LSR CXP
60x10GE LC SFP+	NC6-60X10GE-L-S NC6-60X10GE-L-S= (spare)	Cisco NCS 6000 Series 60x10GE lean-core SFP+

Component	Product ID	Description
60x10GE MS SFP+	NC6-60X10GE-M-S NC6-60X10GE-M-S= (spare)	Cisco NCS 6000 Series 60x10GE multi-service SFP+

LCC Cosmetic Product IDs

Table 17: Cisco NCS 6008 LCC Cosmetic Product IDs

Component	Product ID	Description
Craft panel display	NCS-CRFT=	Cisco NCS craft panel display kit
Front left and right doors	NC6-DOOR-F=	Front left and right doors
Front top grille	NC6-GRILLE-FT=	Front top grille
Front bottom grille	NC6-GRILLE-FB=	Front bottom grille
Rear left and right doors	NC6-DOOR-R=	Rear left and right doors
Exhaust air deflector	NC6-GRILLE-R=	Exhaust air deflector, rear of the chassis

LCC Accessory Product IDs

Table 18: Cisco NCS 6008 LCC Accessory Product IDs

Component	Product ID	Description
Drill hole template	NC6-DRILLTEMP=	Cisco NCS 6008 chassis drill hole template (spare)
Chassis filter	NC6-5XFILTER=	Cisco NCS 6008 chassis air filter, 5-pack (spare)
Vertical cable trough	NC6-TROUGH=	Cisco NCS 6008 vertical cable trough (spare)
Chassis lift dolly	NCS-LIFT NCS-LIFT= (spare)	Cisco NCS chassis lift dolly
Lift upgrade	NCS-LIFT-BRKT=	Cisco CRS lift upgrade to Cisco NCS chassis (spare)
AC/DC PM slot cover	A9K-PEM-V2-FILR	AC/DC PM slot cover
Line card slot cover	NC6-LC-BLANK	Cover for empty line card slot

Cisco NCS 6000 Fabric Card Chassis Product IDs

FCC Component Product IDs

Table 19: Cisco NCS 6000 FCC Component Product IDs

Component	Product ID	Description
Fabric card chassis	NCS-F-CHASS NCS-F-CHASS= (spare)	Cisco NCS 6000 Fabric Card Chassis (chassis only)
Fabric routing system	NCS-F-SYS-S	Cisco NCS 6000 Fabric System(Includes two SC or two SC-SW cards, 12 FCs, two fan trays, power enclosure, four power trays (AC or DC), power modules (AC or DC), and power cords for AC option)
Craft panel display	NCS-CRFT=	NCS craft panel display kit
Fan tray	NCS-F-FANTRAY NCS-F-FANTRAY= (spare)	NCS Fabric Card Chassis fan tray
Power enclosure	NCS-F-PWR-SHELF NCS-F-PWR-SHELF= (spare)	NCS Fabric Card Chassis power shelf
AC power tray	NCS-AC-PWRTRAY NCS-AC-PWRTRAY= (spare)	Cisco NCS AC power tray
DC power tray	NCS-DC-PWRTRAY NCS-DC-PWRTRAY= (spare)	Cisco NCS DC power tray
AC power module	PWR-3KW-AC-V2 PWR-3KW-AC-V2= (spare)	Cisco NCS AC PM
DC power module	PWR-2KW-DC-V2 PWR-2KW-DC-V2= (spare)	Cisco NCS DC PM
Power control module (PCM) ⁵	NCS-F-PCM NCS-F-PCM=	PMbus module
Power distribution unit bracket (chassis mount)	NCS-PDU-BRKT NCS-PDU-BRKT= (spare)	Cisco NCS PDU bracket
Power distribution unit bracket (19-inch rack mount)	NCS-PDU-BRK-MNT NCS-PDU-BRK-MNT=	Cisco NCS PDU bracket

Component	Product ID	Description
Delta power distribution unit	NCS-PDU-DELTA NCS-PDU-DELTA= (spare)	Cisco NCS redundant 3-to-1 Phase Delta PDU
Wye power distribution unit	NCS-PDU-WYE NCS-PDU-WYE= (spare)	Cisco NCS redundant 3-to-1 Phase Wye PDU
AC power cord	NC6-AC-CAB-NA NC6-AC-CAB-AU NC6-AC-CAB-UK NC6-AC-CAB-EU NC6-AC-CAB-IT	AC power cord—North America AC power cord—Australia AC power cord—United Kingdom AC power cord—Europe AC power cord—Italy Note Length of each power cord is 167 in (4.25m)

⁵ The PCM can be serviced in the field by Cisco personnel or with proper guidance from Cisco technical support.

FCC Fabric Card Product IDs

Table 20: Cisco NCS FCC Fabric Card Product IDs

Component	Product ID	Description
MC S13 FC (six cards per LCC)	NC6-FC-MC NC6-FC-MC= (spare)	NCS 6008 S13 Multi-Chassis Fabric Card (installed in the LCC)
FCC SC card (up to two cards per chassis)	NCS-F-SC NCS-F-SC= (spare)	NCS Fabric Card Chassis shelf controller
FCC SC-SW card (up to two cards per chassis)	NCS-F-SCSW NCS-F-SCSW= (spare)	NCS Fabric Card Chassis shelf controller and switch card
FCC S2 FC (up to 12 cards per chassis: SC=0, SC-SW=2 for N+1 configurations)	NCS-F-FC NCS-F-FC= (spare)	NCS Fabric Card Chassis S2 Fabric Card
FCC blank	NCS-F-FC-BLANK NCS-F-FC-BLANK= (spare)	NCS Fabric Card blank

FCC Cosmetic Product IDs

Table 21: Cisco NCS 6000 Cosmetic Product IDs

Component	Product ID	Description
Front door	NC6-DOOR-F NC6-DOOR-F= (spare)	NCS Fabric Card Chassis door front
Rear door	NCS-F-DOOR-R NCS-F-DOOR-R= (spare)	NCS Fabric Card Chassis door rear
Upper grille	NCS-F-GRILLE-UF= (spare)	NCS Fabric Card Chassis grille upper front
Lower grille	NCS-F-GRILLE-UR= (spare)	NCS Fabric Card Chassis grille upper rear
Vertical cable trough	NCS-F-V-TROUGH= (spare)	NCS Fabric Card Chassis front and rear vertical cable trough
Horizontal cable trough	NCS-F-H-TROUGH= (spare)	NCS Fabric Card Chassis front and rear horizontal cable trough

FCC Accessory Product IDs

Table 22: Cisco NCS 6000 FCC Accessory Product IDs

Component	Product ID	Description
Drill hole template	NC6-DRILLTEMP= (spare)	Cisco NCS 6000 Fabric Card Chassis drill hole template
Chassis filter	NC6-5XFILTER= (spare)	Cisco NCS 6000 Fabric Card Chassis air filter, 5-pack
Chassis lift dolly	NCS-LIFT NCS-LIFT= (spare)	Cisco NCS chassis lift dolly
Lift upgrade	NCS-LIFT-BRKT=	Cisco CRS lift upgrade to Cisco NCS chassis (spare)
AC/DC PM slot cover	A9K-PEM-V2-FILR	AC/DC PM slot cover

FCC Optical Module IDs

Table 23: Cisco NCS 6000 FCC Optical Module IDs

Component	Product ID	Description
SFP modules	SFP-10G-SR	Short reach SFP 10GE transceiver module
	SFP-10G-LR	Long reach SFP 10GE transceiver module
QSFP modules	QSFP-40G-SR4	Short reach QSFP 40GE optical module (SC-SW card only)
	QSFP-40G-LR4	Long reach 40GE QSFP optical module (SC-SW card only)
Optical module set	NCS-FAB-OPT	<p>Optical module set that includes 96 CXP-100G-SR12 modules for multi-chassis configurations.</p> <p>Two optical modules sets are required for each LCC, one set plugs into the S13 FCs on the LCC, one set plugs into the S2 FC cards in the FCC, and one set plugs into the MC S13 FC cards in the LCC.</p>