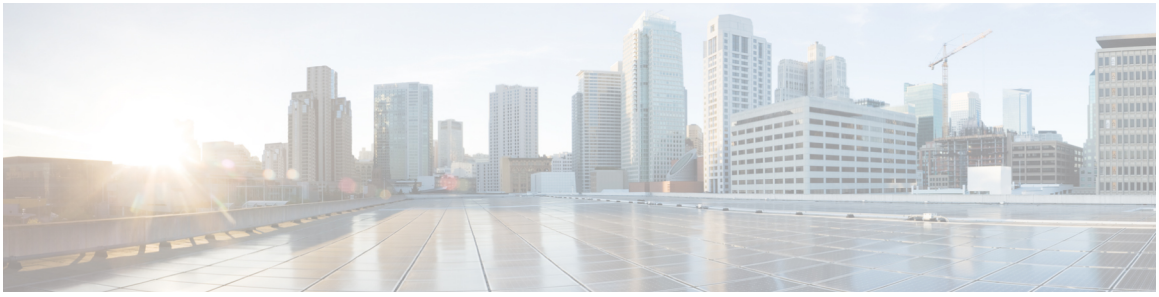


Hardware Installation Guide for Cisco NCS 1020

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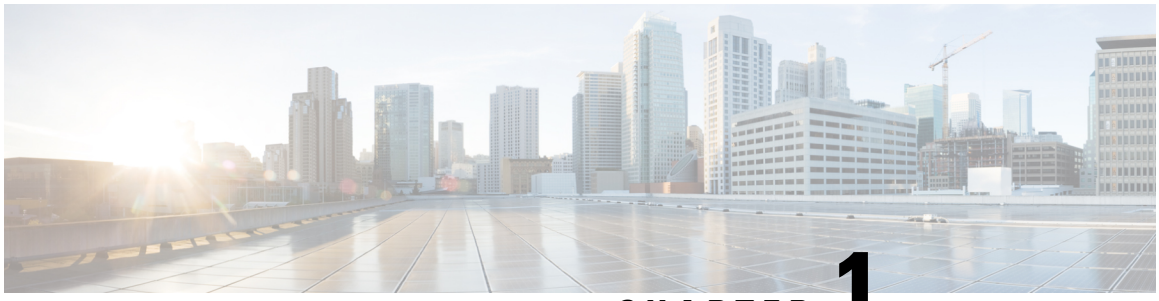
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CHAPTER 1

Cisco NCS 1020 Overview

This chapter provides an overview for the Cisco NCS 1020 chassis, its modules, and line cards.

- Cisco NCS 1020 Chassis Overview, on page 1
- PIDs, on page 7
- Safety Precaution for Laser Radiation, on page 9
- Line Cards, on page 9
- L-Band Cover, on page 15
- Cisco NCS 1020 Modules, on page 16
- Cisco NCS 1020 Filler Modules, on page 21
- Cisco NCS 1020 Front Door Kit (NCS1020-DR=), on page 26

Cisco NCS 1020 Chassis Overview

The Cisco NCS 1020 is a new Wavelength Division Multiplexing (WDM) System that is optimized for ZR/ZR+ WDM router interfaces. Its salient features are:

- Operates as an integrated optical layer Reconfigurable Optical Add-Drop Multiplexer (ROADM) and Amplifier system to support Point-to-Point (P2P), Ring, and Mesh network architectures, complete with add/drop capabilities.
- Offers transmission versatility by supporting multiple coherent sources such as:
  - 400G digital coherent ZR/ZR+ optics (-10dBm output power)
  - High-performance DCO transponders such as 1.2T and 2-QDD-C cards that use high GBaud rates.
- Supports C-band only and C+L-band WDM transmission to maximize capacity.

Note In R24.2.11, the Cisco NCS 1020 supports only C-band networks.

Cisco NCS 1020 is a 10RU chassis that has an in-built External Interface Timing Unit (EITU) and the following field-replaceable modules.

- One Solid State Drive (SSD)
- Two controllers (active and backup)

- Two power supply units (PSUs)
- Eight fan trays (four NCS1010-FAN trays and four NCS1020-FAN trays)

Note In this chapter, "front fan tray" refers to the NCS1010-FAN tray, "rear fan tray" refers to the NCS1020-FAN tray, and "filler fan tray" refers to the NCS1020-FAN-BLANK tray. Front fan trays and rear fan trays contain a different set of fan units. Slots for the front fan trays and rear fan trays aren't interchangeable.

- Ten line cards (two NCS 1010 line cards and eight NCS 1014 line cards).

Note NCS 1010 line card slots and NCS 1014 line card slots aren't interchangeable. In this chapter, Type 1 line card refers to "NCS 1010 line card" and Type 2 line card refers to "NCS 1014 line card".

The NCS 1020 chassis supports the following line cards:

Table 1: Supported Line Cards

Line Card	Description	Release
Type 1 Line Cards		
NCS1K-OLT-C	C-band Optical Line Terminal without Raman	Cisco IOS XR Release 24.2.11
NCS1K-E-OLT-C	C-band Optical Line Terminal without Raman, Enhanced	Cisco IOS XR Release 24.2.11
Type 2 Line Card		
NCS1K14-CCMD-16-C	NCS 1000 16-port Colorless Direct attach LC with EDFA, C-band	Cisco IOS XR Release 24.2.11

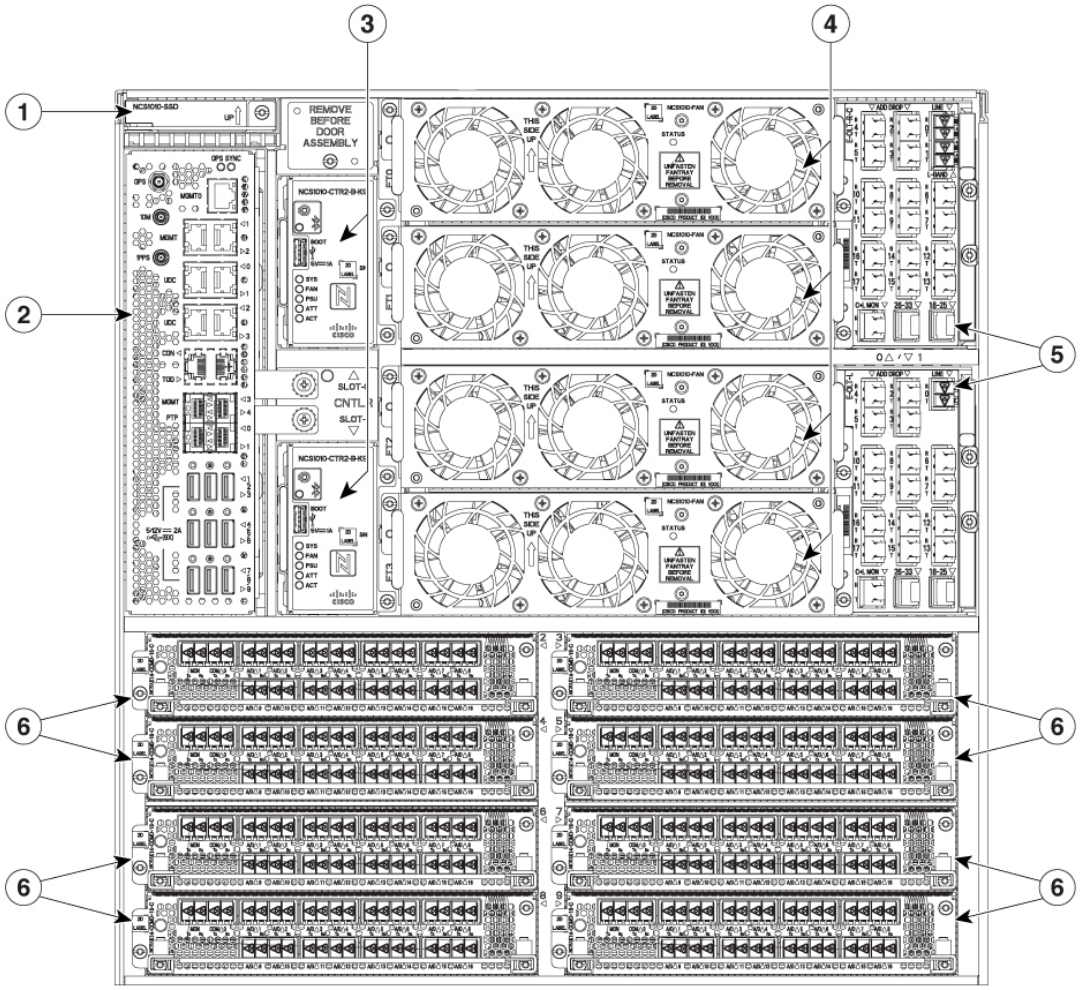
In this chapter, the following table lists the references that are used for each line card.

Line Card	Referred As
NCS1K-OLT-C=	OLT-C
NCS1K-E-OLT-C=	E-OLT-C
NCS1K14-CCMD-16-C=	CCMD-16-C

The chassis has the EITU, controller, SSD, front fan trays, and line card slots on the front side.

The following image shows a fully loaded Cisco NCS 1020 chassis. The chassis supports the Type 1 line cards in slots 0 and 1 and the Type 2 line cards in slots 2 to 9. The controllers occupy CNTLR slots 0 and 1.

Figure 1: Fully Loaded Cisco NCS 1020 Front View



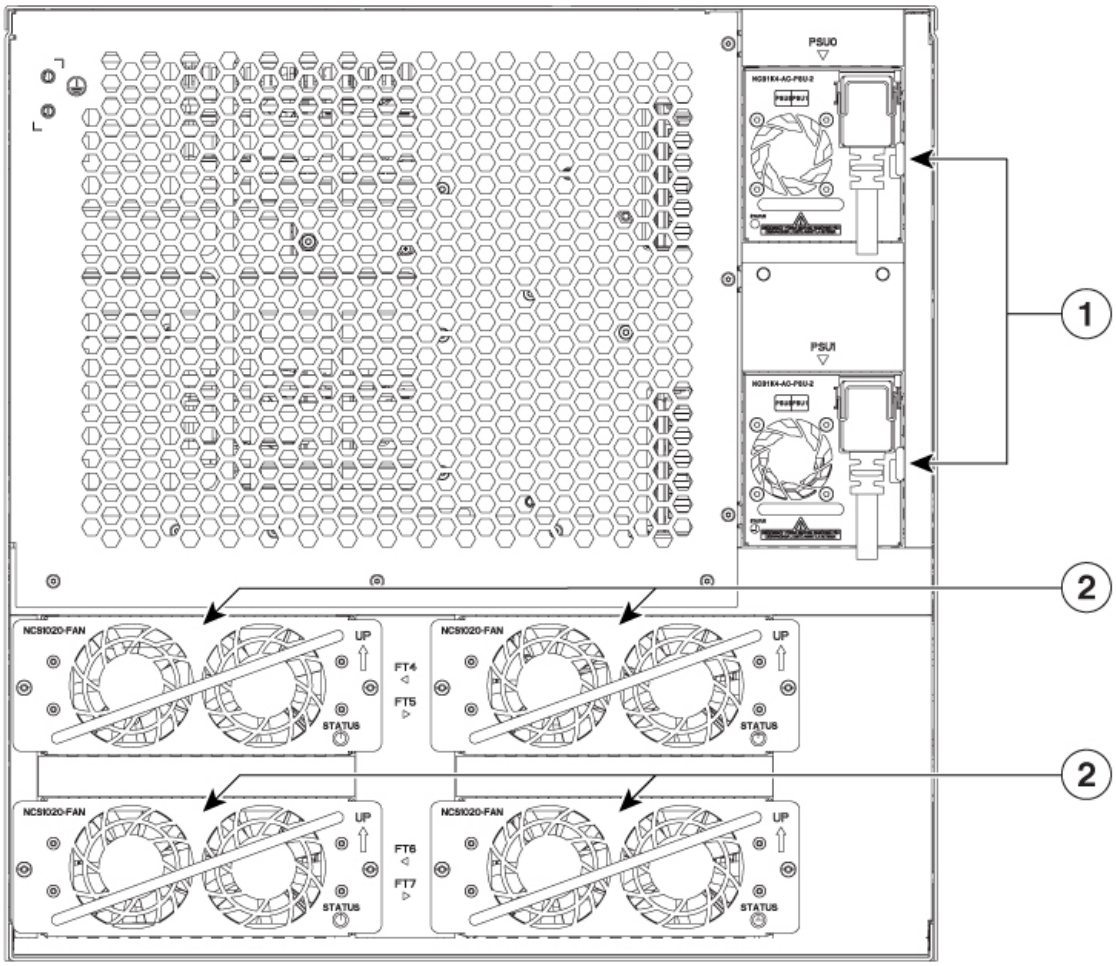
1	SSD	4	Front fan trays
2	EITU	5	Type 1 line cards
3	Controllers	6	Type 2 line cards

The chassis has the PSUs and rear fan trays on the rear side.

The following image is the rear view of the Cisco NCS 1020. In the chassis, the rear fan trays in the slots FT4 and FT5 cool the Type 2 line cards in slots from 2 to 5 at the front. Fan trays in slots FT6 and FT7 cool the Type 2 line cards in slots from 6 to 9 at the front.

Note Filler fan trays can only be used when all the Type 2 card slots at the front are populated with Type 2 filler cards. Even if there's only one Type 2 line card in the Type 2 card slots, you must install rear fan trays in both the rear slots. For more information, see Install the Rear Fan/Filler Fan Trays, on page 80.

Figure 2: Cisco NCS 1020 Chassis Rear View



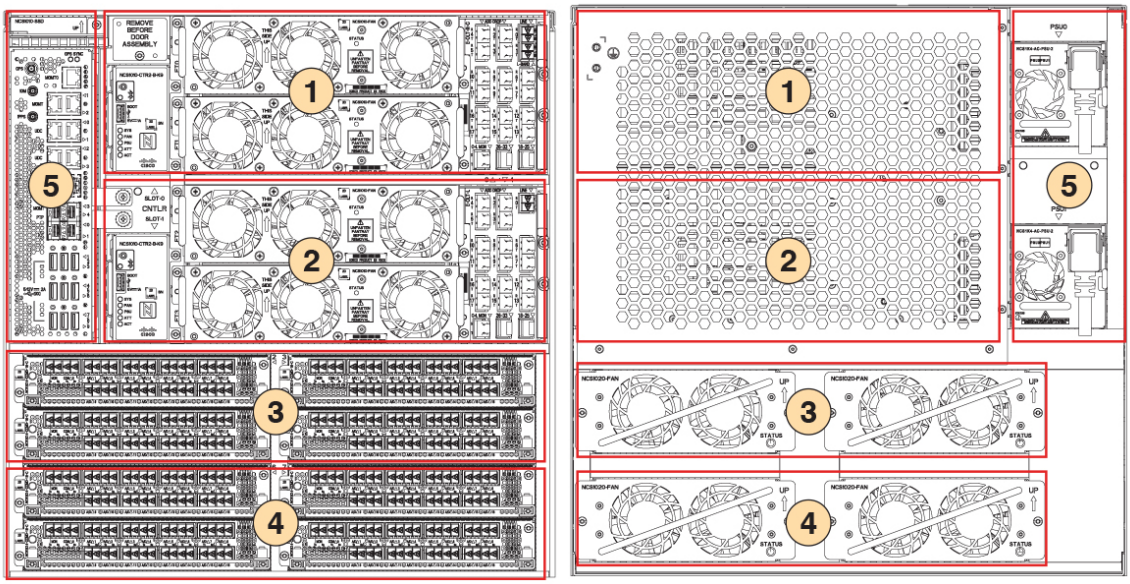
1	PSUs	2	Rear fan trays

Airflow in the Cisco NCS 1020 Chassis

The Cisco NCS 1020 chassis has a front-to-rear airflow mechanism to ventilate the modules. It delivers cooling through five different channels.

The following image shows the airflow channels in a fully loaded NCS 1020 chassis.

Figure 3: Cisco NCS 1020 Chassis Airflow



The following table describes the airflow in a fully loaded NCS 1020 chassis.

Table 2: Airflow in a Fully Loaded NCS 1020 Chassis

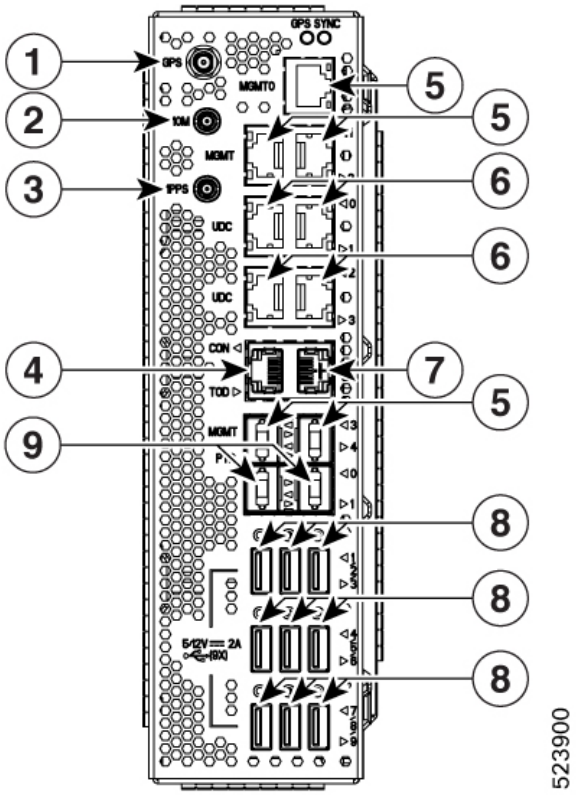
Callout	Airflow Channel	Airflow Process
1	Channel 1	Pair of front fan trays at top cool the Type 1 line card and controller in slot 0.
2	Channel 2	Pair of front fan trays at bottom cool the Type 1 line card and controller in slot 1.
3	Channel 3	Rear fan trays in slots FT4 and FT5 cool the Type 2 line cards in slots 2, 3, 4, and 5.
4	Channel 4	Rear fan trays in slots FT6 and FT7 cool the Type 2 line cards in slots 6, 7, 8, and 9.
5	Channel 5	Built-in fans in the PSUs cool the EITU and SSD on the front.

External Interface Timing Unit

The External Interface Timing Unit (EITU) manages the control plane interfaces and includes all user external interfaces (timing and management). It is connected to the controller with a redundant 10 G Ethernet bus.

EITU is a fixed part of the chassis and it is not removable or replaceable in the field.

Figure 4: Front View of EITU



The following is the list of the available interfaces:

1	Coaxial connector for GPS antenna RF input (with 5 V antenna power, if necessary) (1x)
2	Coaxial connector for 10 MHz sync signal (bidirectional) (1x)
3	Coaxial connector for 1PPS sync signal (bidirectional) (1x)
4	Console/Universal Asynchronous Receiver/Transmitter (UART) Interface (1x)
5	10/100/1000 RJ-45 Ethernet management ports and Interconnection Link (ILINK) (5x) **Note** In R24.2.11, the MGMT 3 and 4 ports are SFP that support 1 GE optical PTP (1588 and SyncE) (2x)
6	SFP for 1 GE optical User Data Channels (UDC) (4x)
7	RJ-45 for 1588 TOD (1x)

8	USB 2.0 type A, 1.8 A max at 5 V / 12 V (9x) **Note** The USB ports in the EITU do not support USB drives; they only support passive optical devices from Cisco, such as breakout modules and mux/demux patch panels. If you want to install the operating system or copy files to and from the system, use the USB 3.0 ports labeled "Boot" on the controller cards.
9	SFP for 1 GE optical PTP port (1588 and SyncE) (2x)

PIDs

The following tables list the PIDs of the Cisco NCS 1020 and its modules:

Table 3: Shelf and Accessory Option

Product ID	Product Description
NCS1020-SA=	NCS 1020 Shelf Assembly
NCS1020-SYS=	NCS 1020 Assemble to Order
NCS1020-SYS-FULL=	NCS 1020 Assemble to Order, Full
NCS1020-19-KIT=	NCS 1020 Accessory Kit for 19-inch racks
NCS1020-23-KIT=	NCS 1020 Accessory Kit add-on for 23inch racks
NCS1020-ETSI-KIT=	NCS 1020 Accessory Kit add-on for ETSI racks

Table 4: SSD Option

Product ID	Product Description
NCS1010-SSD=	NCS 1010 SSD for NCS 1012,1020 with a capacity of 480 GB

Table 5: Controller Option

Product ID	Product Description
NCS1010-CTR2-K9=	NCS 1010, 1012, 1020 Controller, 112500 bps Default Console Baud Rate
NCS1010-CTR2-B-K9=	NCS 1010, 1012, 1020 Controller, 9600 bps Console Baud Rate

Table 6: Fan Option

Product ID	Product Description
NCS1010-FAN=	NCS 1010 Shelf Fan Assembly

Product ID	Product Description
NCS1020-FAN=	NCS 1020 Fan for NCS 1014 Slots
NCS1020-FAN-BLANK=	NCS 1020 Fan Blank

Table 7: Power Supply Option

Product ID	Product Description
NCS1K4-DC-PSU-2=	NCS 1004 DC Power Supply Unit, 2.5 kW
NCS1K4-AC-PSU-2=	NCS 1004 AC Power Supply Unit, 2.5 kW

Table 8: Line Card Option–Type 1 Cards

Product ID	Product Description
NCS1K-OLT-C=	C-band Optical Line Terminal without Raman
NCS1K-E-OLT-C=	C-band Optical Line Terminal without Raman, enhanced

Table 9: Line Card Option–Type 2 Cards

Product ID	Product Description
NCS1K14-CCMD-16-C=	NCS 1000 16 port Colorless Direct attach LC with EDFA, C-band

Table 10: Line Card Filler/Blank Option

Product ID	Product Description
NCS1010-FLR-P=	Filler / Blank for NCS 1010 Slot on NCS 1012, 1020, Passive
NCS1010-FLR-A=	Filler / Blank for NCS 1010 Slot on NCS 1012, 1020, Active, with Fan slots
NCS1010-CTR2-FLR=	Filler / Blank for Controller Slot on NCS 1012, 1020
NCS1K14-BLANK=	Network Convergence System 1014 Blank card

Table 11: Door Option

Product ID	Product Description
NCS1020-DR=	NCS 1020 Door with Filters
NCS1020-DR-FTF=	Replaceable Air Filter

Safety Precaution for Laser Radiation

Cisco NCS 1020 is classified as Hazard Level 1M as per IEC 60825-2 and Laser Class 1/1M as per IEC 60825-1, since it may include Class 1 or Class 1M Laser sources.

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

Figure 5: Class 1M Laser Product Label



Figure 6: Class 1M Laser Product Label



Statement 1055

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

Line Cards

The Cisco NCS 1020 chassis supports the following line cards:

Note The NCS 1020 chassis supports the Type 1 (NCS 1010) line cards in card slots 0 and 1. It supports the Type 2 (NCS 1014) line cards in card slots 2–9.

Note When not used, fill the empty Type 1 line card slots with either Active Filler (NCS1010-FLR-A) or Passive Filler (NCS1010-FLR-P). Similarly, fill the empty Type 2 line card slots with NCS 1014 filler cards (NCS1K14-BLANK). For more information on the filler modules, see Cisco NCS 1020 Filler Modules, on page 21.

Note In the following sections, the OLT line cards are Type 1 line cards and CCMD-16-C line card is Type 2 line card.

NCS1K-OLT-C Line Card

The C-band Optical Line Terminal without Raman (OLT-C) line card includes the following features:

Note The **NCS1K-OLT-C** line card refers to **OLT-C** line card in this section.

- 25-dBm line preamplifier True Variable Gain (TVG) Erbium-Doped Fiber Amplifier (EDFA) with two switchable gain ranges
- Dedicated amplification of the odd and even add channels through an embedded Fixed Gain (FG) EDFA
- 23-dBm line boost-amplifier TVG EDFA single gain range
- Dedicated EDFA for noise loading
- Embedded Optical Time Domain Reflectometer (OTDR) for line RX and TX monitoring
- 37 ports Optical Channel Monitoring (OCM)
- Dedicated Tunable Laser (TL) enabling Connection Verification (CV) and patch cord discovery features
- Up to 30 EXP ports
- Embedded Optical Service Channel at Fast Ethernet (FE)
- Multiplexing and demultiplexing of odd and even channels
- C+L combiner for multiplexing and demultiplexing L-band channels
- 2x2 switch to reverse transmit direction of Optical Service Channel (OSC)-C
- Fiber reflectors to support fiber end detection by OTDR

Figure 7: Front View of OLT-C Line Card

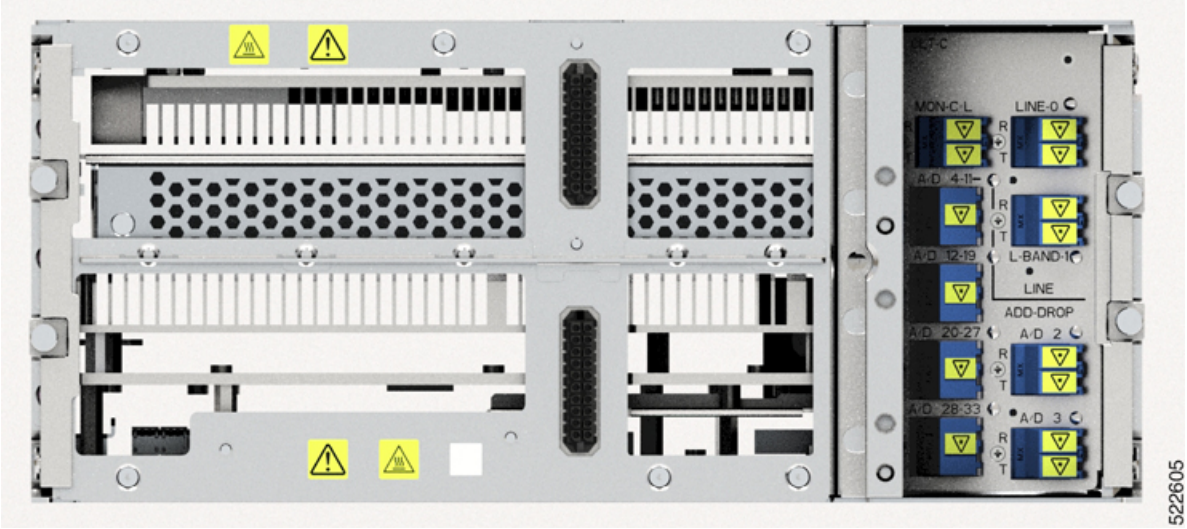


Figure 8: Perspective View of OLT-C Line Card



E-OLT-C Line Card

The C-band Optical Line Terminal without Raman, Enhanced (E-OLT-C) line card includes the following features:

- 25-dBm line preamplifier True Variable Gain (TVG) Erbium-Doped Fiber Amplifier (EDFA) with two switchable gain ranges
- Dedicated amplification of the odd and even add channels through an embedded Fixed Gain (FG) EDFA

- 23-dBm line boost-amplifier TVG EDFA single gain range
- Dedicated EDFA for noise loading
- Embedded Optical Time Domain Reflectometer (OTDR) for line RX and TX monitoring
- 37 ports Optical Channel Monitoring (OCM)
- Dedicated Tunable Laser (TL) enabling Connection Verification (CV) and patch cord discovery features
- Up to 30 EXP ports
- Embedded Optical Service Channel at Fast Ethernet (FE)
- Multiplexing and demultiplexing of odd and even channels
- C+L combiner for multiplexing and demultiplexing L-band channels
- 2x2 switch to reverse transmit direction of Optical Service Channel (OSC)-C
- Fiber reflectors to support fiber end detection by OTDR

Figure 9: Front View of E-OLT-C Line Card

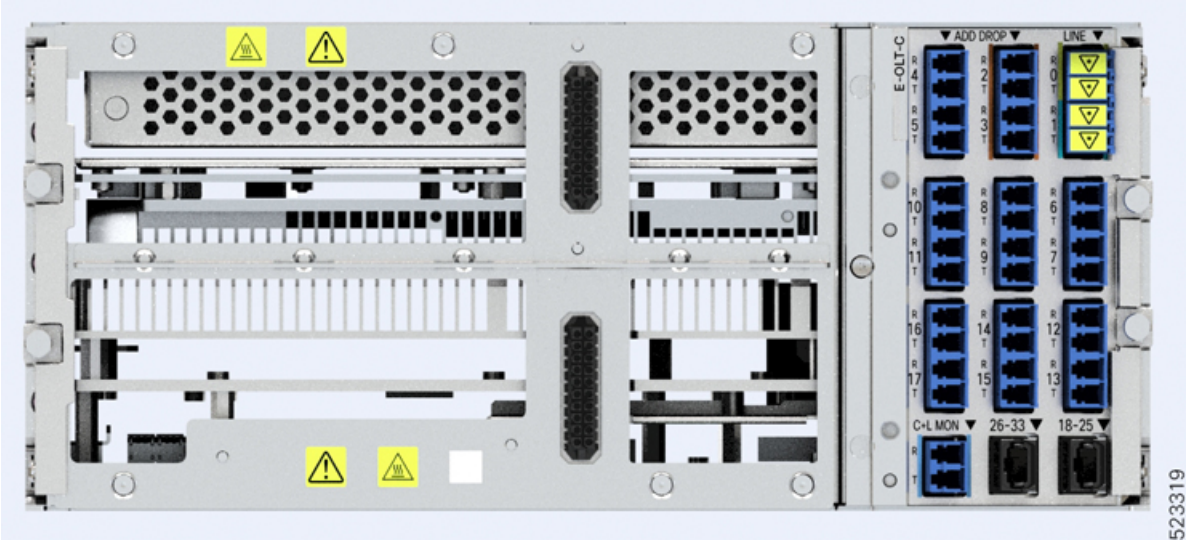
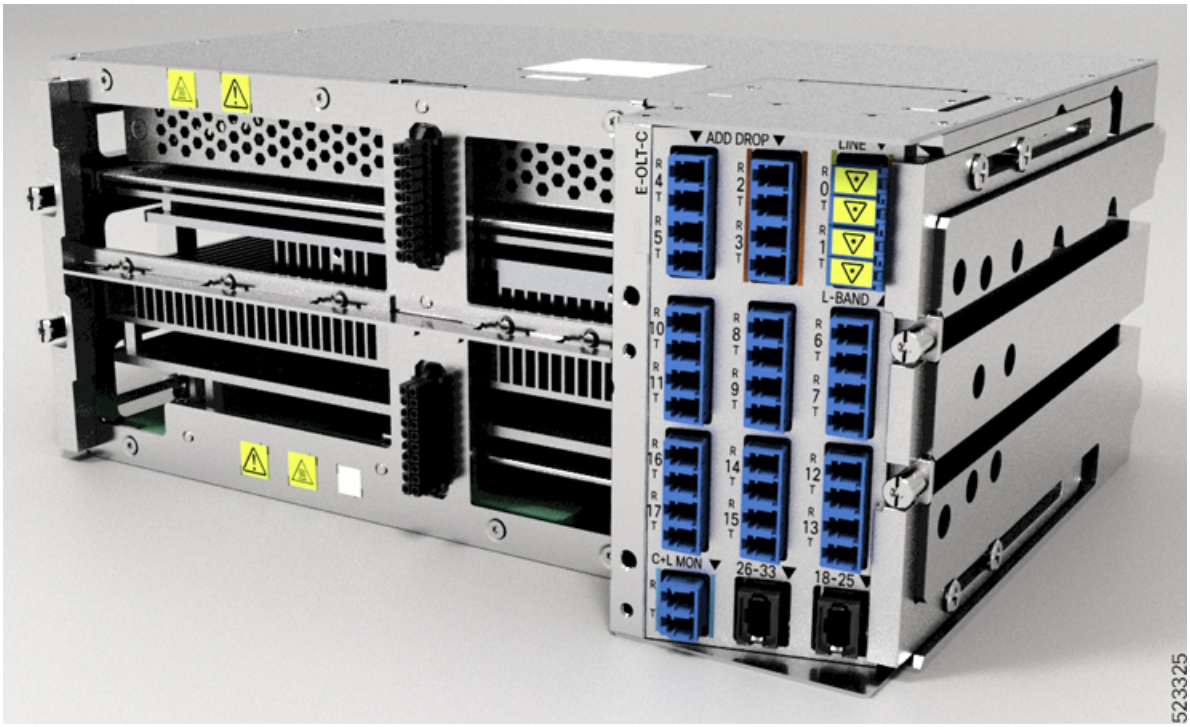


Figure 10: Perspective View of E-OLT-C Line Card



CCMD-16-C Line Card

The NCS 1000 16-port Colorless Mux/Demux Optical (CCMD-16-C) Line Card is a multiplexing and demultiplexing unit with fixed gain EDFAs on both Add and Drop sections. The optical line card provides colorless functionality on the add/drop ports. It multiplexes any wavelength with the flexible options of baud rate and modulation format to the line side ROADM or amplifier units for transmission. It transmits and receives signals from optical line terminal (OLT) units.

In the Cisco NCS 1020 chassis, you can install the optical line card in one or more card slots.

Note The chassis supports the NCS 1014 CCMD-16 line cards in card slots 2–9.

The optical line card has:

- Two line ports to transmit and receive using the same LC connectors.
- 16 ports for add/drop with LC connector-based interfaces

There are two variants of the optical line card:

- **NCS1K14-CCMD-16-C**

  The NCS1K14-CCMD-16-C line card is a C-band, 16-port Colorless Direct attach optical line card with EDFA. It can host up to 16 channels. It supports any signal distribution between 191250 and 196200 GHz, for example, the 64 channels grid with 75-GHz spacing.

The following table summarizes the central frequency of the first and the last channel of this specific grid.

Table 12: C-Band Channel Wavelength Plan

Channel	Central Frequency (THz)	Wavelength (nm)
1	196.100	1528.77
64	191.375	1566.52

- **NCS1K14-CCMD-16-L**

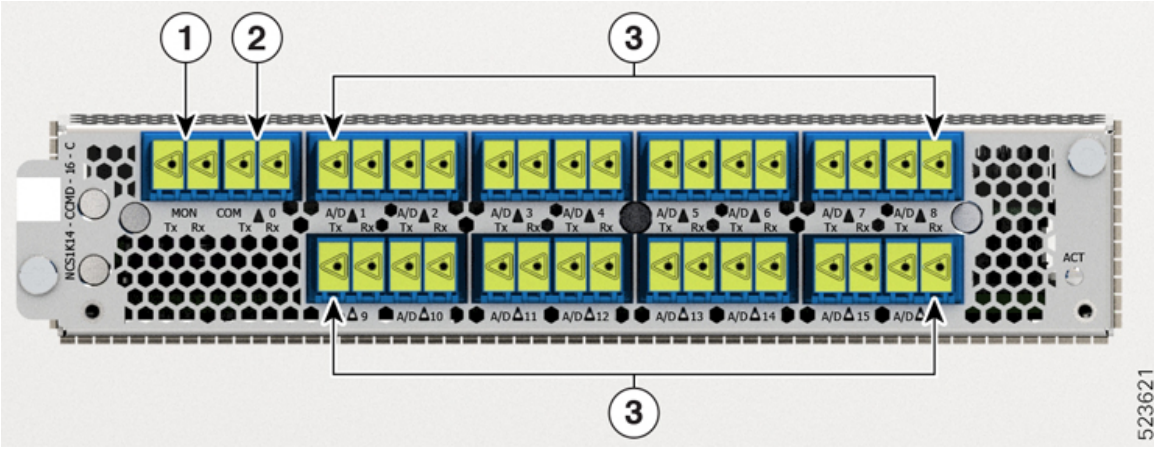
The NCS1K14-CCMD-16-L line card is an L-band, 16-port Colorless Direct attach optical line card with EDFA. It can host up to 16 channels. It supports any signal distribution between 186025 and 191000 GHz, for example, the 64 channels grid with 75-GHz spacing.

The following table summarizes the central frequency of the first and the last channel of this specific grid.

Table 13: L-Band Channel Wavelength Plan

Channel	Central Frequency (THz)	Wavelength (nm)
1	190.850	1570.83
64	186.125	1610.7

Figure 11: NCS1K14-CCMD-16 Line Card Front View



The following table shows the port names and their connector types for both CCDM-16-C and CCMD-16-L cards.

Table 14: Line Card Interface and Connector Assignment

Callout	Connector Label	Connector Type	Port Name
1	MON	LC	MON TX
			MON RX
2	COM	LC	COM TX
			COM RX
3	A/D 1…16	LC	A/D TX [1…16]
			A/D RX [1…16]

L-Band Cover

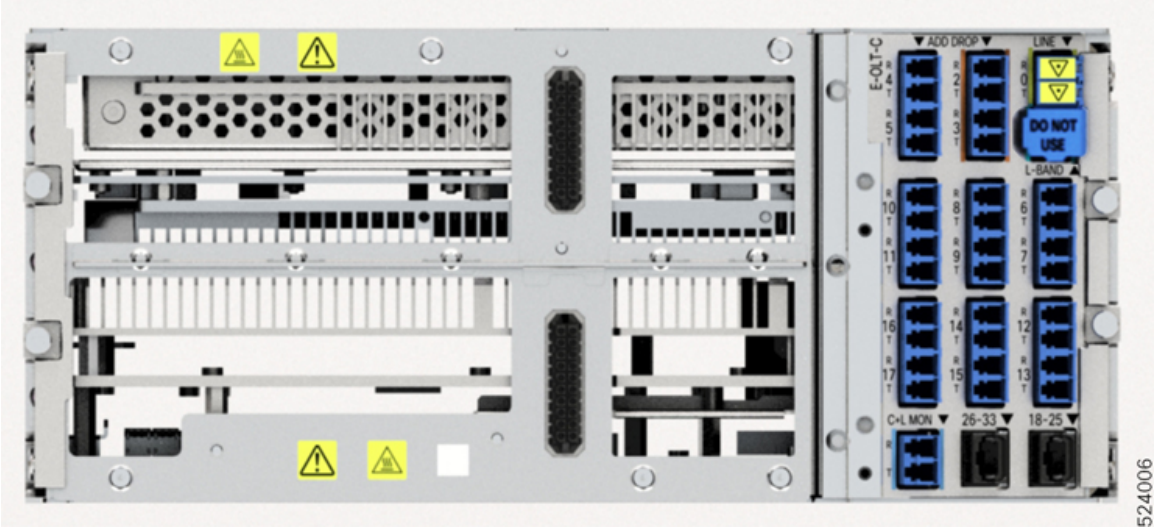
The Type 1 line card comes preinstalled with an L-band cover for safety. The L-band cover has the *DO NOT USE* label on its face and covers the L-band port.

Figure 12: L-Band Cover



Caution Remove the cover without disturbing the fiber optic cables in the adjacent ports.

Figure 13: Type 1 Line Card with L-Band Cover



The following table provides the details on when to remove the L-band cover in the field based on your network configuration.

Configuration	Action
C-Band Only	Need not remove the covers in the field.
C+L Band	Remove the covers before connecting the fiber optic cables.
Future L-Band Upgrade	Remove the covers during the maintenance window only without disturbing the fiber optic cables in the adjacent ports.

For more information on the removal of the L-band cover, see Remove the L-Band Cover, on page 87.

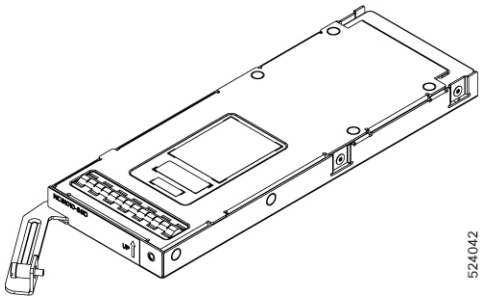
Cisco NCS 1020 Modules

The Cisco NCS 1020 chassis supports the following modules:

SSD

The field-replaceable SSD is accessible from the front of the Cisco NCS 1020 chassis. This chassis SSD acts as the backup software storage in case the SSD inside the CPU fails. It has 480 GB storage space to store the running software and configuration. This backup storage enables Cisco NCS 1020 to quickly recover to functional state if either route processor (RP) corruption or replacement occurs.

Figure 14: Perspective View of the SSD



Controller Cards

The Cisco NCS 1020 chassis has slots to accommodate up to two controllers. It supports single controller and dual controller configurations.

The chassis supports controller card redundancy through Active and Backup controller cards. The backup controller card, also called as peer controller card, stays in standby state and remains non-functional. When the system detects a fault in the active controller card, the system moves the active controller card to the fault state. Then, the backup controller card transitions to the active state and starts to function. The switchover process is entirely hardware based and increases the chassis availability.

Note When you do not need the backup controller card, you must cover the empty slot for the controller card with a controller filler.

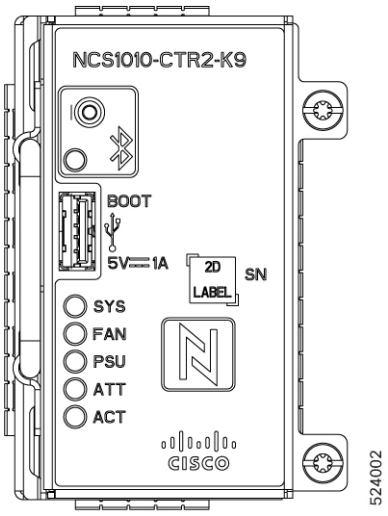
The Cisco NCS 1020 chassis supports the following controller cards:

NCS1010-CTR2-K9

The NCS1010-CTR2-K9 controller card supports a default of 115200 bps baud rate on the RS232 console port. The controller card has a USB 3.0 port and six status LEDs. For details of the NCS1010-CTR2-K9 controller card, see Figure 66: Front View of the NCS1010-CTR2-K9 Controller, on page 108.

Note In R24.2.11, the NCS1010-CTR2-K9 controller card supports only USB 2.0 drive in the USB port.

Figure 15: NCS1010-CTR2-K9 Controller Card

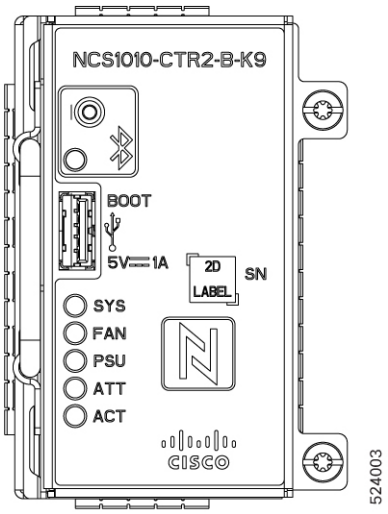


NCS1010-CTR2-B-K9

The NCS1010-CTR2-B-K9 controller card supports a default of 9600 bps baud rate on the RS232 console port. The controller card has a USB 3.0 and six status LEDs. For details of the NCS1010-CTR2-B-K9 controller card, see Figure 67: Front View of the NCS1010-CTR2-B-K9 Controller, on page 108.

Note In R24.2.11, the NCS1010-CTR2-B-K9 controller card supports only USB 2.0 drive in the USB port.

Figure 16: NCS1010-CTR2-B-K9 Controller Card



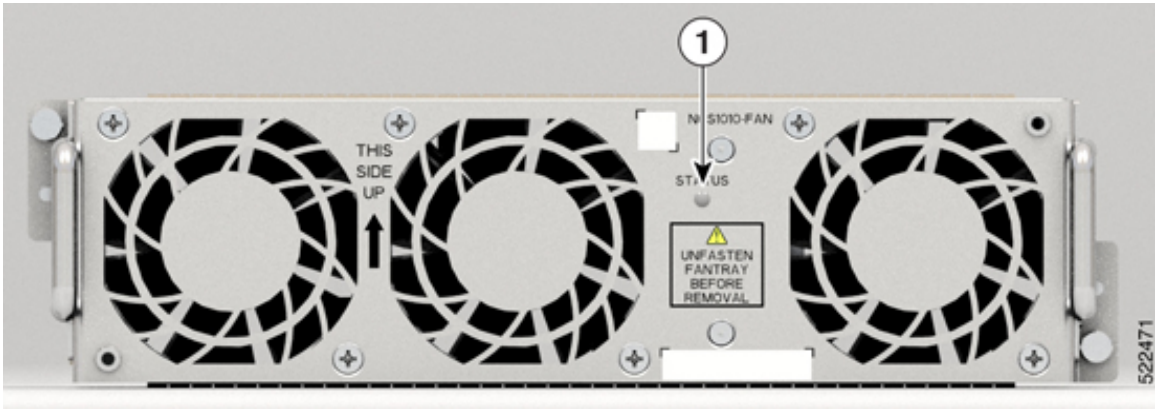
Fan Trays

NCS1020 has two fan sections:

Front Fan Section

The front fan section consists of four fan tray slots (FT0, FT1, FT2, FT3). Each fan tray consists of three fan units (Fan 0, Fan 1, Fan 2) and a Status LED.

Figure 17: Front Fan Tray (NCS1010-FAN=)

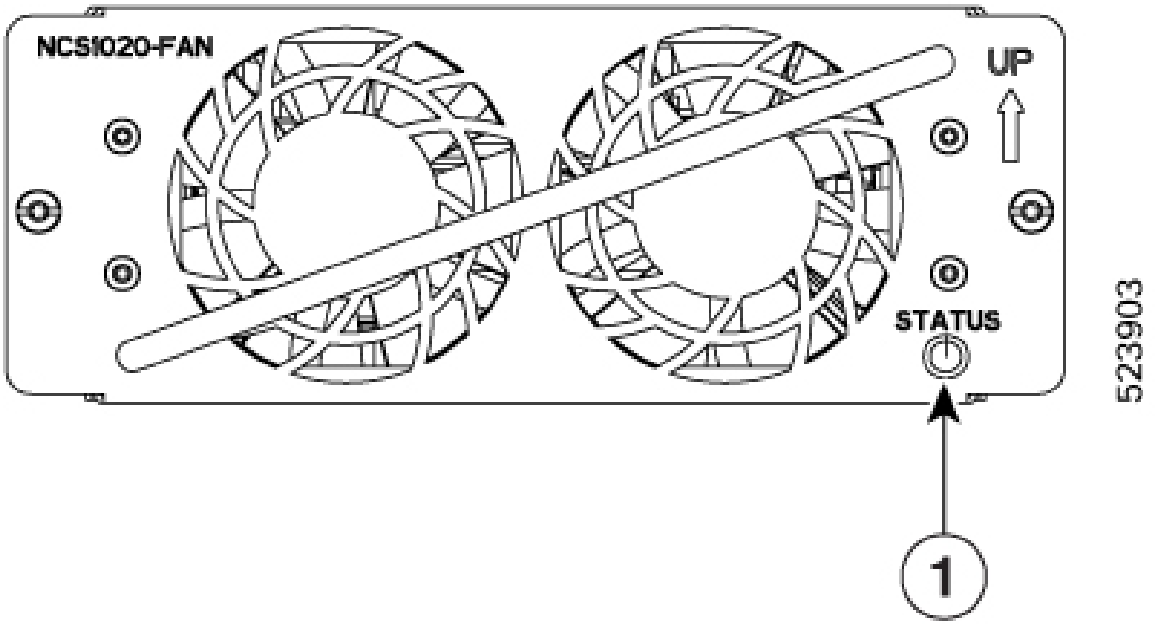


1	Front fan tray LED

Rear Fan Section

The rear fan section consists of four fan tray slots (FT4, FT5, FT6, FT7). Each fan tray consists of two fan units (Fan 0, Fan 1) and a Status LED.

Figure 18: Rear Fan Tray (NCS1020-FAN=)



1	Rear fan tray LED

Power Supply

The Cisco NCS 1020 chassis has two slots for 2.5-kW AC and DC redundant PSUs. Both the PSUs must always remain installed in the chassis, except during replacement. When the chassis has only one PSU installed, the system raises the *Power Module Redundancy Lost* alarm.

2.5-KW PSUs (NCS1K4-AC-PSU-2 and NCS1K4-DC-PSU-2)

2.5-kW PSU power derating and option table, including ambient temperature details are here. The power details are for output power.

- AC high voltage range output power—2500 W up to 40-degree C for 1 PSU; 2500 W up to 55-degree C for 2 PSUs (for a short duration, as specified by Telcordia GR-63-Core).
- AC low voltage range output power—1500 W up to 40-degree C for 1 PSU; 1500 W up to 55-degree C for 2 PSUs (for a short duration, as specified by Telcordia GR-63-Core).
- DC power supply—2500 W output power up to 40-degree C for 1 PSU; 2500 W up to 55-degree C for 2 PSUs (for a short duration, as specified by Telcordia GR-63-Core).

For power specifications, see Power Specifications, on page 119.

Power Supply Units (PSUs)

The redundant, field-replaceable PSUs power the Cisco NCS 1020 chassis. The chassis has slots for two PSUs at the rear side. Each PSU supports up to 2.5 kW per system.

The PSUs have internal fans to regulate the temperature inside the PSUs. The fans in the PSU receive power from the main PSU or the standby PSU. The PSUs are available in reverse airflow (RAF) direction meaning the airflow direction is from the output connector to the input connector.

To ensure the necessary fan redundancy, the two PSUs implement a protection mechanism. When the mechanism detects a single PSU failure or if a PSU fails to power up, it triggers all the operational fans to run at maximum speed. This mechanism activates without intervention from the software.

The Cisco NCS 1020 chassis supports the following PSUs:

NCS1K4-AC-PSU-2

NCS1K4-AC-PSU-2 is a 2.5-kW AC to DC, power-factor-corrected (PFC) power supply that converts standard AC power into a main output of 12 VDC.

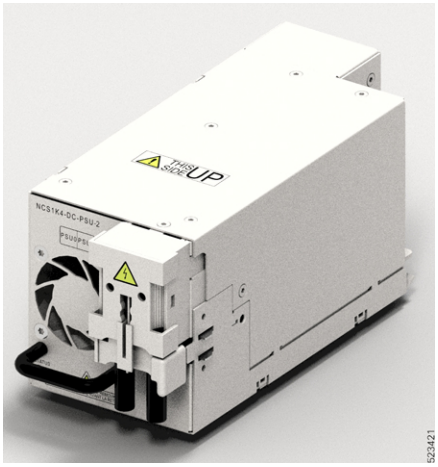
Figure 19: NCS1K4-AC-PSU-2



NCS1K4-DC-PSU-2

NCS1K4-DC-PSU-2 is a 2.5-kW DC to DC, PFC power supply with 12 VDC (main) and 12 VDC (standby) output.

Figure 20: NCS1K4-DC-PSU-2



Cisco NCS 1020 Filler Modules

The Cisco NCS 1020 chassis accommodates different filler modules based on the chassis configurations. Each filler module has a predetermined slot to occupy.

Important Install the filler modules in the empty slots of the chassis to prevent overheating and dust formation.

The Cisco NCS 1020 chassis supports the following filler modules.

Controller Filler

Controller filler (**NCS1010-CTR2-FLR**) is the filler module for the controller slots.

When to Use the Controller Filler

Add the controller filler, when you do not need the backup controller.

Type 1 Line Card Filler

- **Active Filler for Type 1 Line Cards**

  Active Filler (**NCS1010-FLR-A**) is the filler module for type 1 line cards. It has slots for the front fan trays to ensure proper airflow to the controller. This filler is similar to the Type 1 line cards but it doesn't contain the OLT or ILA modules.



Remember Active filler is supported in slot 1.

When to Use the Active Filler for Type 1 Line Cards

If your chassis needs a backup controller without the need for the corresponding type 1 line card, install the active filler into the empty slot. The active filler occupies the empty slot, providing the additional benefit of cooling the backup controller.

This setup is useful for disaster recovery and C-band only configuration.

- **Passive Filler for Type 1 Line cards**

  Passive Filler (**NCS1010-FLR-P**) acts as the filler module for type 1 line cards. It's different from the Active Filler and doesn't have slots for fan trays. Similar in size to the Type 1 line cards, this filler doesn't contain the OLT or ILA modules.



Remember Passive filler is supported in slot 1.

When to Use the Passive Filler for Type 1 Line Cards

If your chassis doesn't need a backup controller, install the passive filler into the empty type 1 card slot.

This setup is useful for operating a C-band only network without disaster recovery.

Type 2 Line Filler

Type 2 filler cards (**NCS1K14-BLANK**) are designed to fill the empty slots in the type 2 card section.



Remember Type 2 filler cards are supported in card slots from 2 to 9.

When to Use the Type 2 Filler Card

If you don't intend to use the type 2 line card in your configuration, install the type 2 filler card into the empty slots.

Filler Fan Tray

Filler fan tray (**NCS1020-FAN-BLANK**) is the filler module for the rear fan trays.



Remember Filler fan trays are supported in fan slots from FT4 to FT7 at the rear.

When to Use the Filler Fan Tray

When type 2 filler cards are present in slots 2, 3, 4, and 5, install the filler fan trays in the slots FT4 and FT5 at the rear.

When type 2 filler cards are present in slots 6, 7, 8, and 9, install the filler fan trays in the slots FT6 and FT7 at the rear.

Slot Assignment for Filler Modules

The following table shows the supported filler modules and their associated slots in the chassis.

Table 15: Applicable Slots for Filler Modules

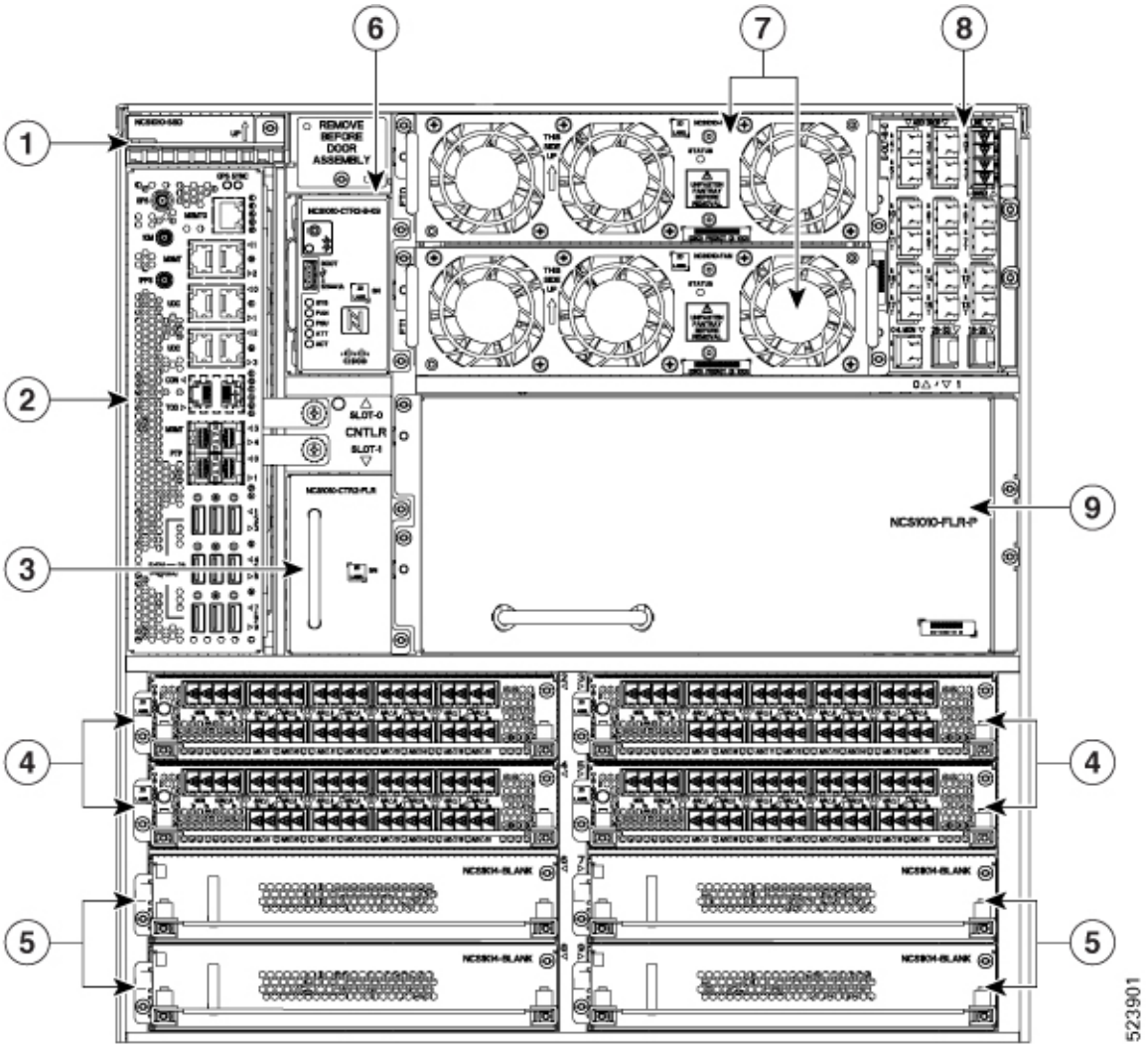
PID	Filler Module	Applicable Slots
NCS1010-FLR-A	Active Filler for Type 1 line cards	1
NCS1010-FLR-P	Passive Filler for Type 1 line cards	1
NCS1010-CTR2-FLR	Controller filler	SLOT-1
NCS1020-FAN-BLANK	Filler fan tray	FT4–FT7
NCS1K14-BLANK	Type 2 filler card	2–9

NCS 1020 Chassis Configurations with Filler Modules

NCS 1020 Chassis with Passive Filler, Controller Filler, Type 2 Filler Card

The following image shows the NCS 1020 chassis with passive filler, controller filler, and type 2 filler cards.

Figure 21: C-Band Only NCS 1020 Chassis with Passive Filler, Controller Filler, Type 2 Filler Card

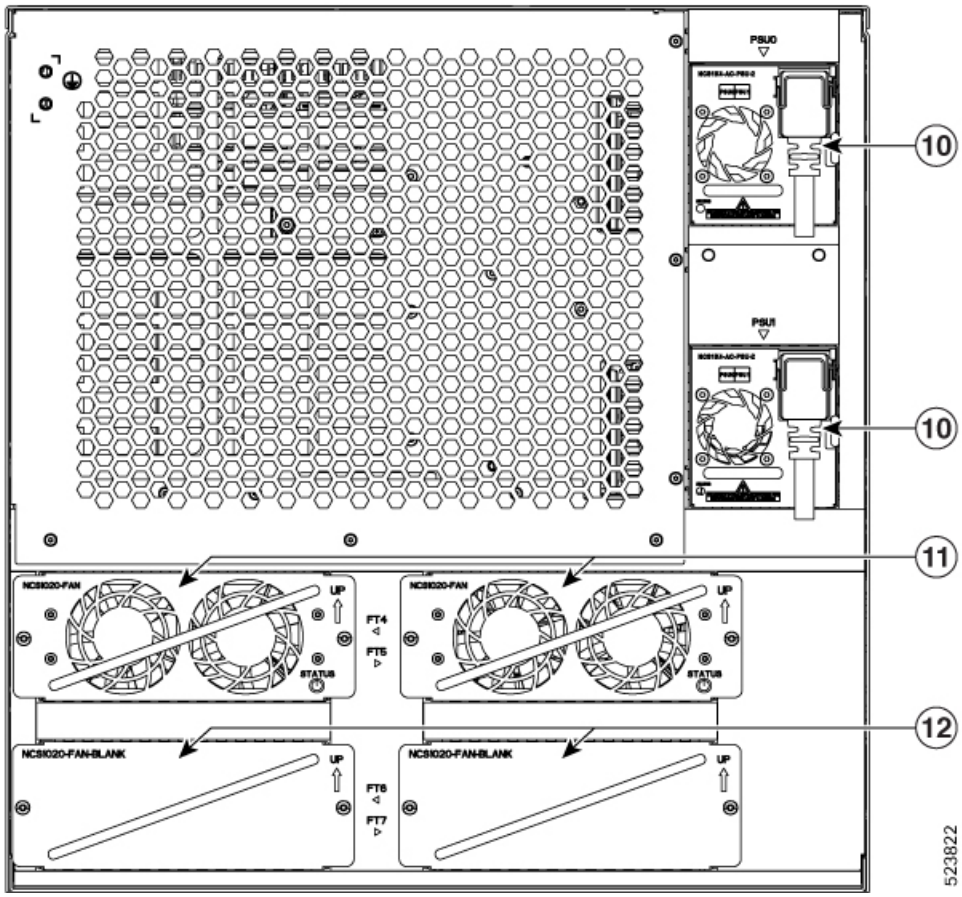


1	SSD	4	Type 2 line cards	7	Front fan trays
2	EITU	5	**Type 2 filler cards**	8	Type 1 line card
3	**Controller filler**	6	Controller card	9	**Passive filler for Type 1 line card**

NCS 1020 Chassis Rear View with Filler Fan Tray

The following image shows the NCS 1020 chassis with filler fan tray.

Figure 22: NCS 1020 Chassis Rear View with Filler Fan Tray

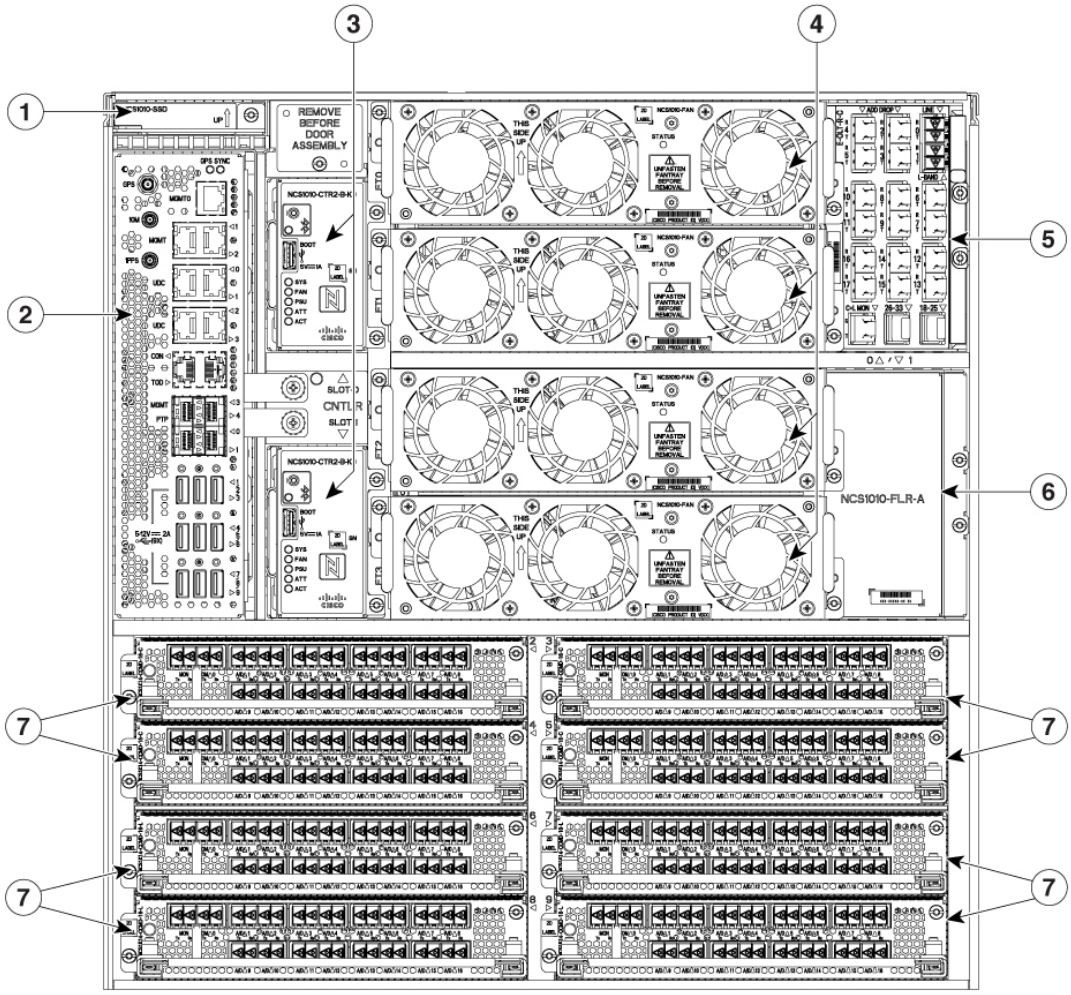


10	PSU	12	**Filler fan trays**
11	Rear fan trays		

NCS 1020 Chassis Front View with Active Filler

The following image shows the NCS 1020 chassis with active filler.

Figure 23: C-Band Only NCS 1020 Chassis with Active Filler



1	SSD	4	Front fan trays
2	EITU	5	Type 1 line card
3	Controller cards	6	**Active filler for type 1 line card**
		7	Type 2 line cards

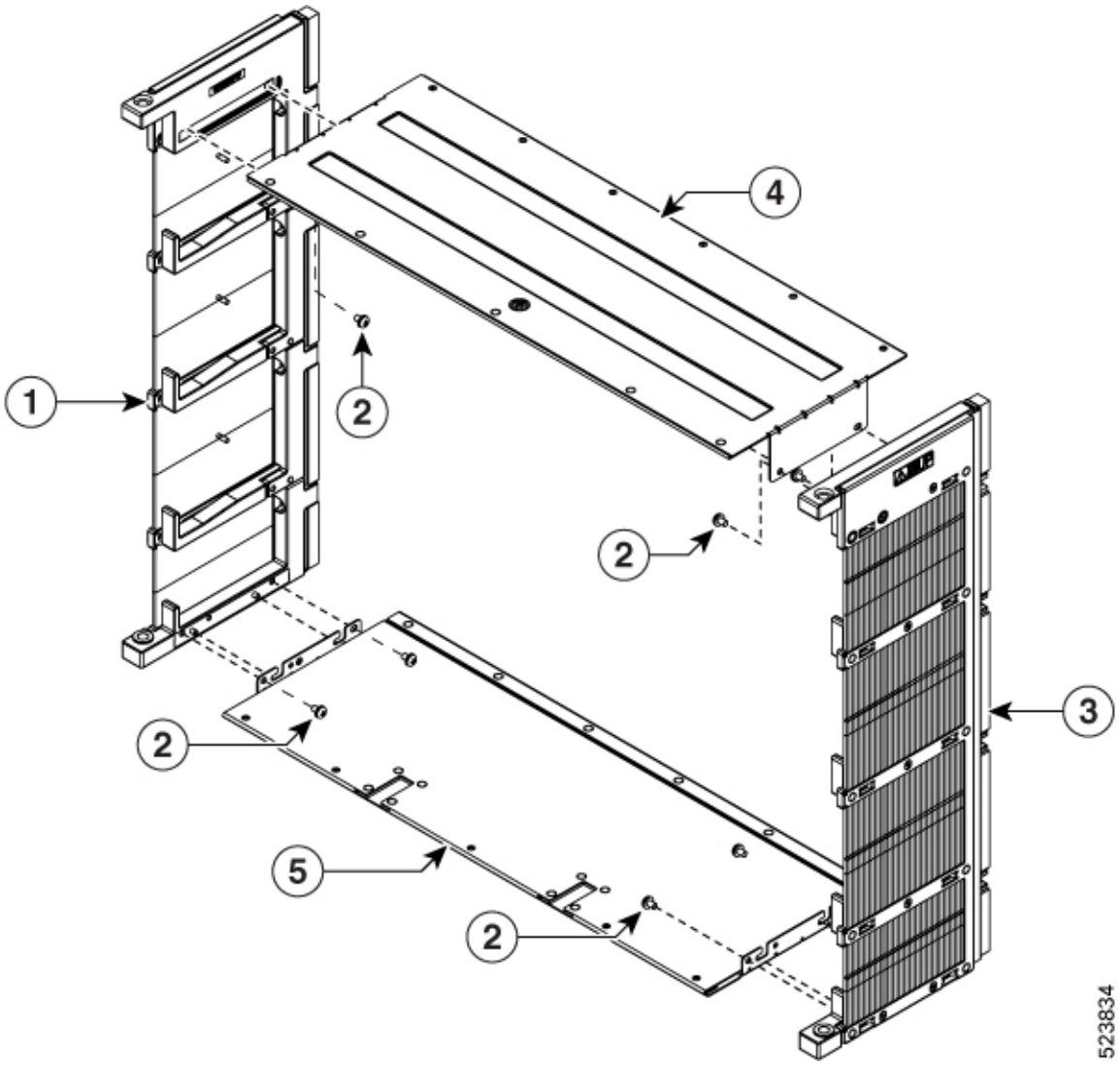
Cisco NCS 1020 Front Door Kit (NCS1020-DR=)

The NCS 1020 Doors with air filters (**NCS1020-DR=**) kit keeps the NCS 1020 chassis clean in a dusty environment and safe inside cabinets without doors. The door kit features a replaceable, internal air filter that prevents dust or foreign particles from entering the chassis. It also has grounding straps for safety, hex openings for efficient airflow and pull hinges for quick attachment onto the chassis.

Note Inspect the air filters every three months and replace them as needed. Air filters should be disposed of and replaced when they become dirty. According to NEBS guidelines, washing or cleaning them is not allowed. Make sure to order these consumable items separately and keep a spare stock. These parts cannot be replaced through the RMA process.

The front door LEDs (SYS and ATT) mimic the behaviour of the SYS and ATT LEDs on the controller, only when the door is closed. The fiber management brackets on the sides position and route the fiber-optic cables to prevent cluttering of cables.

Figure 24: Fiber Management Brackets

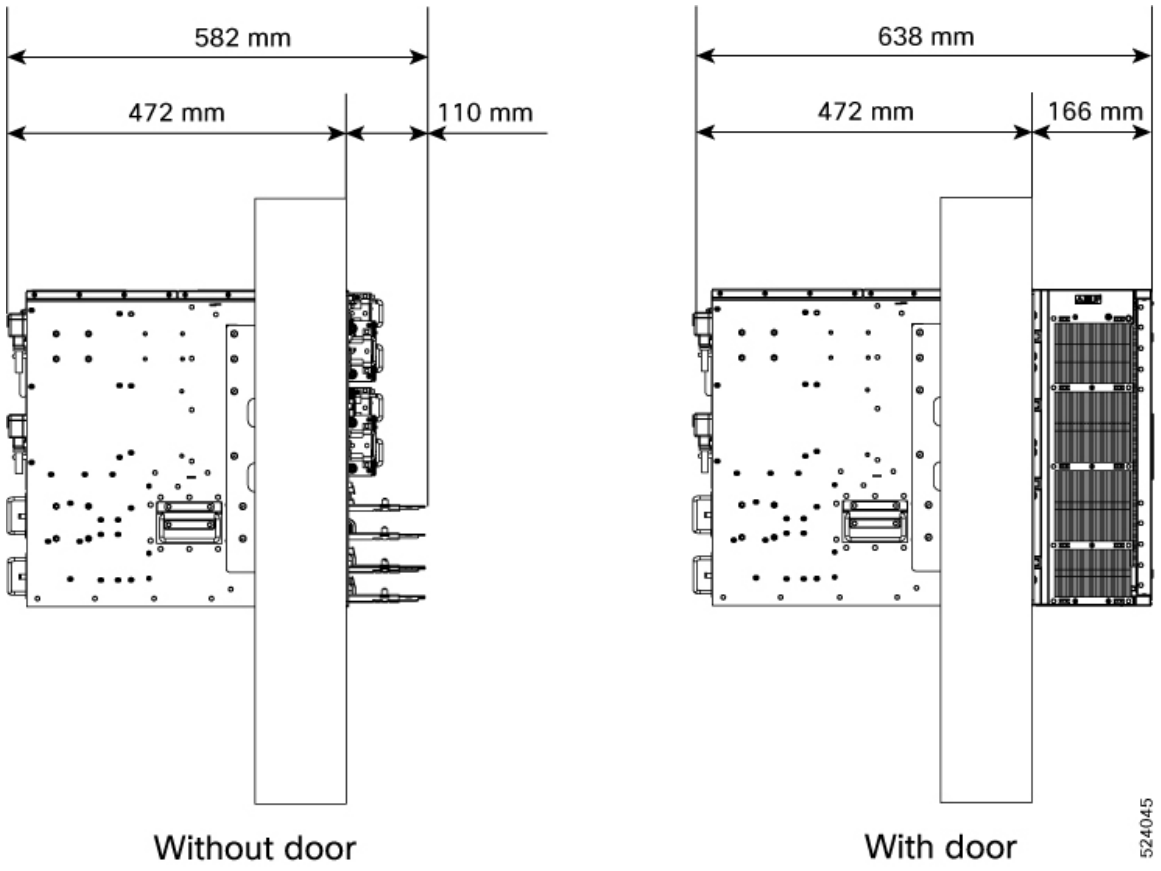


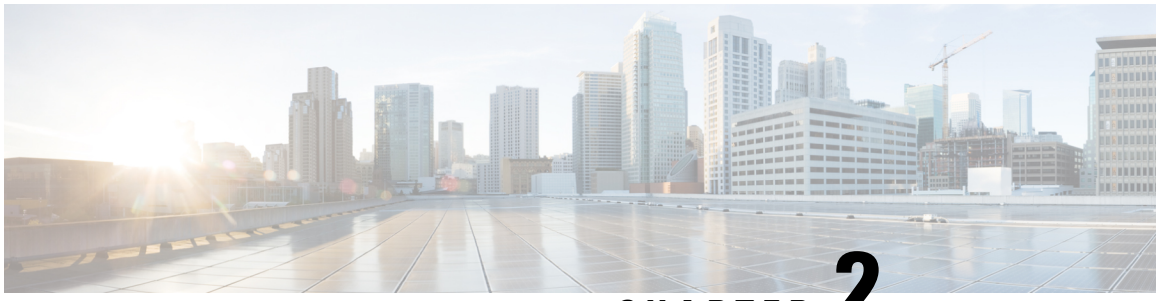
1	Left side bracket	2	Top hood and bottom cover screws
3	Right side bracket	4	Top hood

5	Bottom cover		

The dimensions of the Cisco NCS 1020 chassis with and without door varies.

Figure 25: Cisco NCS 1020 Chassis Dimensions—With and Without Front Door





CHAPTER 2

Safety Guidelines

Before you perform any procedure in this publication, you must review the safety guidelines in this section to avoid injuring yourself or damaging the equipment. Note that this section contains *guidelines*, and does not include every potentially hazardous situation. During any installation procedure, always use caution and common sense.

Review the complete list of safety warnings available at Regulatory Compliance and Safety Information for *Cisco NCS 1020 Series*.

- Standard Warning Statements, on page 29
- General Safety Guidelines for Personal Safety and Equipment Protection, on page 31
- Safety Precaution for Module Installation and Removal, on page 32
- Safety with Electricity, on page 33
- Power Connection Guidelines , on page 34
- Personal Safety Guidelines for Rack Mounting, on page 35
- Safety Precaution for Laser Radiation, on page 35
- Prevent Electrostatic Discharge Damage , on page 36
- NEBS Regulatory Compliance Statements, on page 37

Standard Warning Statements

Warning

Statement 1015—Battery Handling

To reduce risk of fire, explosion, or leakage of flammable liquid or gas:

- Replace the battery only with the same or equivalent type recommended by the manufacturer.
- Do not dismantle, crush, puncture, use a sharp tool to remove, short the external contacts, or dispose of the battery in fire.
- Do not use if battery is warped or swollen.
- Do not store or use battery in a temperature > 70° Celsius.
- Do not store or use battery in low air pressure environment < 10.1 PSIA.

Statement 1015

Warning

Statement 1071—Warning Definition

IMPORTANT SAFETY INSTRUCTIONS

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

SAVE THESE INSTRUCTIONS



Note

Statement 407—Japanese Safety Instruction

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

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

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

〈製品使用における安全上の注意〉

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

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

Warning

Statement 1029—Blank Faceplates and Cover Panels

Blank faceplates and cover panels serve three important functions: they reduce the risk of electric shock and fire, they contain electromagnetic interference (EMI) that might disrupt other equipment, and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.

Warning

Statement 9001—Product Disposal

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



Warning **Statement 1073—**No User-Serviceable Parts

There are no serviceable parts inside. To avoid risk of electric shock, do not open.



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

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



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

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

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



Warning **Statement 1090—**Installation by a Skilled Person

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

General Safety Guidelines for Personal Safety and Equipment Protection

Follow these safety guidelines:

- Never attempt to lift an object that might be too heavy for you to lift by yourself.
- Always unplug power cables when performing maintenance or working on the chassis, unless the replacement part is hot swappable and designed for online insertion and removal (OIR).
- Keep the work area clear and dust free during and after installation.
- Keep tools and chassis components away from walkways and equipment rack aisles.
- Do not wear loose clothing, jewelry (including rings and chains), or other items that could get caught in the equipment.
- Fasten your tie or scarf and sleeves.
- Operate Cisco equipment safely by using it in accordance with its electrical ratings and product usage instructions.

- Do not work alone if potentially hazardous conditions exist.
- Ensure that the installation of the router is in compliance with national and local electrical codes: in the United States, National Fire Protection Association (NFPA) 70, United States National Electrical Code; in Canada, Canadian Electrical Code, part I, CSA C22.1; in other countries, International Electrotechnical Commission (IEC) 364, part 1 through part 7.

Safety Precaution for Module Installation and Removal

Ensure to observe the following safety precautions when you are working with the chassis modules.

Warning **Statement 1090—**Installation by a Skilled Person

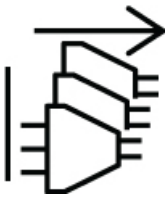
Only a skilled person should be allowed to install, replace, or service this equipment. See statement 1089 for the definition of a skilled person.

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

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

Warning **Statement 1028—**More Than One Power Supply

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



Warning **Statement 1073—**No User-Serviceable Parts

There are no serviceable parts inside. To avoid risk of electric shock, do not open.

Safety with Electricity

Warning **Statement 1005—**Circuit Breaker

This product relies on the building's installation for short-circuit (overcurrent) protection. To reduce risk of electric shock or fire, ensure that the protective device is rated not greater than: 20 A for AC and 40 A for DC.

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

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

Warning **Statement 1017—**Restricted Area

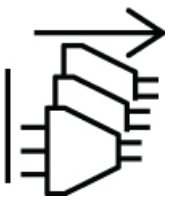
This unit is intended for installation in restricted access areas. Only skilled, instructed, or qualified personnel can access a restricted access area.

Warning **Statement 1022—**Disconnect Device

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

Warning **Statement 1028—**More Than One Power Supply

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





Warning **Statement 1029—**Blank Faceplates and Cover Panels

Blank faceplates and cover panels serve three important functions: they reduce the risk of electric shock and fire, they contain electromagnetic interference (EMI) that might disrupt other equipment, and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.



Warning **Statement 1046—**Installing or Replacing the Unit

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

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

Power Connection Guidelines

Check the power at your site to ensure you are receiving clean power (free of spikes and noise).

Ensure to observe the following safety guidelines while connecting the device power supplies.



Warning **Statement 1024—**Ground Conductor

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



Warning **Statement 1101—**Connected To Grounded Outlet

In the Scandinavian countries (Denmark, Finland, Iceland, Norway, and Sweden) the appliance must be connected to a grounded outlet.

Personal Safety Guidelines for Rack Mounting



Warning **Statement 1006—**Chassis Warning for Rack-Mounting and Servicing

To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.



Warning **Statement 1032—**Lifting the Chassis

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



Warning **Statement 1098—**Lifting Requirement

2 people are required to lift the heavy parts of the product. To prevent injury, keep your back straight and lift with your legs, not your back.

Safety Precaution for Laser Radiation

Cisco NCS 1014 is classified as Hazard Level 1M as per IEC 60825-2 and Laser Class 1/1M as per IEC 60825-1, since it may include Class 1 or Class 1M Laser sources.

Figure 26: Class 1M Laser Product Label



Take note of the following optical connection warnings:

Warning **Statement 1051—**Laser Radiation

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

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

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



Prevent Electrostatic Discharge Damage

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 these ESD prevention procedures:

- Ensure that the device chassis is electrically connected to earth ground.
- Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact.
- Handle components by only their handles or edges; do not touch the printed circuit boards or connectors.
- 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.

NEBS Regulatory Compliance Statements

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

The following NEBS statements apply to Cisco NCS 1020:



Note **Statement 7001—**ESD Mitigation

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



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

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

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

RJ-45 Copper Ethernet Port



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

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

This statement applies to the intrabuilding ports listed below:

RJ-45 Copper Ethernet Port



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

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

Connecting a Cable to the GNSS Antenna Interface

- GNSS modules have built-in ESD protections on all pins, including the RF-input pin. However, additional surge protection is required if an outdoor antenna is being connected. The Lightning Protector must be able to provide a low clamping voltage (less than 600V).
- A lightning protection must be mounted at the place where the antenna cable enters the building. The primary lightning protection must be capable of conducting all potentially dangerous electrical energy to PE (Protective Earth).
- Surge arrestors should support DC-pass and suitable for the GPS frequency range (1.575GHz) with low attenuation.



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

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



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

This equipment is suitable for installations using the CBN.



Note **Statement 7016**—Battery Return Conductor

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



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

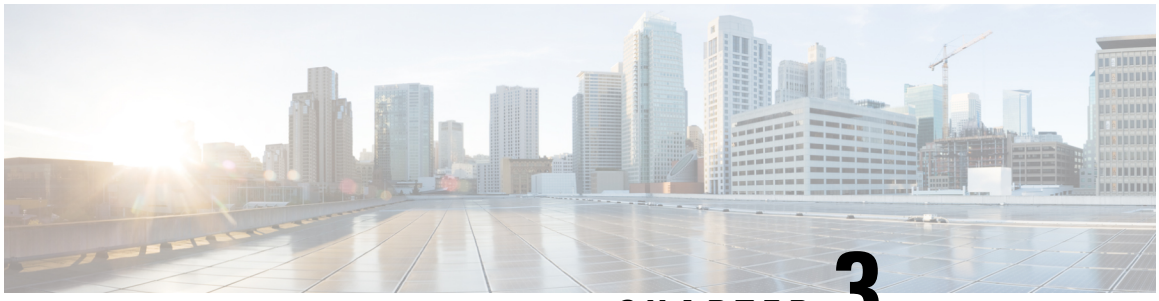
This equipment is suitable for installation in network telecommunications facilities.



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

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

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



CHAPTER 3

Prepare to Install Cisco NCS 1020

This chapter explains how to prepare for the Cisco NCS 1020 installation.

- Package Contents, on page 41
- Unpack and Verify the Cisco NCS 1020 Chassis, on page 42

Package Contents

You can order Cisco NCS 1020 as an assembled chassis (NCS1020-SYS) or as an empty chassis (NCS1020-SA) along with the components.

The shipped package contains the following:

- Cisco NCS 1020 chassis.

Note When you order a spare or ATO chassis, it comes with a torx head screwdriver.

- Accessory kit (NCS1020-19-KIT)—Includes all the hardware necessary for the chassis installation on the 19" rack. You can order the accessory kits for ETSI (NCS1020-ETSI-KIT) and 23" ANSI (NCS1020-23-KIT) racks as required. The following table describes the contents of the accessory kits.

Table 16: Accessory Kit Contents

Accessory Kit	Contents
NCS1020-19-KIT	This kit has the following items for chassis installation on a 19" rack: • Left bracket (1x) • Right bracket (1x) • M4 flat torx head screws to assemble brackets on chassis (38x) • 12-24 pan head rack mount screws (24x) • Double hole ground lug (1x) • M5 pan head screws for ground lug (2x) • Lock washer for ground lug (2x)

Accessory Kit	Contents
NCS1020-23-KIT	This kit has the following items for chassis installation on an ANSI 23" rack: • 23" rack to 19" rack adapter (2x) • 12–24 pan head screws (56x)
NCS1020-ETSI-KIT	This kit has the following items for chassis installation on an ETSI rack: • ETSI rack to 19" rack adapter (2x) • 12-24 pan head screws (34x)

- Field replaceable modules such as PSUs, controllers, fan trays, filler fan trays, filler cards, SSD, and line cards (the variant of line cards that you have ordered).
- AC and DC power cables that you have ordered. See Cable Specifications, on page 120.
- Front door accessory kit.

Door Kit	Contents
NCS1020-DR	This door kit has the following items for door installation on the NCS 1020 chassis: • Right cable management bracket (1x) • Left cable management bracket (1x) • Top panel (1x) • Bottom panel (1x) • Right door filter (1x) • Left door filter (1x) • M4.0x6mmL pan head screws (8x) • M4x16mmL pan head screws (6x) • M3.0x7mmL pan head srews (2x) • Guide pins (2x)

Unpack and Verify the Cisco NCS 1020 Chassis

Contact your Cisco Sales Representative for the Unpacking procedure of the NCS 1020 Chassis.

Use this procedure to unpack the shipment and verify that you have all the chassis modules that are required for installation.

Tip Be sure to save the packaging in case you need to return any of the components products.

Procedure

Step 1 When you receive the Cisco NCS 1020 equipment at the installation site, carefully move the pallet holding the chassis to the staging area where you plan on unpacking it.

Important
Ensure that there's sufficient room around the chassis pallet for unpacking.

Step 2 Using a pair of scissors, cut the carton sealing tape and straps tied around the package and open the top of the box.

Step 3 Remove accessories and corner boards from the box. The box contains the Cisco NCS 1020 chassis and other items that are needed for installation.

Step 4 Pull the box covering the chassis to remove it.

Step 5 Using a screwdriver, remove the shipping brackets from the chassis.

Step 6 To transfer the chassis from the pallet, grasp the side of the chassis and lift it away from the pallet.

Tip
To make the chassis weigh less for moving, remove the installed modules and place them where their connectors won't be damaged.

Do not try to remove the EITU. It is part of the NCS 1020 chassis.

Use these lifting guidelines to avoid injury to yourself or damage to the equipment:

- Don't lift the equipment alone. Have another person help you to lift the equipment.

  A fully loaded chassis can weigh as much as 100 kg (220.5 lbs).

- Ensure that your footing is solid; balance the weight of the object between your feet.
- Lift the equipment slowly; never move suddenly or twist your body as you lift.
- Keep your back straight and lift with your legs, not your back. When bending down to lift equipment, bend at the knees (not at the waist), to reduce the strain on your lower back muscles.

Step 7 Transfer the chassis to a mechanical lifting device.

a) Place the mechanical lifting device in front of the chassis on the pallet (or on the Line Card side).
b) Prepare to use the mechanical lifting device by placing a piece of cardboard on the surface of the lift (to prevent scratching).
c) With at least two or three people, move the chassis carefully from the pallet onto the lifting device.

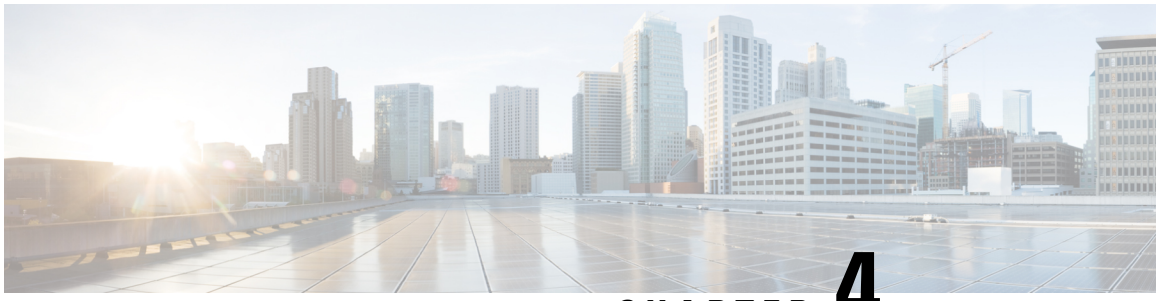
Step 8 Verify the following:

- The Cisco NCS 1020 chassis is undamaged. Check the chassis for scratches, bends, discolorations, or deformations.
- The other modules that are shipped with the chassis or separately are undamaged.

Step 9 If you notice any damage to the chassis or the modules, call your Cisco sales engineer for a replacement.

What to do next

After moving the chassis to the room or area where you want to install it, begin the procedure to mount the chassis into the rack.



CHAPTER 4

Install the Cisco NCS 1020 Chassis

This chapter contains procedures to install the Cisco NCS 1020 chassis.

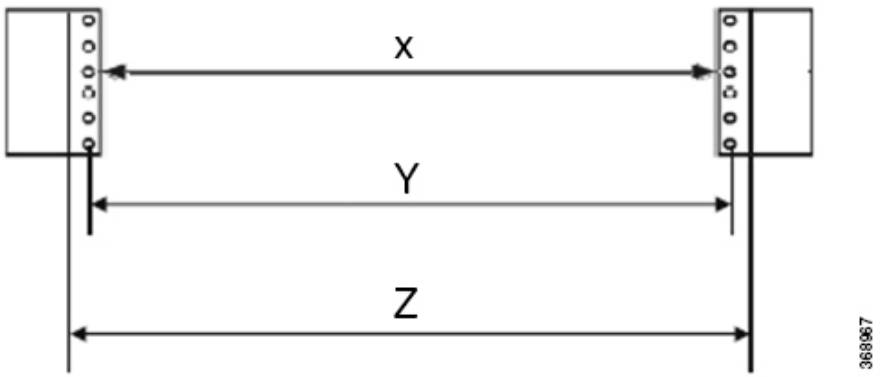
- Rack Compatibility, on page 45
- Attach the Mounting Brackets to the Chassis, on page 46
- Personal Safety Guidelines for Rack Mounting, on page 49
- Install the Cisco NCS 1020 Chassis on an EIA/ANSI/ETSI Rack, on page 49
- General Power and Grounding Requirements, on page 57

Rack Compatibility

The Cisco NCS 1020 chassis can be installed in a standard EIA (19"), ANSI (23"), or ETSI rack.

- The rack can be two post type or four post type rack.
- The 19" and 23" racks must be compliant with "EIA Universal" holes.
- The ETSI Rack must be compliant with "ETSI Universal" holes.

Figure 27: Rack Specification



Rack Type	Rack Front Opening X	Rack Mounting Hole Center-Center Y	Mounting Flange Dimension Z
19" racks	450.8mm (17.75")	465mm (18.312")	482.6mm (19")

Rack Type	Rack Front Opening X	Rack Mounting Hole Center-Center Y	Mounting Flange Dimension Z
23" racks	552.45mm (21.75")	566.7mm (22.312")	584.2mm (23")
ETSI racks	500.0mm(19.68")	515.0mm(20.276")	533.4mm(21")

Attach the Mounting Brackets to the Chassis

Use this procedure to attach the mounting brackets to the Cisco NCS 1020 chassis.

Before you begin

Required tools and equipment:

- NCS1020-19-KIT= accessory kit
- Torx head screwdriver (Cisco supplied)

Procedure

Step 1 Identify the left and right brackets.

Step 2 Place the wider side of the mounting bracket flush against the chassis markings on the sides.

Step 3 Align the mounting bracket screw holes against the chassis screw holes.

Figure 28: Attaching the Mounting Brackets on a Loaded Chassis

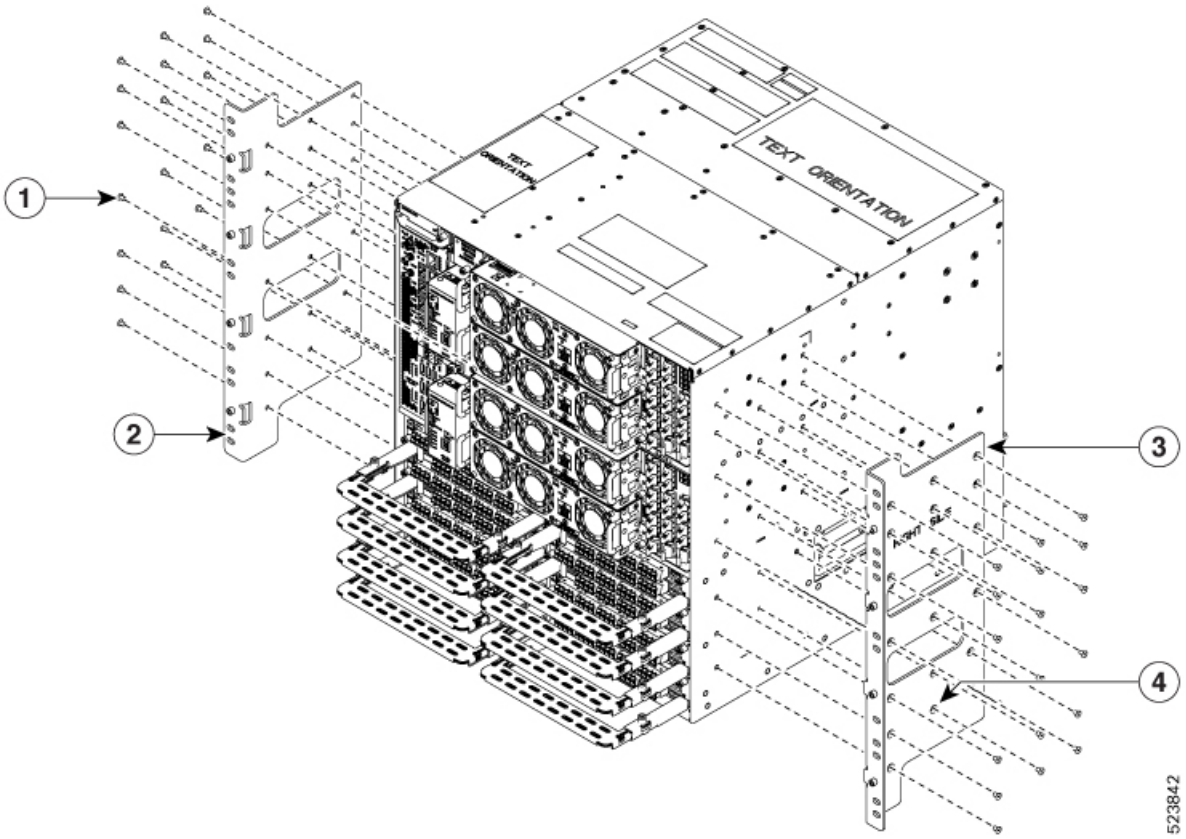
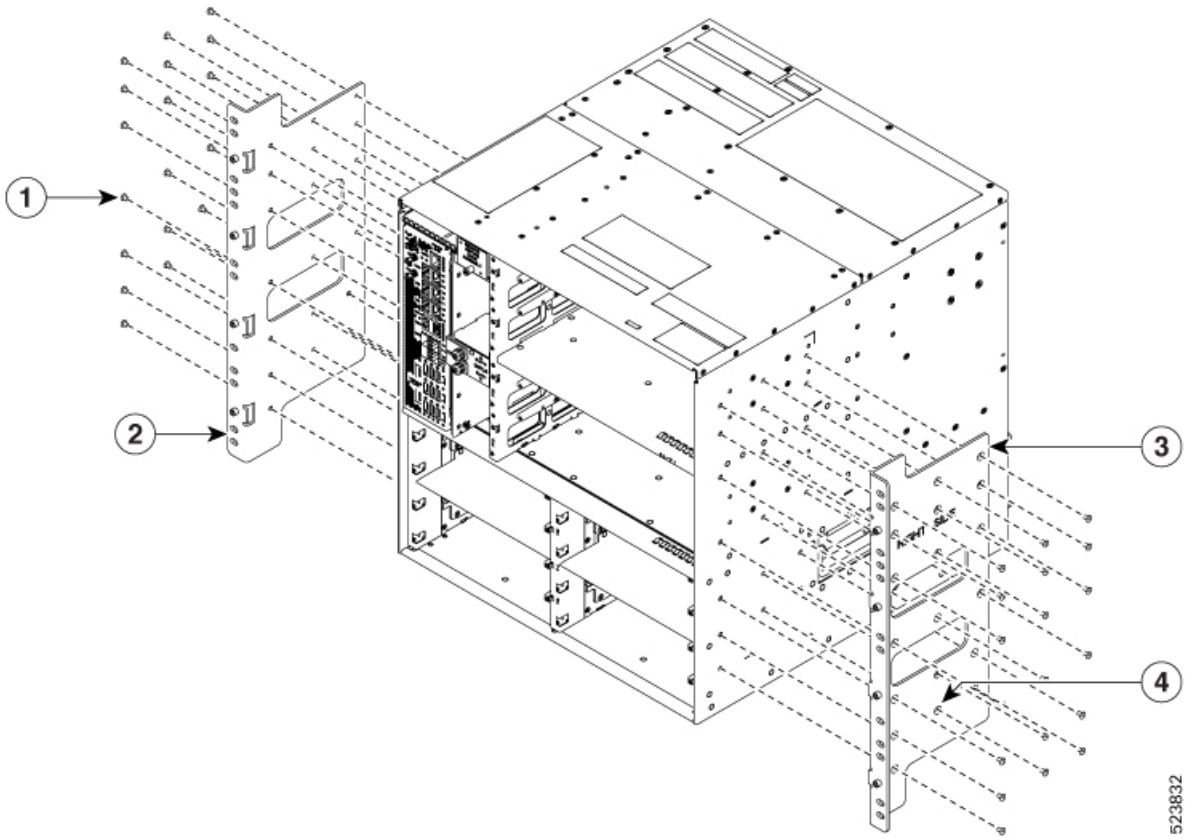


Figure 29: Attaching the Mounting Brackets on an Empty Chassis



1	M4 flat torx head screws	3	Right bracket
2	Left bracket	4	Bracket screw holes

Step 4 Insert the M4 flat head screws available in the accessory kit (NCS1020-19-KIT=) and tighten them to a torque value of 1.5 N-m (13.3 lbs-in).

Step 5 Repeat the preceding steps to mount the bracket on the opposite side.

What to do next

Install the Cisco NCS 1020 Chassis on an EIA/ANSI/ETSI Rack, on page 49

Personal Safety Guidelines for Rack Mounting



Warning **Statement 1006—**Chassis Warning for Rack-Mounting and Servicing

To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:

- This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
- When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
- If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.



Warning **Statement 1032—**Lifting the Chassis

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



Warning **Statement 1098—**Lifting Requirement

2 people are required to lift the heavy parts of the product. To prevent injury, keep your back straight and lift with your legs, not your back.

Install the Cisco NCS 1020 Chassis on an EIA/ANSI/ETSI Rack

Use this procedure to mount the Cisco NCS 1020 chassis on an EIA/ANSI/ETSI rack.



Note The mounting brackets and adapters fit only in the front posts of the four-post rack. Therefore, you can use the mounting brackets and adapters for both two-post and four-post racks.

Warning

Rack Mount Instructions

The following or similar rack-mount instructions are included with the installation instructions:

- Elevated Operating Ambient—If installed in a closed or multirack assembly, the operating temperature of the rack environment may be greater than room temperature. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified.
- Reduced Air Flow—Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- Mechanical Loading—Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.
- Circuit Overloading—Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.
- Reliable Earthing—Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (for example, use of power strips).

Before you begin

Ensure that the rack is compatible. See Rack Compatibility.

Attach the Mounting Brackets to the Chassis, on page 46

Procedure

Step 1 Attach the rack adapters to the chassis. Perform one of the following steps.

- For the 19" rack, the chassis directly fits the rack.
- For the 21" rack, use the 19 to ETSI adapter from the accessory kit (NCS1020-ETSI-KIT=). For the 23" rack, use the 19" to 23" adapter from the accessory kit (NCS1020-23-KIT=). To attach the 19" to ETSI or 19" to 23" adapter:
  - **a.** Identify the left side and right side adapters.
  - **b.** Place the adapters behind the narrower side of the mounting brackets.
  - **c.** Align the adapter screw holes against the mounting bracket screw holes.
  - **d.** Insert the adapter screws from the front on either side of the chassis.
  - **e.** Tighten the adapter screws to a torque value of 4.65 N-m (41 lbs-in).

Step 2 Mount the NCS 1020 chassis onto the rack. Perform the following steps:

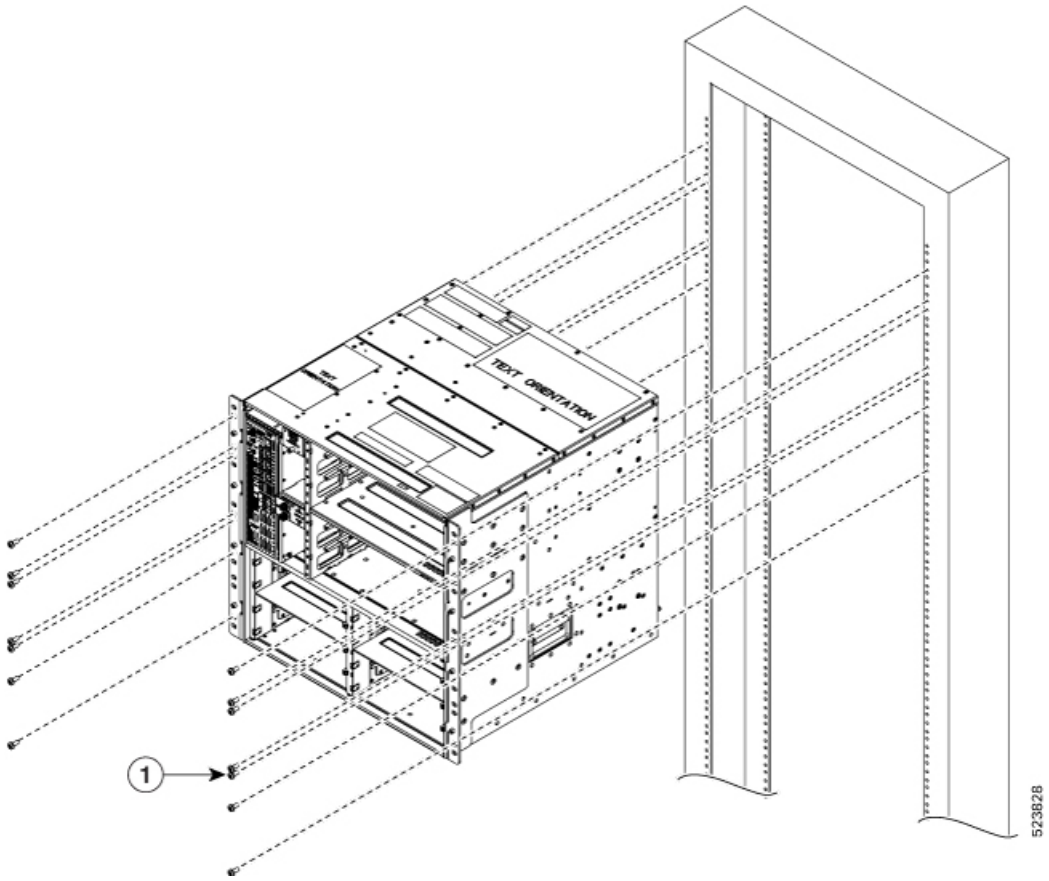
a. Lift the chassis to the needed position in the rack.

The fully loaded chassis requires two people to lift. Alternatively, you can use a mechanical lift to position the chassis in the rack.

b. Align the mounting bracket screw holes against the rack screw holes.

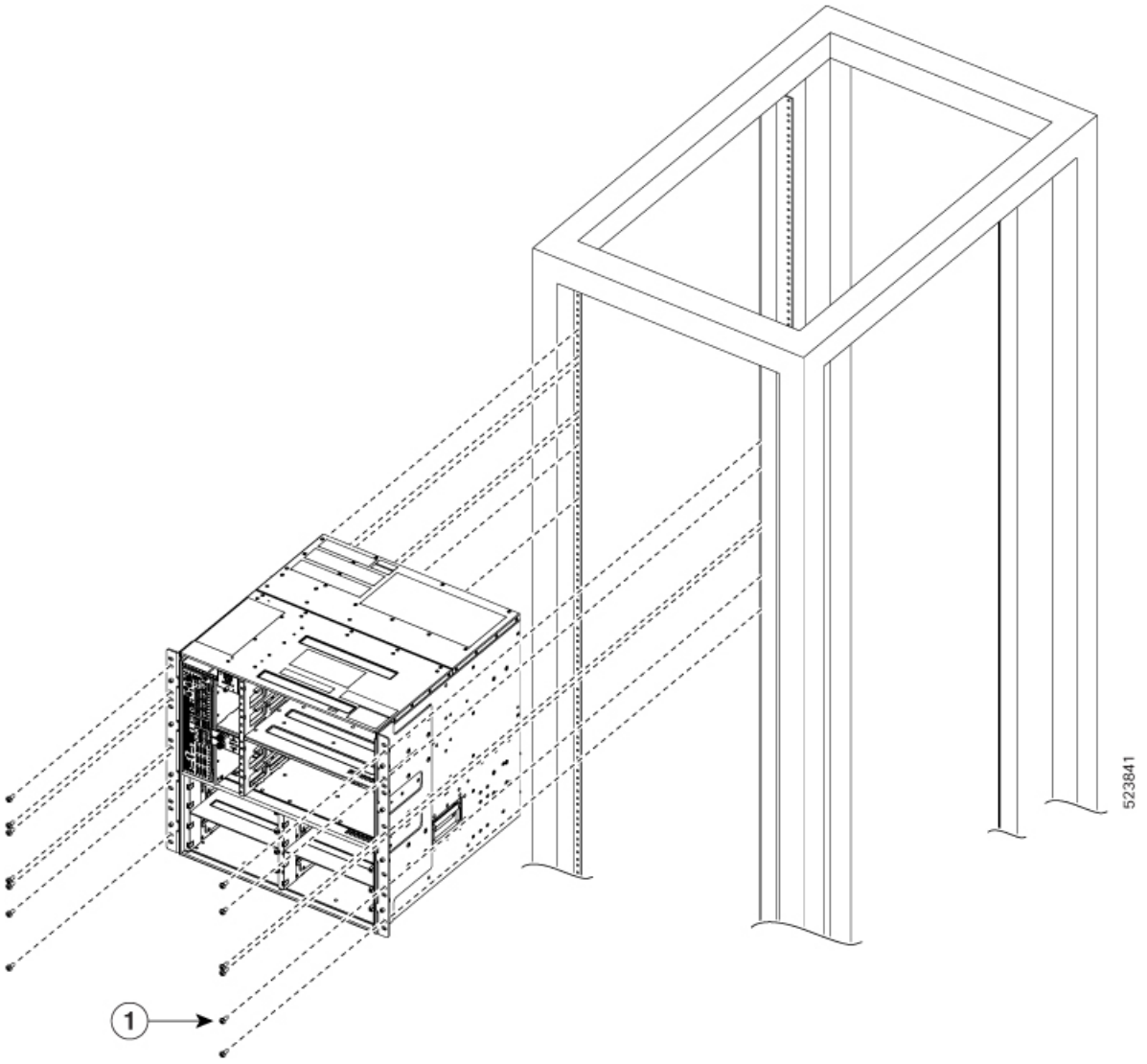
For ETSI and 23" racks, align the adapter screw holes against the rack screw holes.

Figure 30: Mounting the NCS 1020 on a Two-Post 19" Rack



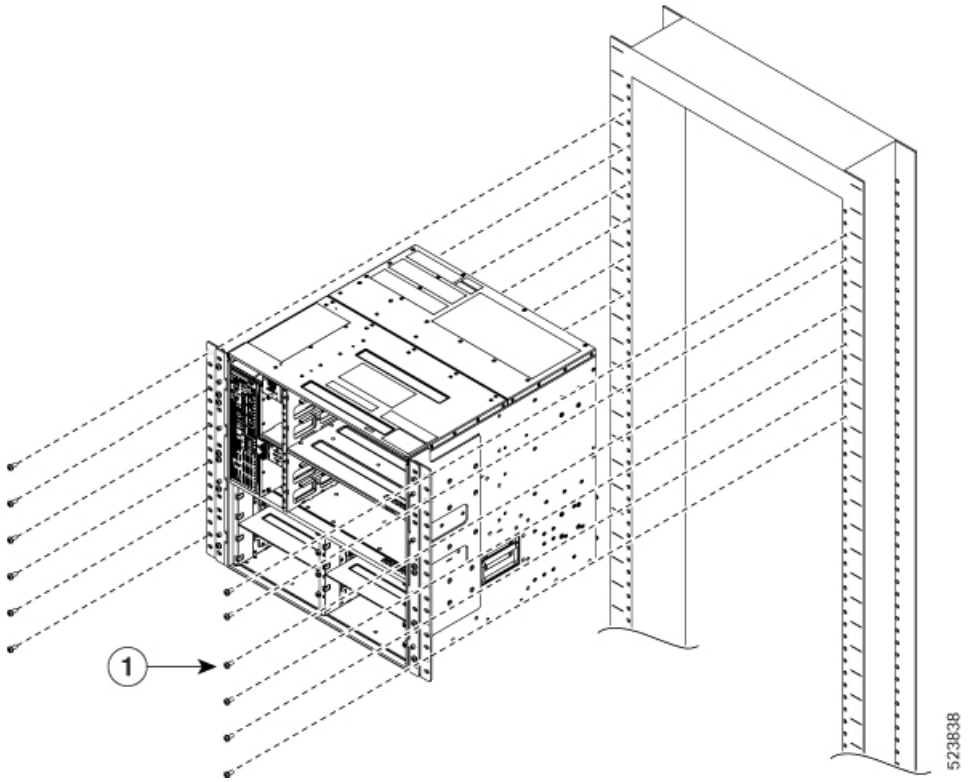
1	12–24 pan head screws

Figure 31: Mounting the NCS 1020 on a Four-Post 19" Rack



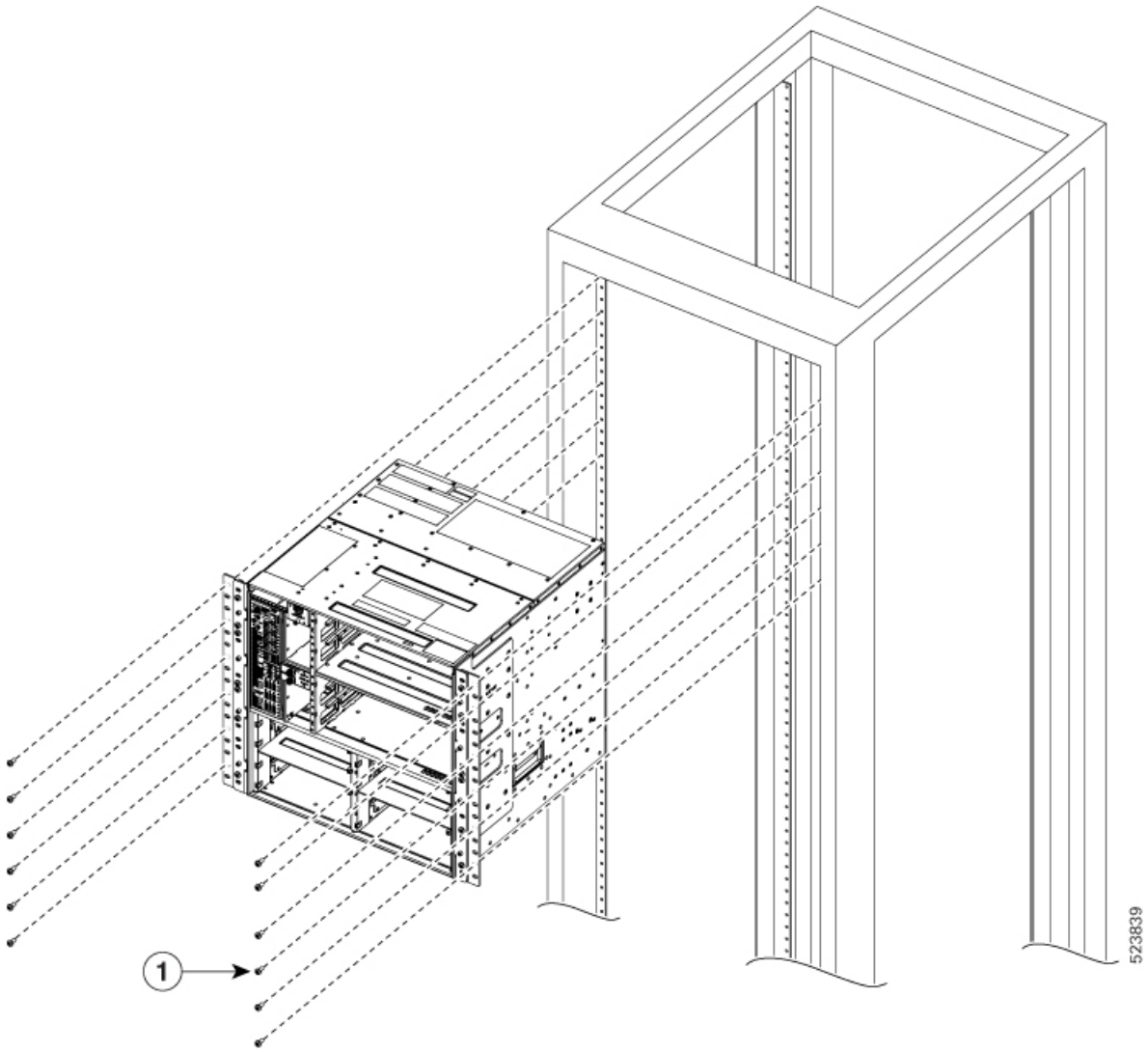
1	12–24 pan head screws

Figure 32: Mounting the NCS 1020 on a Two-Post ETSI Rack



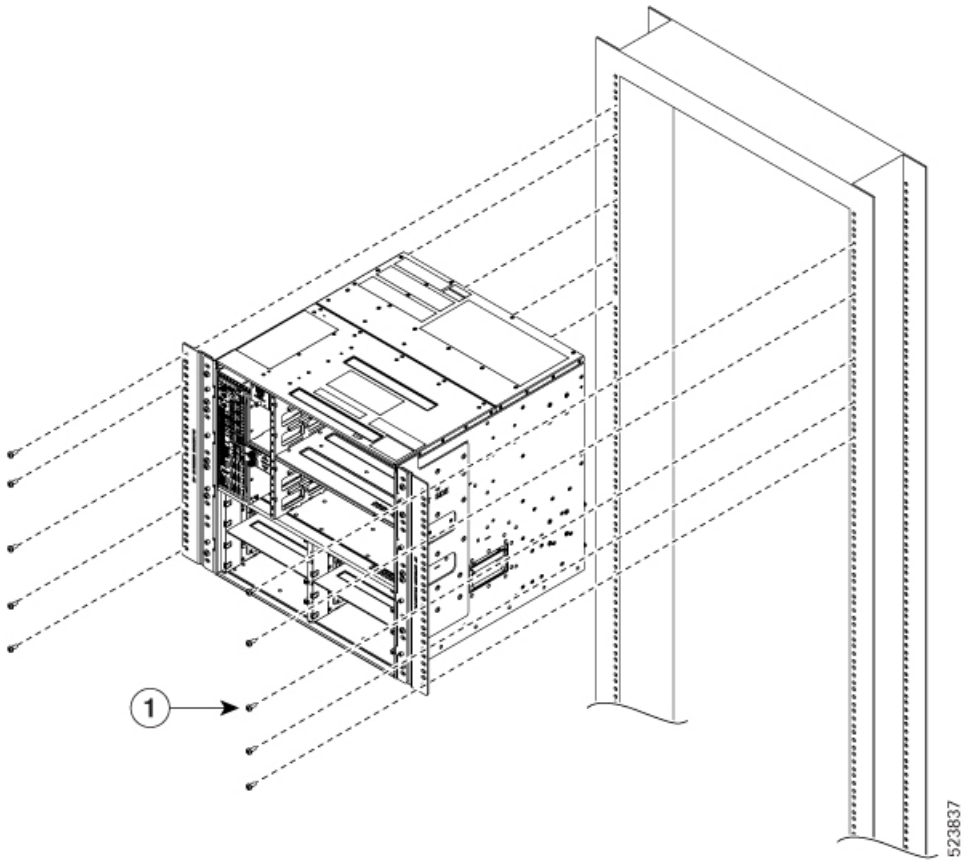
1	12–24 pan head screws

Figure 33: Mounting the NCS 1020 on a Four-Post ETSI Rack



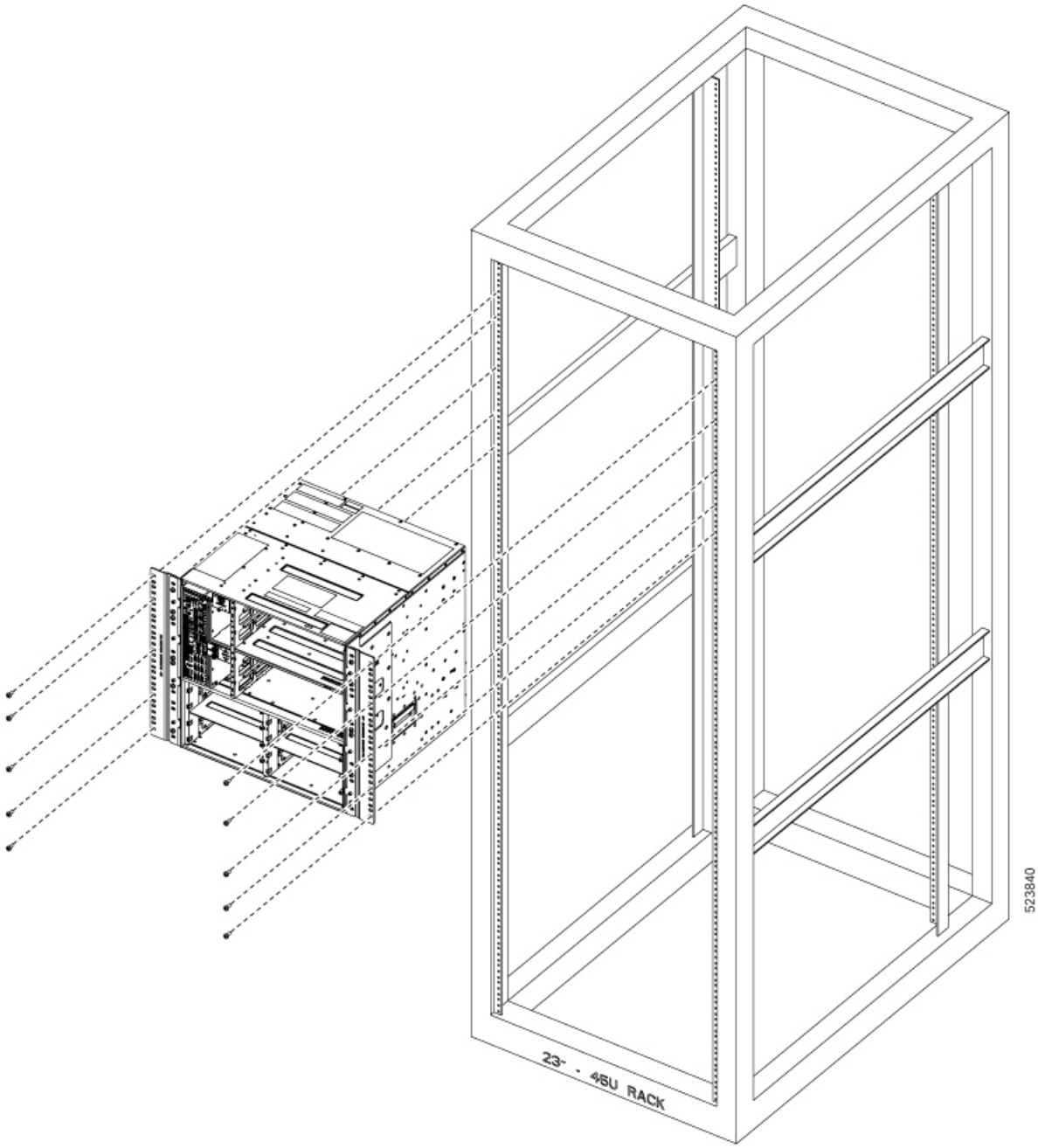
1	12–24 pan head screws

Figure 34: Mounting the NCS 1020 on a Two-Post ANSI Rack



1	12–24 pan head screws

Figure 35: Mounting the NCS 1020 on a Four-Post ANSI Rack



1	12–24 pan head screws

Figure 36: Mounting the NCS 1020 Chassis on to the rack



c. Insert the mounting screws on each bracket or adapter screw holes.

d. Using a screwdriver, tighten the 12–24 pan head screws to a torque value of 1.5 N-m (13.3 lbs-in).

General Power and Grounding Requirements

General power and grounding requirements are:

- 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 2N redundancy for system power. Each power source requires its own circuit breaker.
- Each power source must provide clean power to the site. 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.

Note Ground lug connection is mandatory for the AC chassis version too.

- Site power planning must 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 the Cisco Network Convergence System *Regulatory Compliance and Safety Information for the Cisco Network Convergence System 1020* before attempting to install the chassis.

Ground NCS 1020

This procedure provides the grounding details for the NCS 1020 chassis. In the installation of the chassis, the ground lug should be connected first.

There is one grounding point at the rear side of the NCS 1020 chassis. The following warning is affixed as a label on the chassis.

Warning High leakage current, earth connection essential before connecting supply.

Caution When terminating the frame ground, do not use soldering lug connectors, screwless (push-in) connectors, quick connect connectors, or other friction-fit connectors.

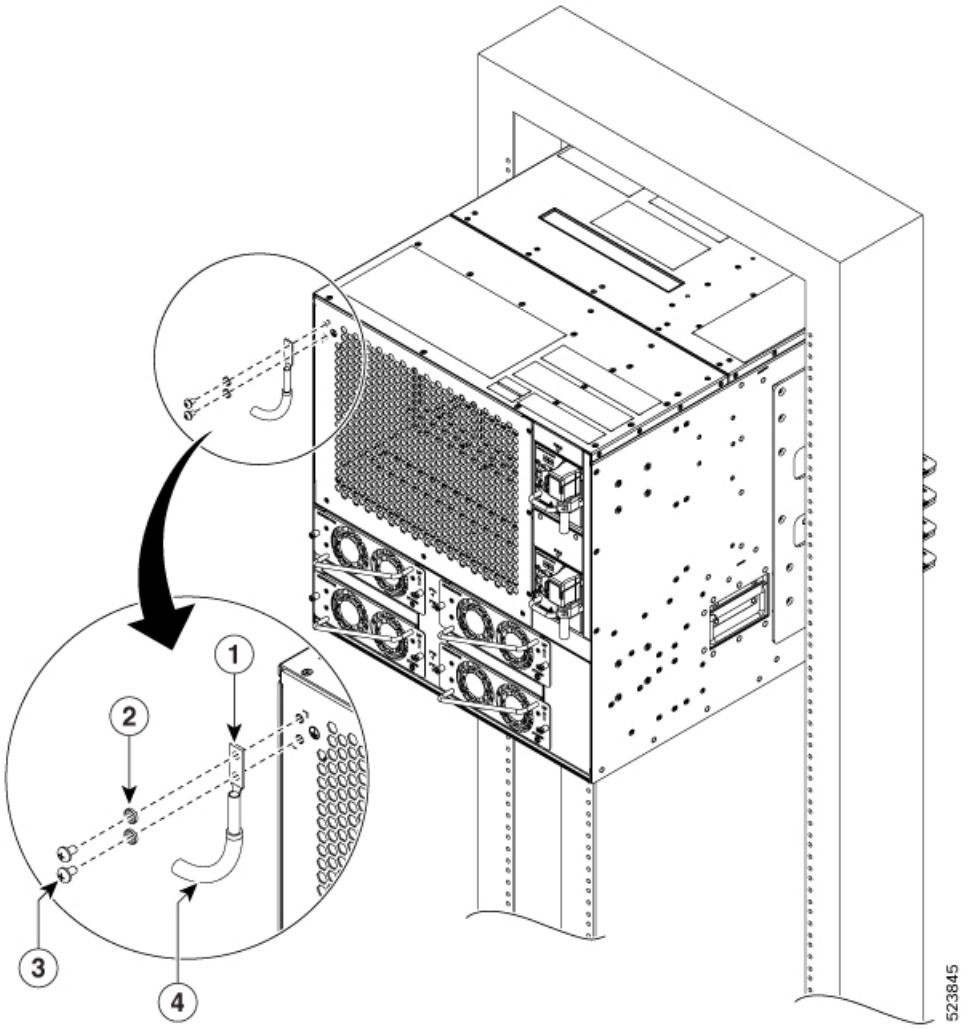
Procedure

Step 1 Verify that the office ground cable is connected to the top of the rack and the office ground, according to local site practice.

Step 2 Remove any paint and other nonconductive coatings from the surfaces between the shelf ground and bay frame ground point. Clean the mating surfaces and apply the appropriate antioxidant compound to the bare conductors.

Step 3 Attach one end of the shelf ground cable (#6 AWG cable) to the ground point using the dual-hole lug connector.

Figure 37: NCS 1020 Ground Lug

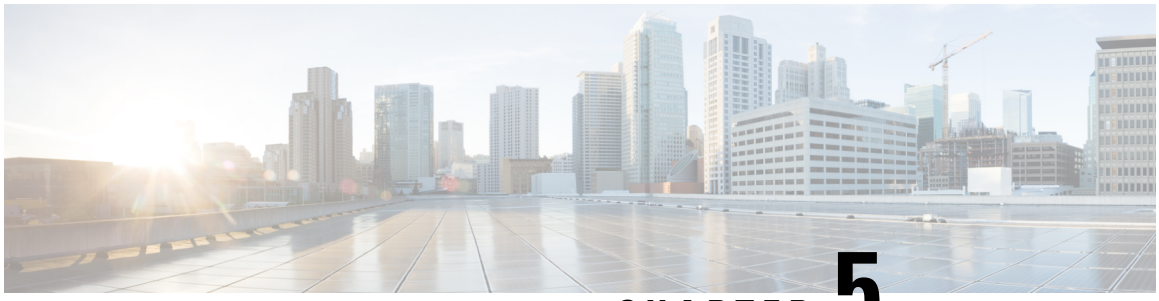


1	Double-hole lug	3	M5 pan head screws
2	M6 lock washers	4	Ground cable

The orientation of the lug cable is always at the bottom side.

Step 4 Tighten the M5 pan head screws to a torque value of 3.1 N-m (27.4 lbs-in).

Step 5 Attach the other end of the shelf ground cable to the bay frame using a dual-hole lug connector according to the equipment rack frame specifications.



CHAPTER 5

Install the Cisco NCS 1020 Modules

This chapter contains procedures to install the modules of Cisco NCS 1020.

Note In this chapter, "front fan tray" refers to the NCS1010-FAN tray, "rear fan tray" refers to the NCS1020-FAN tray, and "filler fan tray" refers to the NCS1020-FAN-BLANK tray. Front fan trays and rear fan trays contain a different set of fan units. Slots for the front fan trays and rear fan trays are not interchangeable.

Note In this chapter, "Type 1 line card" refers to "NCS 1010 line card" and "Type 2 line card" refers to "NCS 1014 line card".

- Install the Controller/Controller Filler, on page 61
- Install the Type 1 Line/Filler Card, on page 65
- Install the Front Fan Trays, on page 68
- Attach the Fiber Management Bracket, on page 70
- Install the Type 2 Line/Filler Card, on page 71
- Install the Solid State Drive (SSD), on page 72
- Install the Power Supply Units (PSUs), on page 74
- Install the Rear Fan/Filler Fan Trays, on page 80

Install the Controller/Controller Filler

Use this procedure to install the controller into the Cisco NCS 1020 chassis. The chassis can accommodate up to two controllers.

Note This procedure also applies to controller filler installation.

Attention The following table shows controller assignment for the Type 1 line and filler cards.

Table 17: Supported Controller Slots for Controller and Controller Filler

CNTLR Slot	Module	Supported Card
0	Controller	Top Type 1 line card
1	Controller	Bottom Type 2 line card
	Controller filler	Bottom Type 2 filler card

Procedure

Step 1 Orient the controller appropriately before inserting. Check for the *This Side Up* label.

Step 2 Support the bottom of the controller with hands and insert the controller into the slot.

Figure 38: Installing the Controller

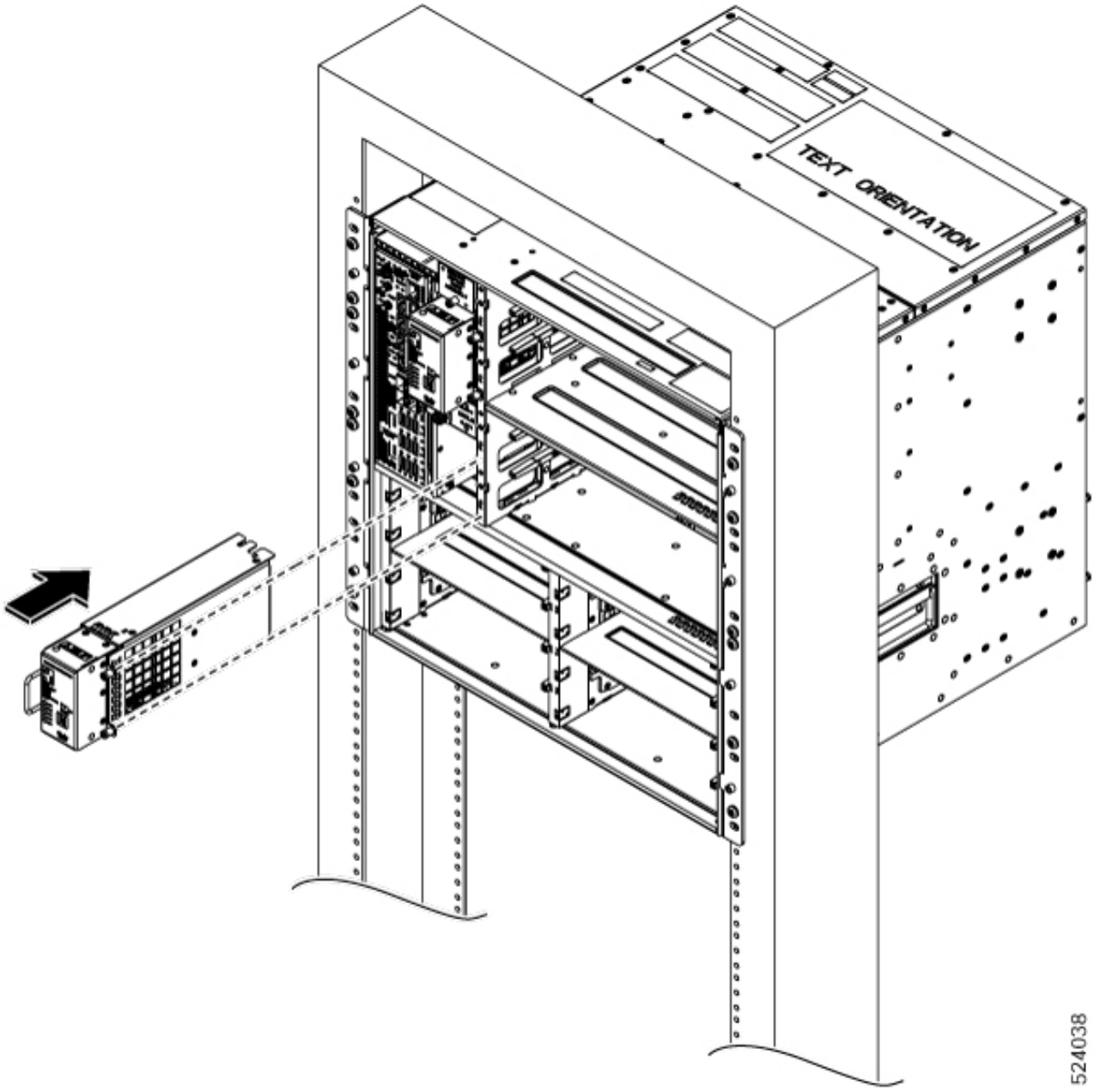


Figure 39: Installation of the NCS 1020 Controller



Figure 40: Installation of the NCS 1020 Controller Filler



Step 3 Using a screwdriver, tighten the two captive screws to a torque value of 0.65 N-m (5.75 lbs-in).

What to do next

Install the Type 1 Line/Filler Card, on page 65

Install the Type 1 Line/Filler Card

Use this procedure to install the Type 1 line card into the Cisco NCS 1020 chassis. The chassis can accommodate up to two Type 1 line cards. See Cisco NCS 1020 Chassis Overview, on page 1 for Type 1 line cards.

Note This procedure also applies to both type 1 active and passive filler installation.

Attention The following table shows the Type 1 card slots supported for the Type 1 line and filler cards.

Table 18: Supported Card Slots for Type 1 Line Card and Filler

Type 1 Card Slot	Type 1 Card
0	Type 1 line card
1	Type 1 line card
	Type 1 active filler
	Type 1 passive filler

Attention Type 1 card slot 0 must always have the Type 1 line card. In slot 1, install the Type 1 active filler when controller is in controller slot 1 and passive filler when contoller filler is in controller slot 1.

Before you begin

Secure the chassis to the rack.

Required tools and equipment:

- Phillips screwdriver with a torque capability (customer supplied)
- Type 1 line/filler card (NCS 1010 line card, NCS 1010 Active filler, or NCS 1010 Passive filler)

Procedure

Step 1 Orient the line card.

Step 2 Align the grooves in both sides of the line card with the slide guides available inside the chassis.

Figure 41: Inserting the C-Band Type 1 Line Card

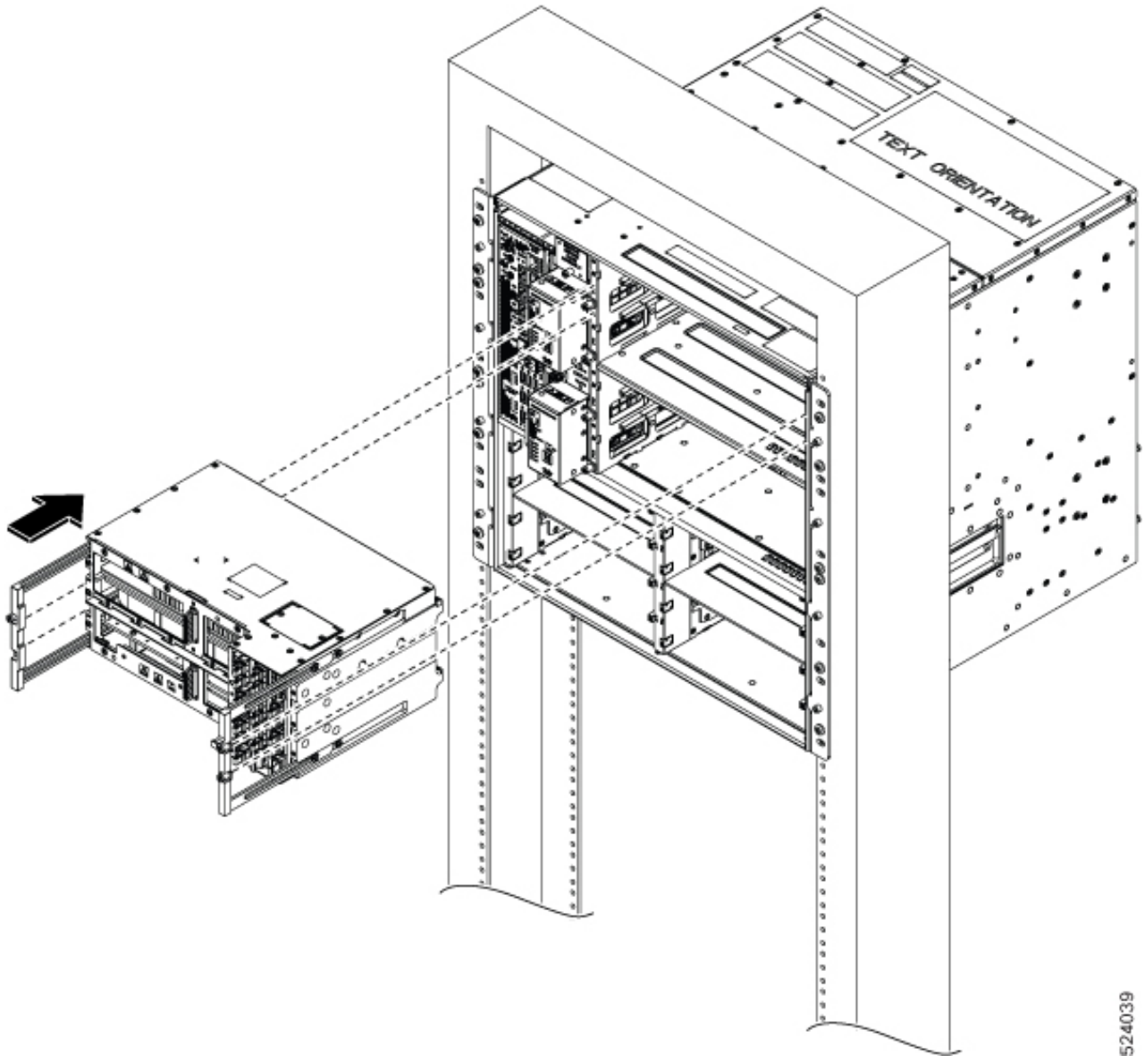
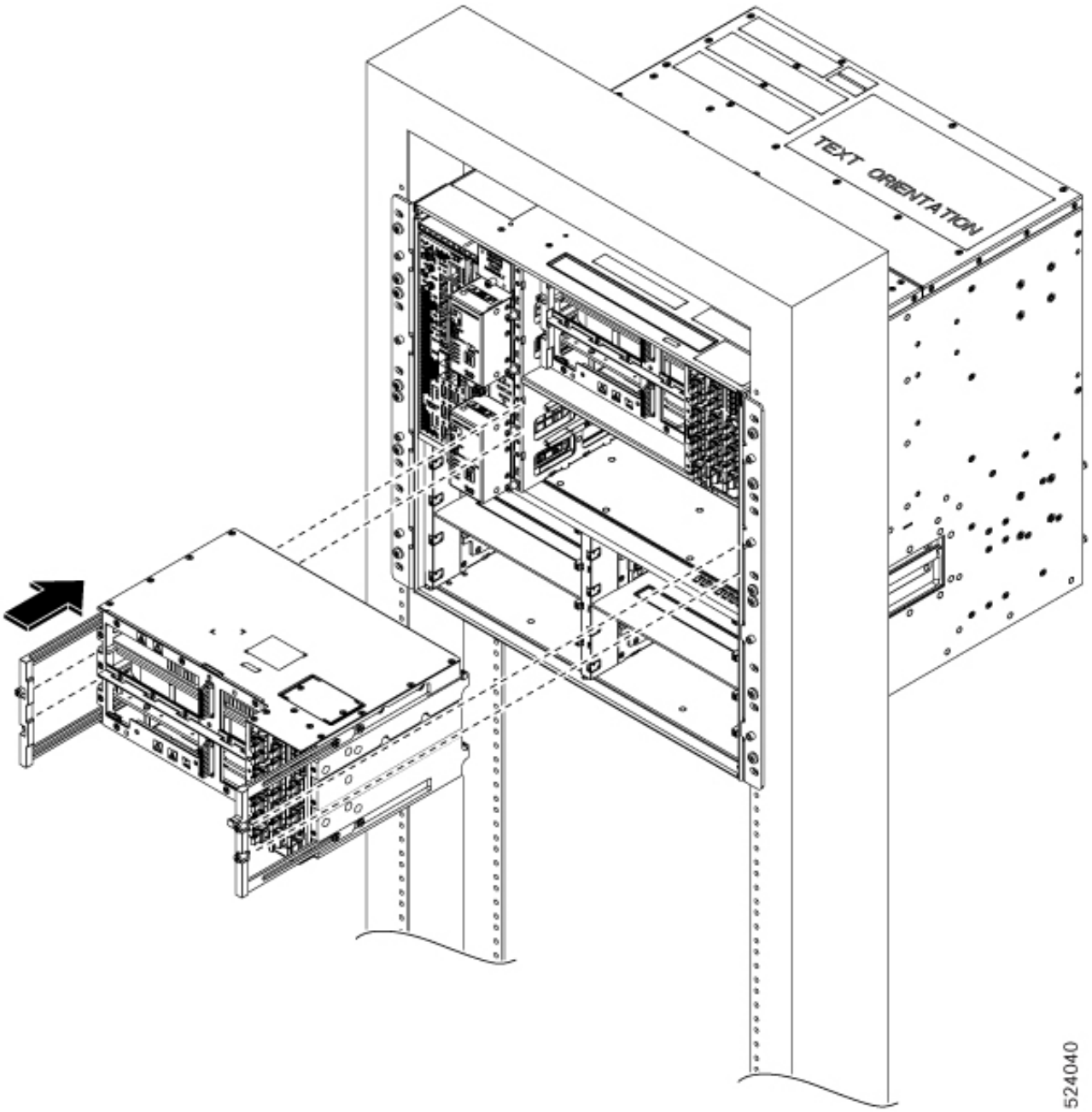


Figure 42: Inserting the L-Band Type 1 Line Card



Step 3 Insert the line card into the chassis.

Caution
Use the handle only to push and pull out the line card from the chassis. Do not use the handle to carry the line card. To prevent any accidental drop, support the bottom of the line card with your hand while you remove or insert it.

Step 4 Tighten the captive screws available in the left and right side handles of the line card, using a screw driver with a torque value of 1.5 N-m (13.3 lbs-in).

What to do next

After installing the Type 1 line card or active filler Install the Front Fan Trays, on page 68.

Install the Front Fan Trays

Use this procedure to install the front fan trays into the chassis. The chassis can accommodate up to four fan trays at the front.

Procedure

Step 1 Orient the fan tray using the guide pins on both sides available in the fan tray, before inserting. Check for the *This Side Up* label.

Step 2 Holding the handles with both hands, insert the fan tray into the slot on the front side of the chassis.

Figure 43: Installing the Front Fan Tray

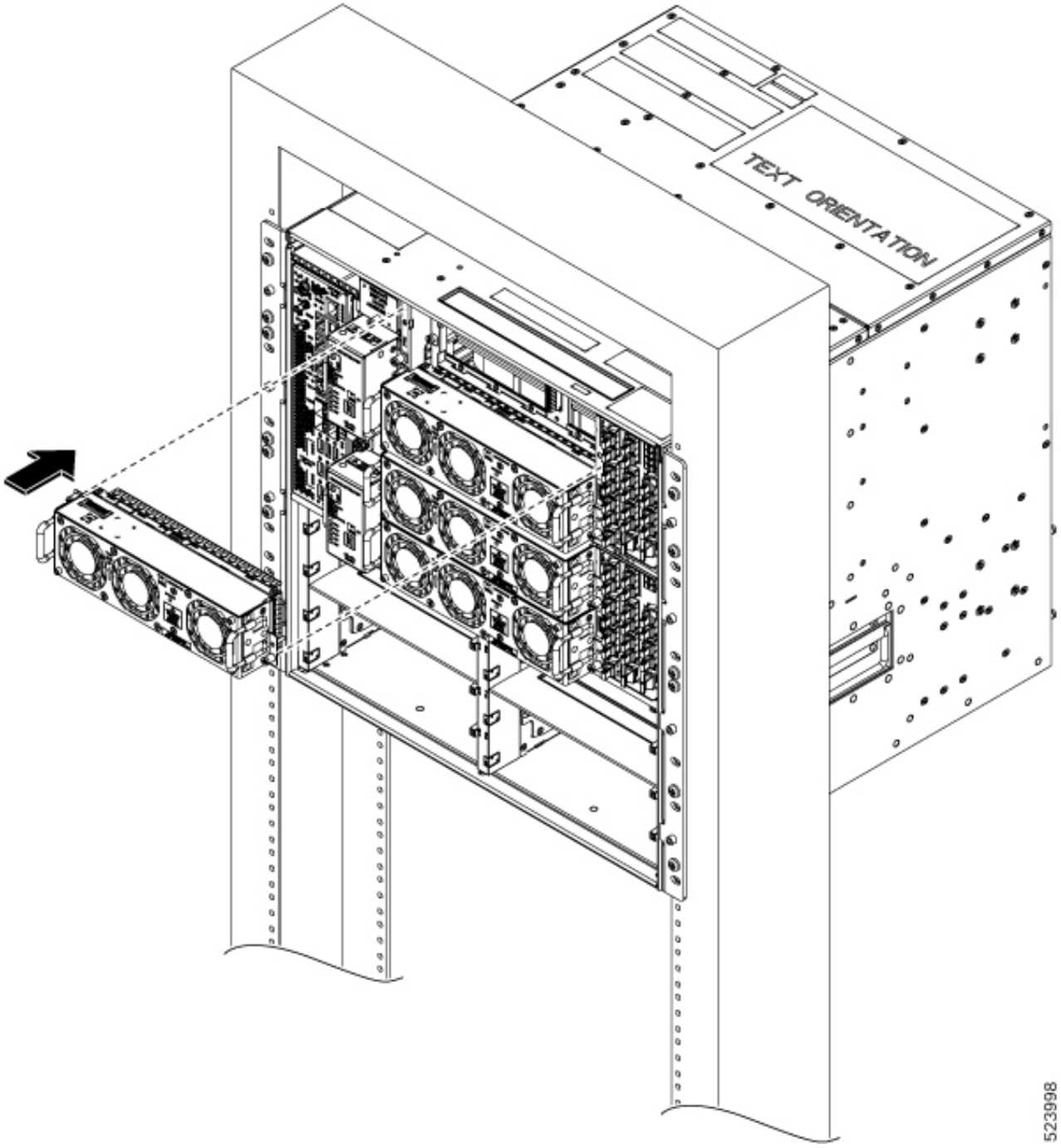


Figure 44: Installing the NCS 1020 Front Fan Tray



Step 3 Using the screw driver, tighten the captive screws at the corners of the fan tray, to a torque value 0.65 N-m (5.75 lbs-in).

The left captive screw goes into the chassis and the right captive screw goes into the line card.

Step 4 Repeat the preceding steps to insert and fix the second fan tray.

Attach the Fiber Management Bracket

Use this procedure to attach a fiber management bracket to a Type 2 line card or filler card.

The fiber management brackets are available in the package. Each Type 2 line card or filler card comes with its own fiber management bracket. Do not interchange the fiber management brackets. The Type 2 line or filler cards have adjustable fiber management brackets.

Procedure

Step 1 Attach the fiber management bracket to the card (line card or filler card). To attach:

a. Orient the captive screws in the fiber management bracket to the line card.

Ensure that the fiber management bracket is in the correct orientation. Incorrect orientation obstructs accessibility to the ports.

b. Seat the bracket captive screws in the line card screw holes.

Step 2 Using a torque-limiting T15 Torx screwdriver, tighten the two M3 T15 Torx screws of the fiber management bracket to a torque value of 0.65 N-m (5.75 lbs-in).

We recommend that you do not remove the fiber management brackets after installing the line card into the chassis.

What to do next

Install the Type 2 Line/Filler Card, on page 71

Install the Type 2 Line/Filler Card

Use this procedure to install an Type 2 line card into the Cisco NCS 1020 chassis. The Cisco NCS 1020 chassis supports a maximum of eight Type 2 line cards. Install the Type 2 line cards in the slot order starting from slot 2 to slot 9.

Before you begin

It is mandatory to attach the fiber management brackets to the Type 2 filler cards and line cards before you install the cards into the chassis. For a detailed procedure, see Attach the Fiber Management Bracket, on page 70.

Note The following procedure is not required if the chassis is shipped with preinstalled Type 2 line cards.

The following procedure also applies to Type 2 filler cards installation.

Procedure

Step 1 Before inserting the line card into the slot, use the *This Side Up* label to help yourself orient the line card correctly.

Step 2 Use both the hands while inserting a line card. To insert the line card, perform the following actions:

a. Use one hand to support the bottom of the line card.

b. Use the other hand to hold the fiber management bracket.

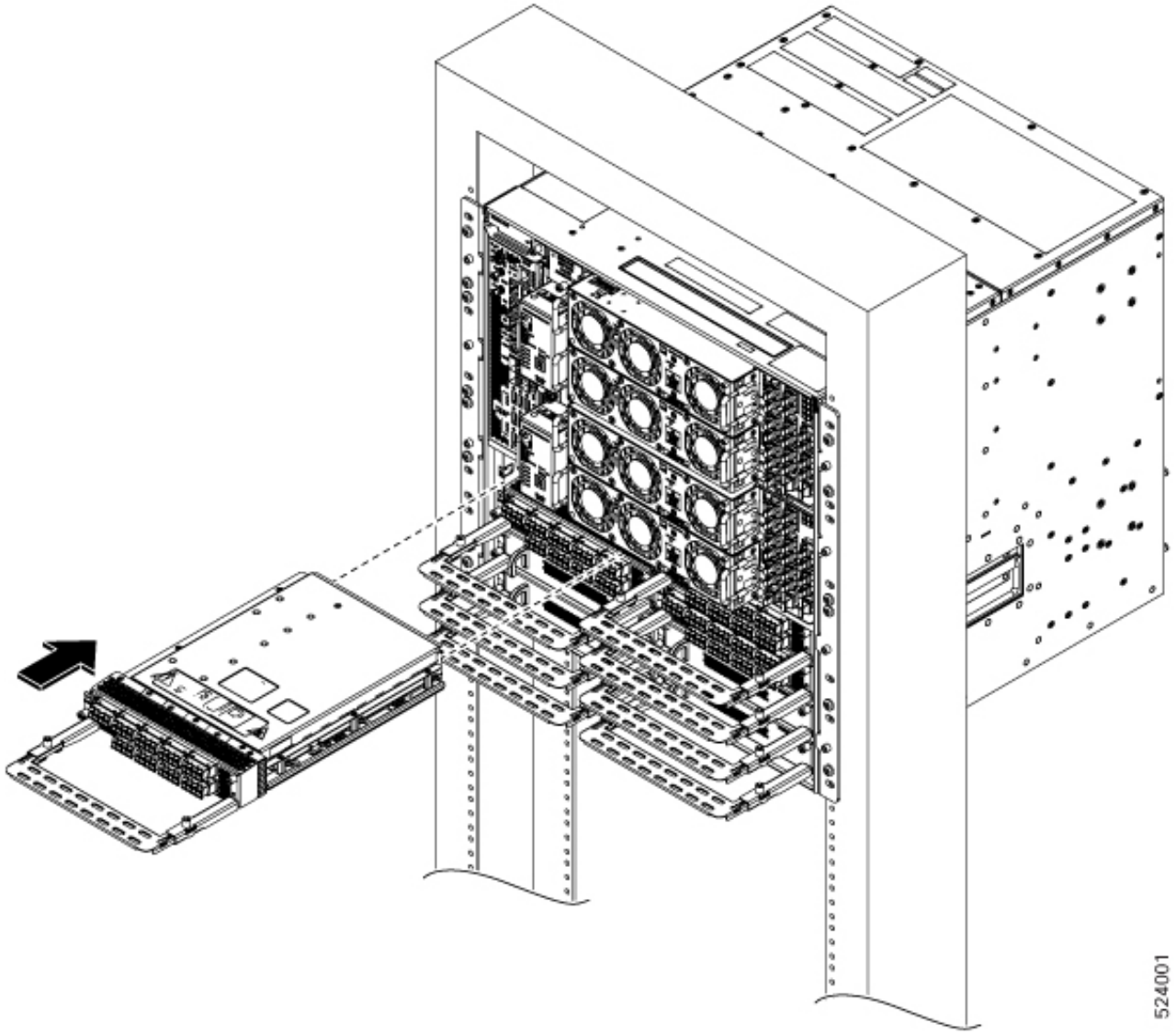
c. With both hands, guide the line card into the slot.

Caution
Use the fiber management brackets only for pulling out or pushing in the line cards or filler cards. Do not use the fiber management brackets to carry the cards. Always support the line card and filler card at the bottom with your hand.

Step 3 Slide the line card completely inside, into the slide guide till it engages in the chassis.

Step 4 Using the torque-limiting T-15 six lobe/slot screwdriver, tighten the two captive screws of the line card to a torque value of 0.44 N-m (3.89 lbs-in) to secure the line card.

Figure 45: Inserting the Type 2 Line Card



Install the Solid State Drive (SSD)

Use this procedure to install the SSD into the Cisco NCS 1020 chassis.

Procedure

Step 1 Before inserting the SSD into the slot, use the *UP* label to help you orient the module correctly.

Step 2 Grasp the ejector handle and align the ejector to chassis hinge point and then rotate inwards to latch the SSD into the slot.

Figure 46: Installing the SSD

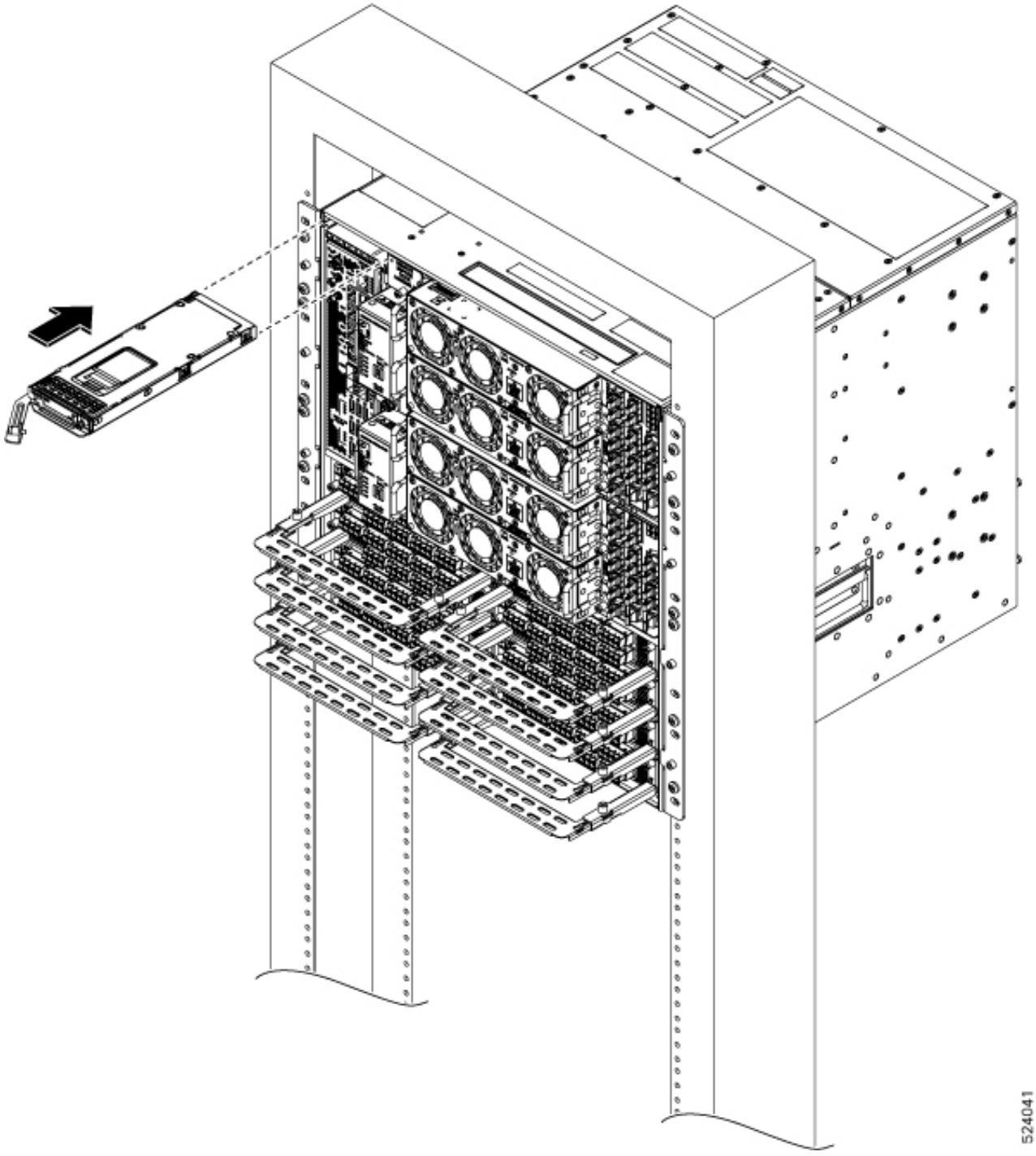


Figure 47: Inserting the SSD



Step 3 Using a T15 six lobe/slot screwdriver, tighten the lone captive screw to a torque value of 0.65 N-m (5.75 lbs-in).

What to do next

Install the Power Supply Units (PSUs), on page 74

Install the Power Supply Units (PSUs)

Use this procedure to install the PSUs into the Cisco NCS 1020 chassis.

Procedure

Step 1 Orient the PSU correctly before inserting. Check for the *This Side Up* label.

Step 2 Slide the PSU into the slot as follows:

a. Support the PSU at the bottom with one hand.

b. Hold the handle with your other hand.

c. Push the PSU in until you hear a *click* sound; see the following figure for direction of insertion.

The click sound indicates that the unit has latched.

Note
Press and release the locking latch only for removing the PSU.

Figure 48: Inserting the DC PSU

Figure 49: Inserting the AC PSU

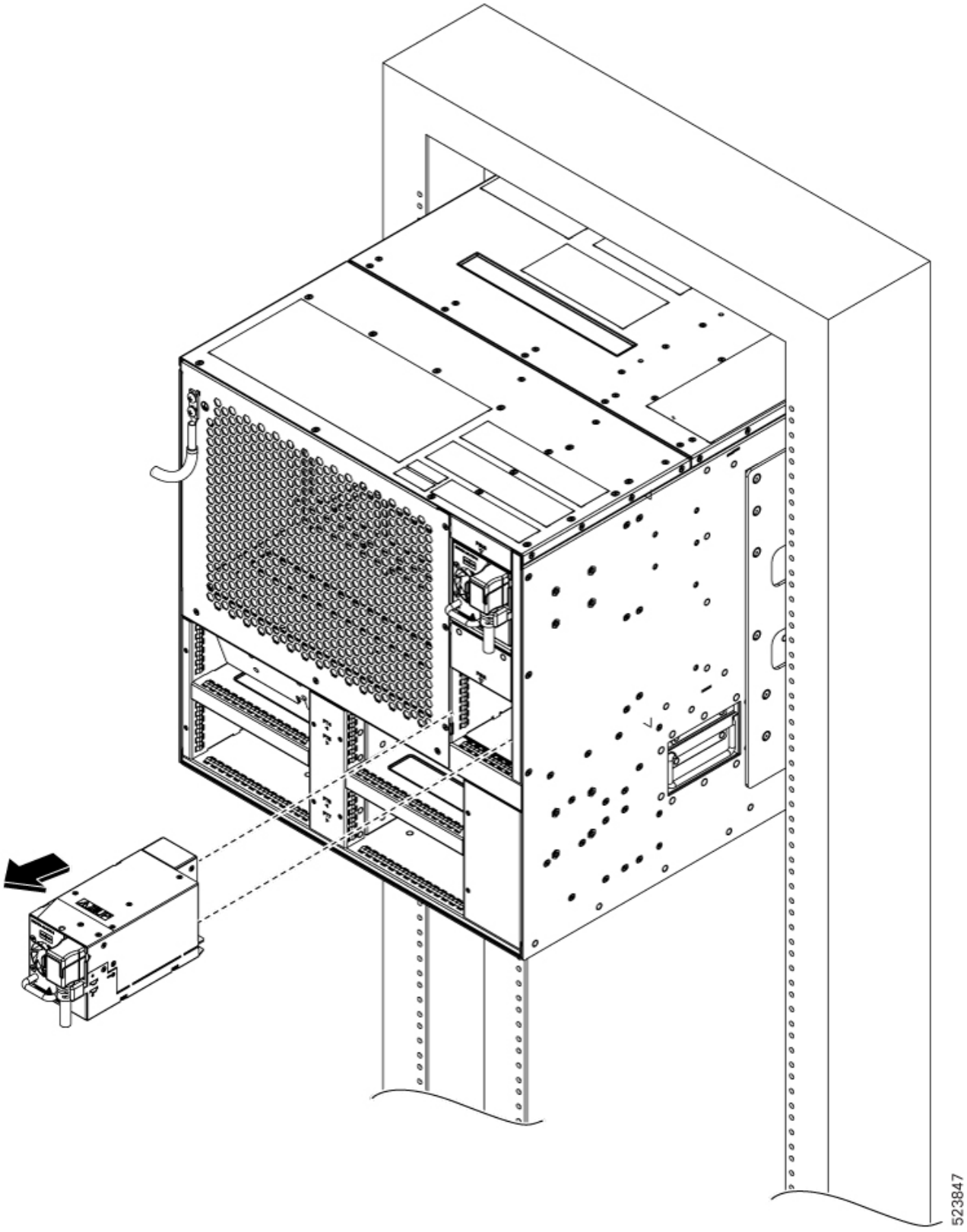

523847

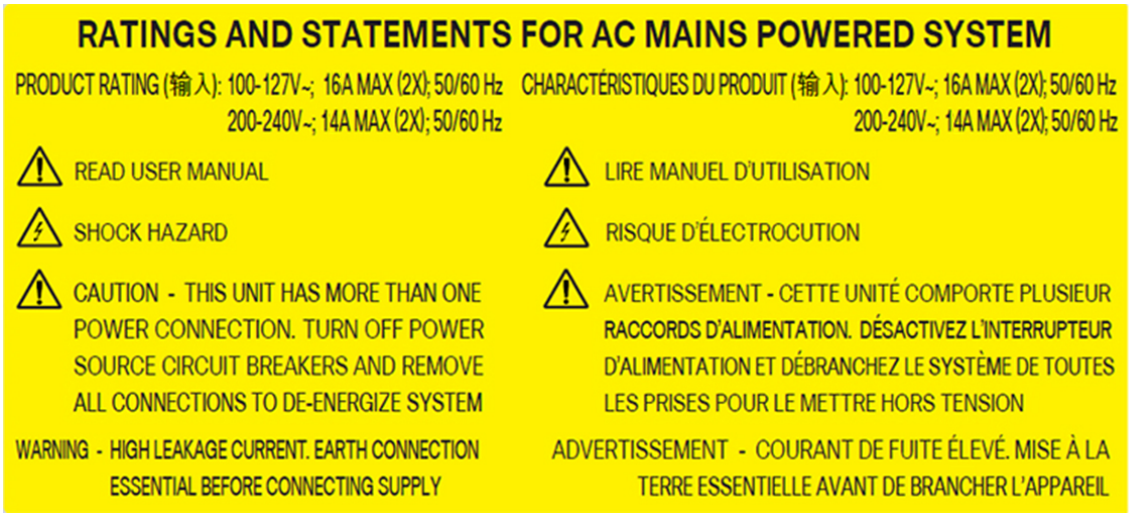
Figure 50: Inserting the PSU



Connect AC Power to the Cisco NCS 1020 Chassis

Caution The Cisco NCS 1020 chassis relies on the protective devices in the building installation to protect against short circuit, overcurrent, and ground faults. Ensure that the protective devices comply with local and National Electrical Codes.

Figure 51: Rating Label for AC Power



The voltage rating value for AC power ranges either 200–230 or 100–120 V~ depending on the standards in various countries.

Note You need a dual pole breaker for the installation. The rating of the dual pole breaker for each feed is 14 A for input voltage 200–230 V~, and 20 A for input voltage 100–120 V~.

Procedure

Step 1 Verify that the AC cable is installed in the correct AC source panel. Ensure that either the fuse is removed or the circuit breaker is in the *off* position and locked out.

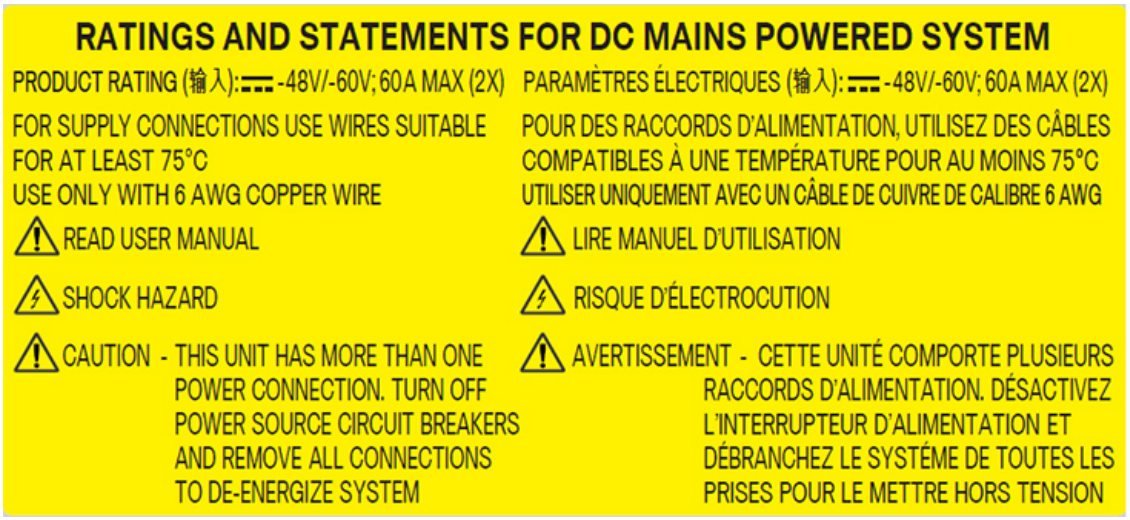
Step 2 Attach the AC power cable to the cable connector in the AC power module.

Step 3 Close the cable retention clips to secure the power cables and to prevent their accidental removal.

Connect DC Power to the Cisco NCS 1020 Chassis

Caution The Cisco NCS 1020 chassis relies on the protective devices in the building installation to protect against short circuit, overcurrent, and ground faults. Ensure that the protective devices comply with local and National Electrical Codes (NEC).

Figure 52: Rating Label for DC Power



Procedure

Step 1 Verify that the correct fuse panel is installed in the top mounting space.

Step 2 Measure and cut the cables as needed to reach the Cisco NCS 1020 chassis from the fuse panel.

Step 3 Dress the power according to local practice.

Step 4 Connect the office battery and return cables according to the fuse panel engineering specifications.

Step 5 Affix the power lug on the unit with two screws. Tighten the screws using torque of 2.7 N-m ± 0.3 N-m (21.69–28.09 lbs-in.).

Caution
Torque level greater than 3.0 N-m can damage the unit.

Use #6AWG cables.

Step 6 Use protection covers to keep the lugs in place.

Snap fit the protection cover towards the top for 90-degree lugs and push it down for straight (180-degree) lugs.

Install the Rear Fan/Filler Fan Trays

Use this procedure to install the rear fan trays to cool the type 2 line cards. The chassis can accommodate up to four rear fan trays.

Note The following procedure also applies to the filler fan tray installation.

Install the rear fan trays in the slot order, FT4 to FT7. Add the rear fan trays as per the installed type 2 line cards. The following table shows the required rear fan trays for each type 2 line card slot.

Type 2 Line Card Slots	Fan Trays
2, 3, 4, 5	FT4, FT5
6, 7, 8, 9	FT6, FT7



Note You must install the rear fan trays in pairs. If you intend to use only one type 2 line card in any of the slots above, you must install both rear fan trays for the respective slot. For type 2 filler cards, install the filler fan trays.

Procedure

Step 1 Before inserting the fan tray, use the *This Side Up* label to help yourself orient the fan tray correctly.

Step 2 Use one hand to support the fan tray at the bottom. Then use the other hand to hold the cross handle and insert the fan tray into the slot.

Figure 53: Installing the Rear Fan Tray

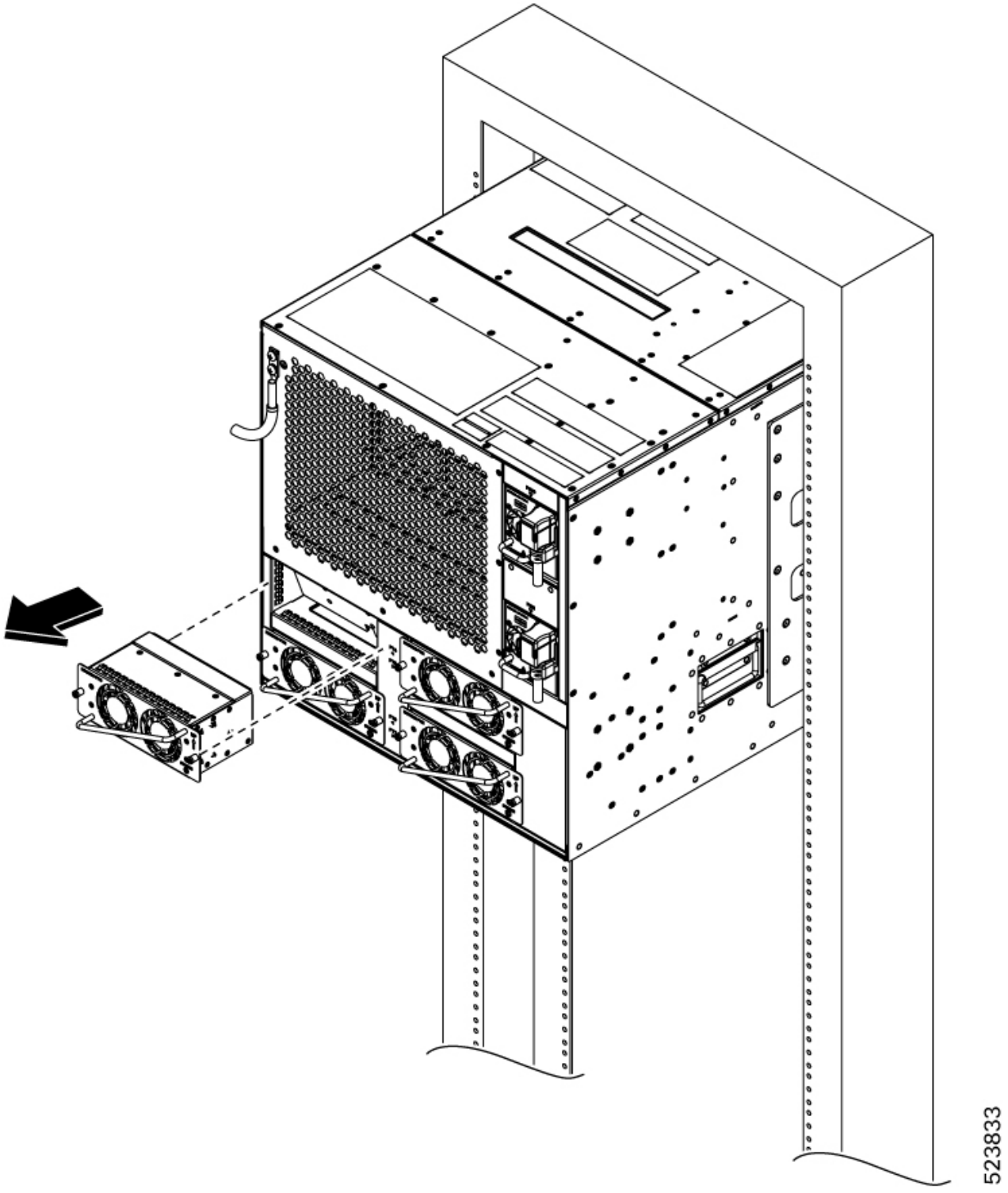
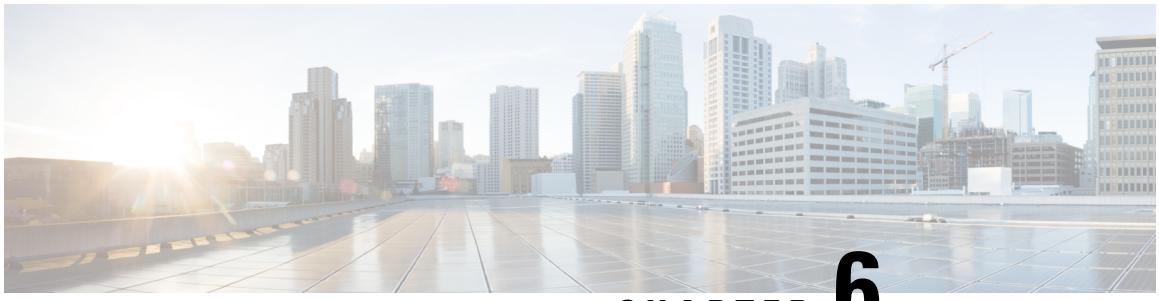


Figure 54: Installing the Rear Fan Tray



Step 3 Using the torque-limiting screwdriver, tighten the captive screws at the sides of the fan tray to a torque value of 0.65 N-m (5.75 lbs-in).

Step 4 Repeat the preceding steps to insert and fix the required number of fan trays.



CHAPTER 6

Remove and Replace the Cisco NCS 1020 Modules

This chapter describes the tasks to remove and replace Cisco NCS 1020 modules.

Note In this chapter, "front fan tray" refers to the NCS1010-FAN tray, "rear fan tray" refers to the NCS1020-FAN tray, and "filler fan tray" refers to the NCS1020-FAN-BLANK tray. Front fan trays and rear fan trays contain a different set of fan units. Slots for the front fan trays and rear fan trays are not interchangeable.

Note In this chapter, "Type 1 line card" refers to "NCS 1010 line card" and "Type 2 line card" refers to "NCS 1014 line card".

Caution Always populate the modular slots in the Cisco NCS 1020 chassis with respective modules (line card, controller, PSU, and fan trays). Perform the replacement or upgrade of the modules (Online Insertion or Removal (OIR)) only when the ambient temperature is below 30-degree C. Complete the OIR of modules within five minutes to prevent overheating of the components.

Warning **This unit might have more than one power supply connection. To reduce risk of electric shock, remove all connections to de-energize the unit.** Statement 1028.



Warning **There are no serviceable parts inside. To avoid risk of electric shock, do not open.** Statement 1073

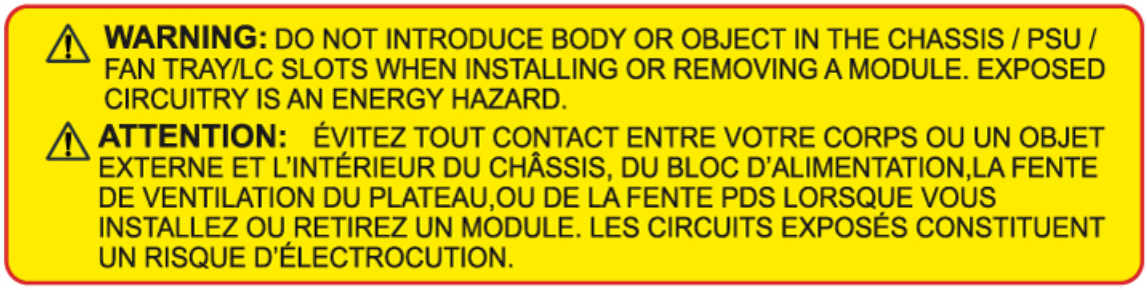
Warning **An instructed person is someone who has been instructed and trained by a skilled person and takes the necessary precautions when working with equipment.** Statement 1089.

A skilled person or qualified personnel is someone who has training or experience in the equipment technology and understands potential hazards when working with equipment. Statement 1089

Warning **Only a skilled person should be allowed to install, replace, or service this equipment. See statement 1089 for the definition of a skilled person.** Statement 1090

Warning **Only an instructed person or skilled person should be allowed to install, replace, or service this equipment. See statement 1089 for the definition of an instructed or skilled person.** Statement 1091

Note The maximum operating altitude for OIR is 1800 m.



- Remove the L-Band Cover, on page 87
- Remove and Replace the Rear Fan Tray, on page 88
- Remove and Replace the Power Supply Unit (PSU), on page 90
- Remove and Replace the Solid State Drive (SSD), on page 91
- Remove and Replace the Type 2 Line Card, on page 93
- Remove and Replace Chassis Door Foam Air Filters, on page 93
- Remove and Replace the Front Fan Tray, on page 96
- Remove and Replace the Type 1 Line Card , on page 98
- Wipe Data in Disk Using Secure Erase, on page 100
- Remove and Replace the Controller, on page 102

Remove the L-Band Cover

Use this task to remove the L-band cover from the Type 1 line cards.

Caution When upgrading the existing C-band only networks to C+L band networks, perform this procedure during the maintenance window only.

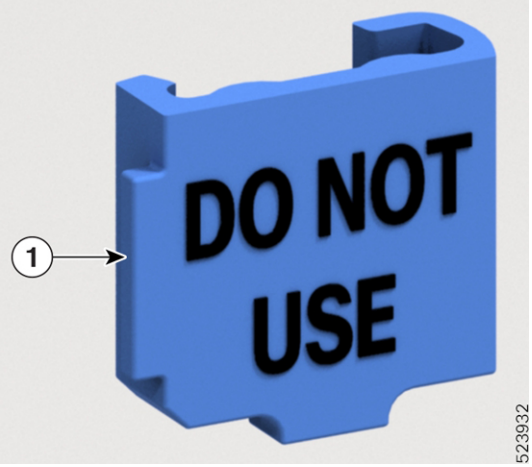
Procedure

Step 1 Look for the *DO NOT USE* label to locate the L-band cover.

Step 2 Using your fingers, hold the L-band cover on both sides.

Step 3 Holding the hinge surface on the left side of the cover, slowly pull the surface away from the chassis.

Figure 55: L-Band Cover



1	L-band hinge

The cover pulls the L-band shutter along with it.

Step 4 (Optional) Using the other hand, prevent the L-band shutter from opening.

Step 5 Carefully rotate the L-band cover with the shutter above the hinge. This unlocks the cover from the shutter, then remove the L-band cover underneath the hinge area.

Figure 56: Removing L-Band Cover



1	L-band cover

Step 6 Discard the cover as per the local recycle practices.

Remove and Replace the Rear Fan Tray

Use this procedure to remove and replace the rear fan tray in the Cisco NCS 1020 chassis.

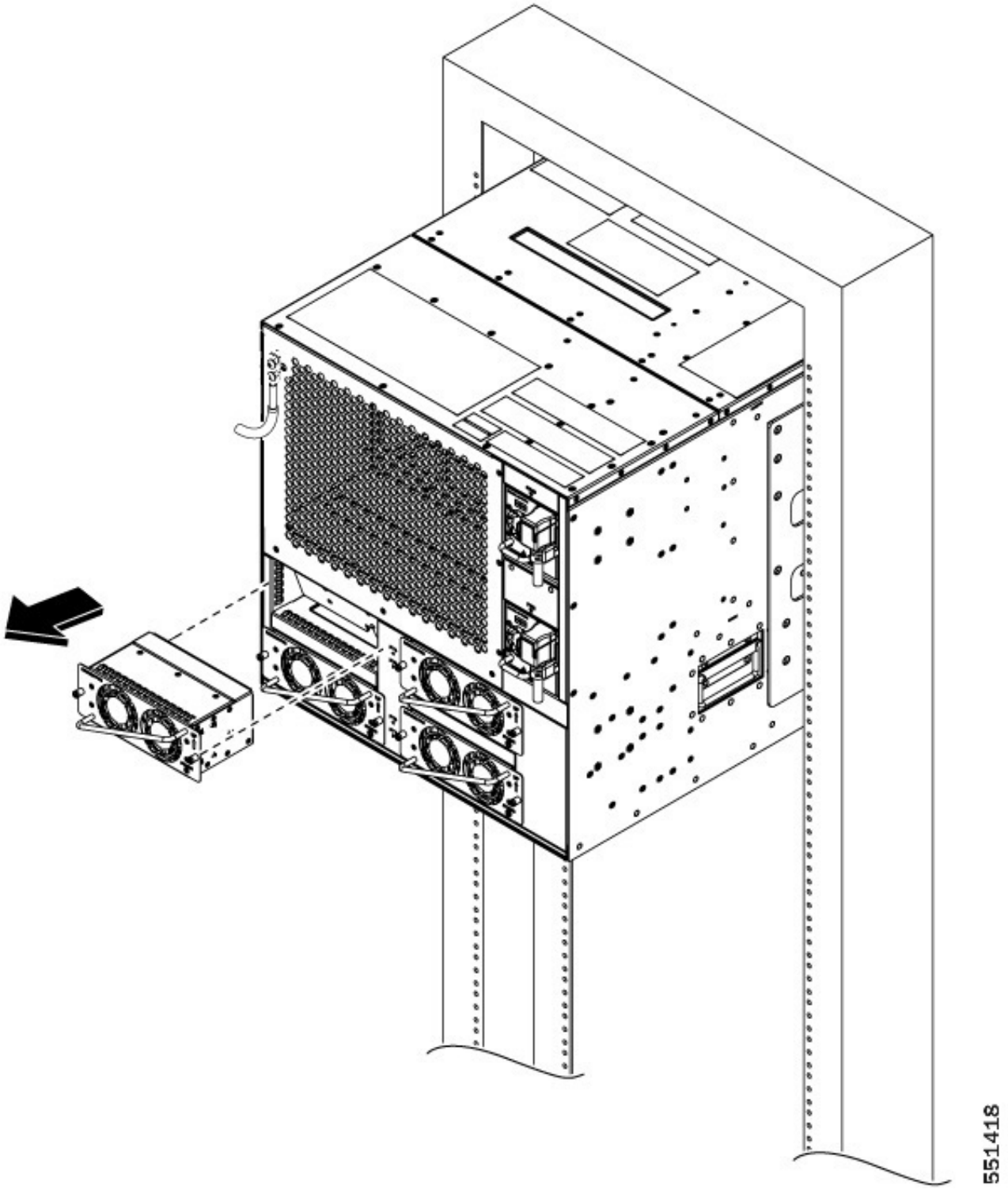
Note The following procedure also applies to the filler fan tray removal.

Procedure

Step 1 Loosen the captive screws (one on the left side and the other on the right side) using a screwdriver.

Step 2 Holding the handle with one hand and supporting the fan tray with the other hand, gently pull it out of the chassis.

Figure 57: Removal of the Rear Fan Tray



What to do next

To install new fan trays or filler trays, see Install the Rear Fan/Filler Fan Trays, on page 80

Remove and Replace the Power Supply Unit (PSU)

Use this procedure to remove and replace a PSU in the Cisco NCS 1020 chassis.

Before you begin

Remove the connections to the power supply:

- Disconnect power from the breaker before disconnecting power from the power supply unit.
- Rotate the retainer to unsecure the cables and pull the cables outward, in case of an AC power supply unit.
- Remove the protection covers, fasteners, and lugs, in case of a DC power supply unit.

Procedure

Step 1 Press the locking latch towards the left to release the lock.

Step 2 Holding the handle with one hand and supporting the PSU with the other, gently pull out the PSU from the slot.

Figure 58: Removal of the AC PSU

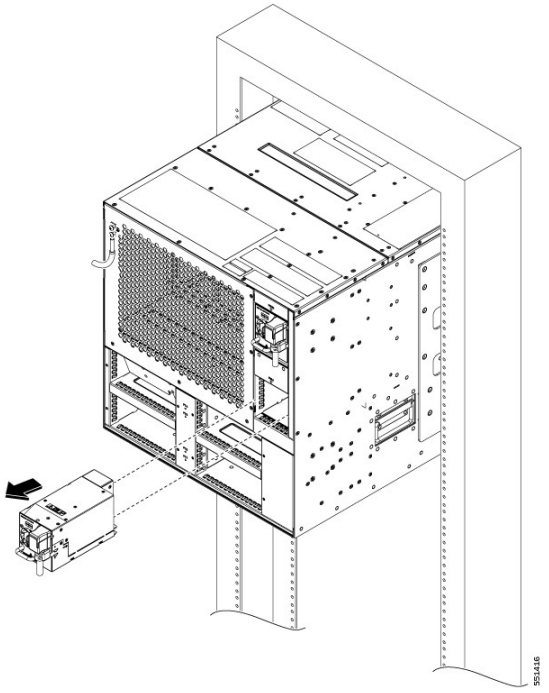
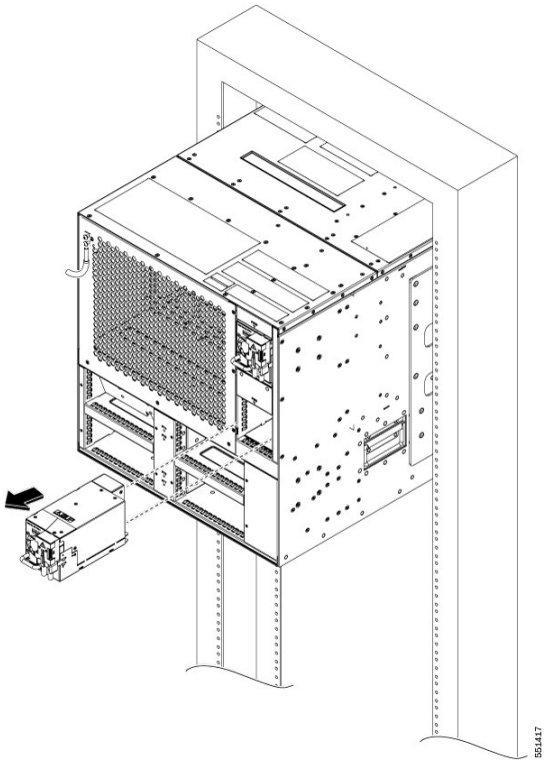


Figure 59: Removal of the DC PSU



What to do next

Install the Power Supply Units (PSUs), on page 74.

Remove and Replace the Solid State Drive (SSD)

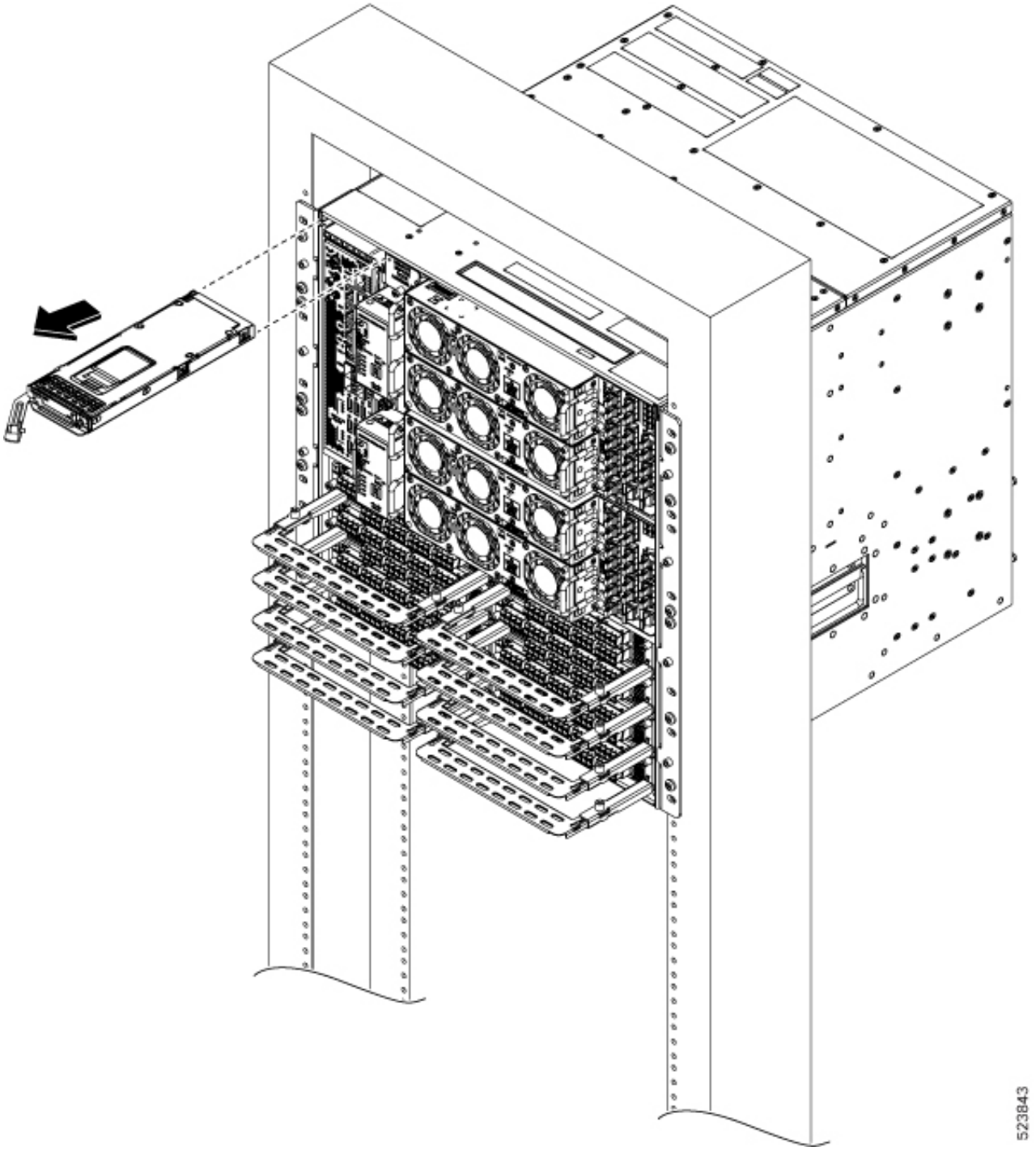
Use this procedure to remove and replace the SSD in the Cisco NCS 1020 chassis.

Procedure

Step 1 Using a T15 six lobe/slot screwdriver, loosen the lone captive screw on the SSD.

Step 2 Rotate the ejector outward against a hinge point on the chassis to unmount it from the connector and then pull out.

Figure 60: Removing the SSD



What to do next

Install the Solid State Drive (SSD), on page 72

Remove and Replace the Type 2 Line Card

Use this procedure to remove and replace the type 2 line card in the Cisco NCS 1020 chassis.

Note This procedure also applies to the type 2 filler card removal.

Caution Perform the removal and replacement procedure for a type 2 line card or filler card only when the ambient temperature is below 30-degree C (80-degree F). Complete the procedure within five minutes to prevent overheating of the chassis components.

Procedure

Step 1 Using the T-15 six lobe/slot screwdriver, loosen the captive screws available in the type 2 line card.

Step 2 Holding the fiber management bracket with one hand and supporting the type 2 line card with the other, pull it away from the slot.

Caution
Use the fiber management brackets only for pulling out or pushing in the type 2 line cards or filler cards. Do not use the fiber management brackets to carry the cards. Always support the type line card or filler card at the bottom with your hand.

What to do next

Install the Type 2 Line/Filler Card, on page 71

Remove and Replace Chassis Door Foam Air Filters

The air filter removes dust from the fan that is drawn into the chassis by the fan trays. If the air filters are damaged, dirty, or clogged with dust, replace them with new air filters. Failure to replace a compromised air filter can result in insufficient fan circulation through the chassis and temperature-related environmental alarms.

Note Inspect the air filters every three months and replace them as needed. Air filters should be disposed of and replaced when they become dirty. According to NEBS guidelines, washing or cleaning them is not allowed. Make sure to order these consumable items separately and keep a spare stock. For PID identification, contact TAC, as these parts cannot be replaced through the RMA process.

The front doors come with preinstalled air filters (NCS1020-DR-FTF=). If air filters need a replacement, use this procedure.

Procedure

Step 1 Remove the two quarter turn fasteners from the front door.

Figure 61: Replace Air Filter

Step 2 Install the new door filters on both the front doors.

Step 3 Tighten the two quarter turn fasteners back on the doors.

Step 4 Store the door frames in a package.

Remove and Replace the Front Fan Tray

Use this procedure to remove and replace a front fan tray in the Cisco NCS 1020 chassis.



Caution Online Insertion and Removal (OIR) duration for the fan tray unit at 30-degree C (80-degree F) ambient temperature, is five minutes.

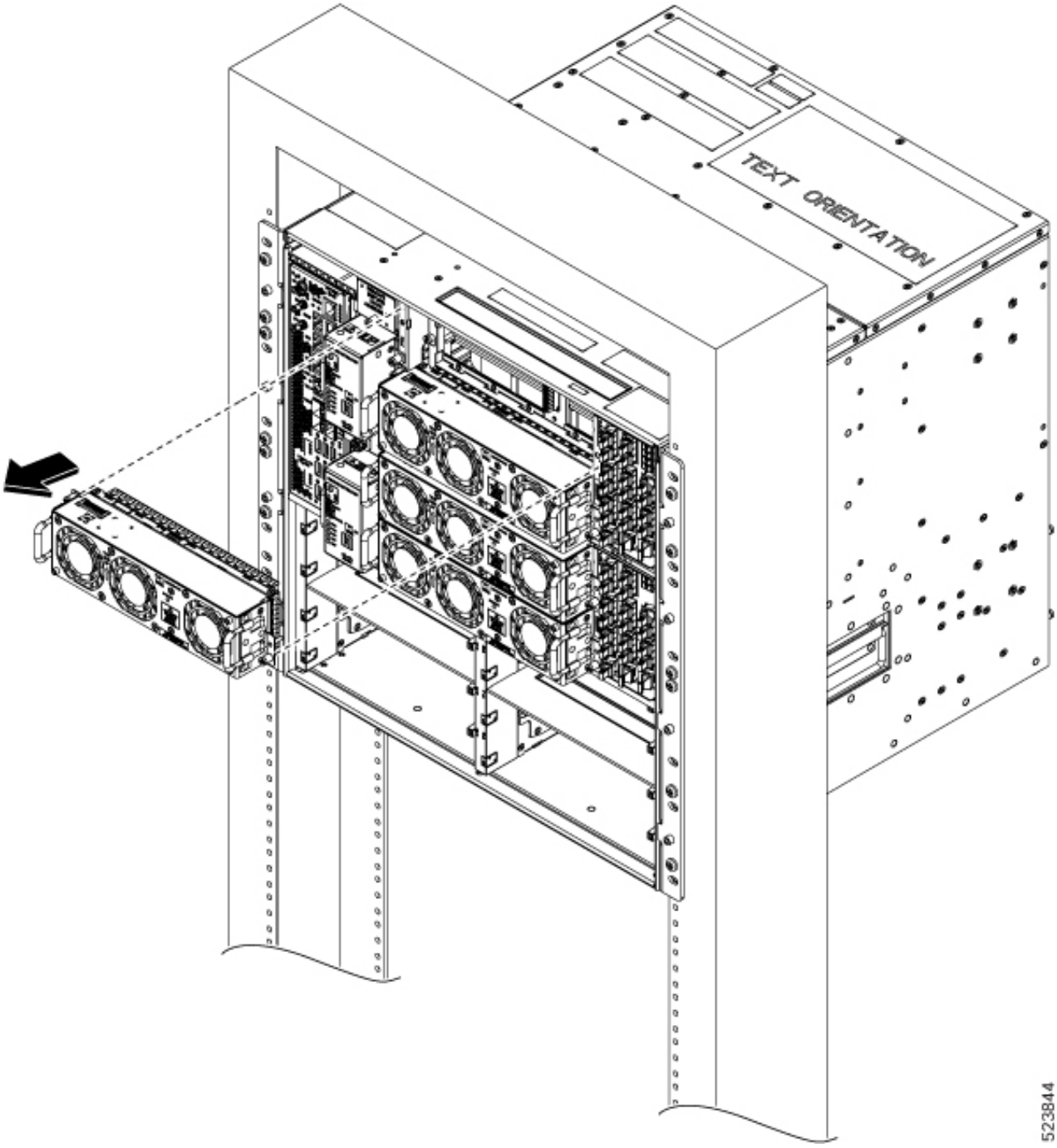
Only one fan tray should be removed at a time. Removing both fan trays simultaneously leads to overheating and may result in an unexpected system shutdown.

Procedure

Step 1 Loosen the captive screws (one on the left side and the other on the right side) using a screwdriver.

Step 2 Using the handle, pull the fan tray out of the chassis.

Figure 62: Removing the Front Fan Tray



Step 3 Repeat Step 1 and Step 2 to remove the second fan tray.

What to do next

To replace a front fan tray, see Install the Front Fan Trays, on page 68.

Remove and Replace the Type 1 Line Card

Note This procedure also applies to the type 1 active and passive filler card removal.

Use this procedure to remove and replace the type 1 line card in the Cisco NCS 1020 chassis.

Before you begin

- Remove the fan trays.

Caution

- **Perform the removal and replacement procedure for the line card only when the ambient temperature is below 30-degree C and complete it within five minutes to prevent overheating of the chassis components.**
- **Ensure that you perform the removal and replacement of the fan trays and line card within the five minutes of time limit.**
- **As the fan trays draw power through the line card, you must complete the line card replacement before installing the fan trays on top of it.**

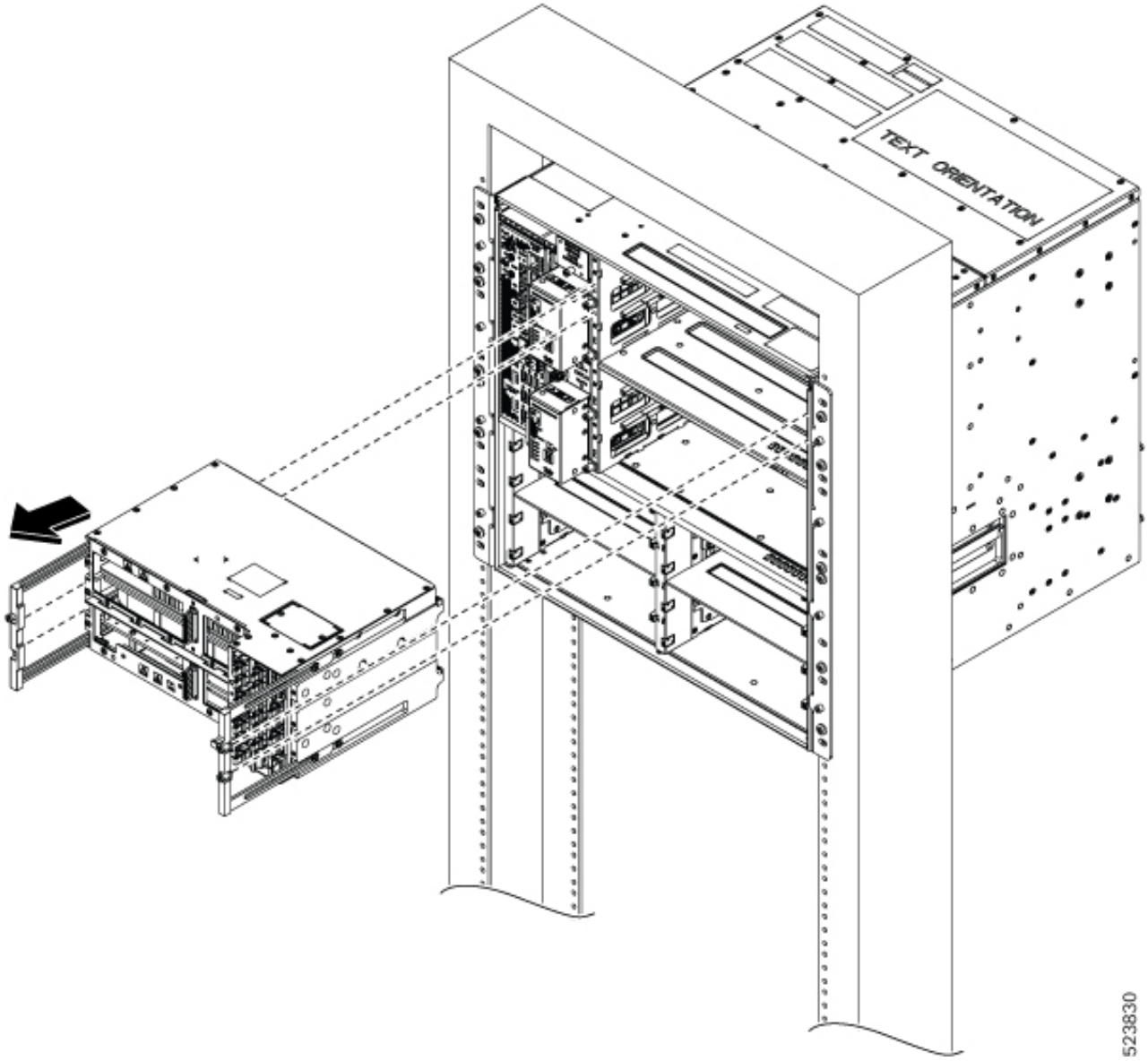
Procedure

Step 1 Loosen the captive screws available in the type 1 card handles.

Step 2 Pull the handles out of the type 1 line card, and gently remove the card from the chassis.

Caution
Use the handles only to push and pull out the type 1 line card from the chassis. Do not use the handles to carry the type 1 line card. To prevent any accidental drop, support the top and bottom of the type 1 line card with your hand while you remove or insert it.

Figure 63: Removing the C-Band Type 1 Line Card



What to do next

To replace the type 1 line card, see Install the Type 1 Line/Filler Card, on page 65.

Wipe Data in Disk Using Secure Erase

When NCS 1020 becomes faulty, contact TAC to open a Return Material Authorization (RMA) request. Before opening an RMA request, you can securely erase data on NCS 1020 disks using the Secure Erase feature.

Warning Use this procedure only during RMA.

Before you begin

- The NCS 1020 unit that is planned for RMA must be taken out of the data center and the network. You must access NCS 1020 only using the console port.
- You must perform the RP cold reload for the successful CPU disk wipe.
- You must perform the chassis cold reload for the successful Chassis disk wipe.

Procedure

Step 1 When NCS 1020 boots during RP cold reload or chassis cold reload, the following message appears.

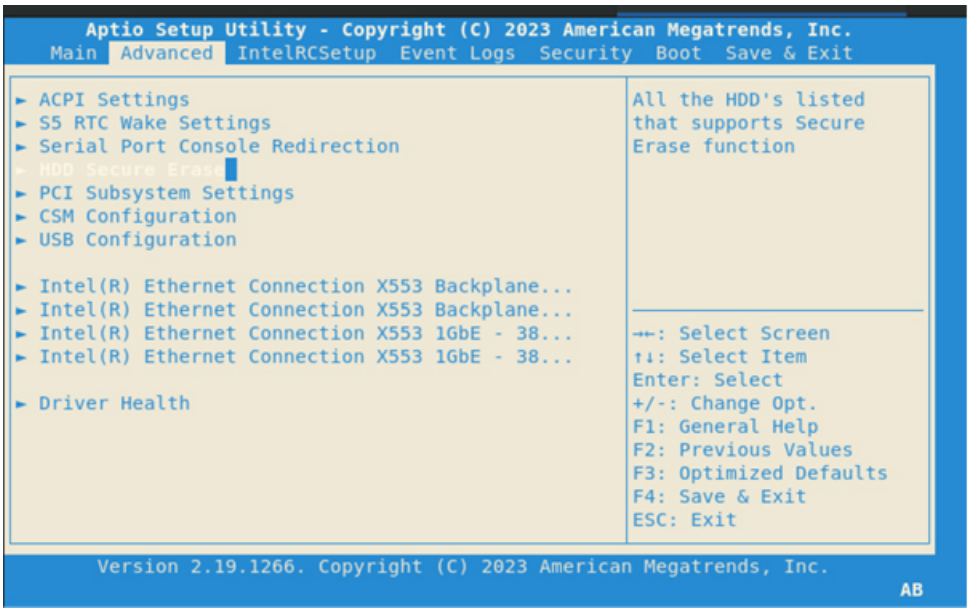
```
Version 2.19.1266. Copyright (C) 2024 American Megatrends, Inc.
BIOS Date: 03/15/2024 16:30:21 Ver: 0ACHI0520
Press <DEL> or <ESC> to enter setup.
Entering Setup...
```

Press DEL or ESC key to enter BIOS.

Step 2 Select the **Advanced** tab using the arrow keys.

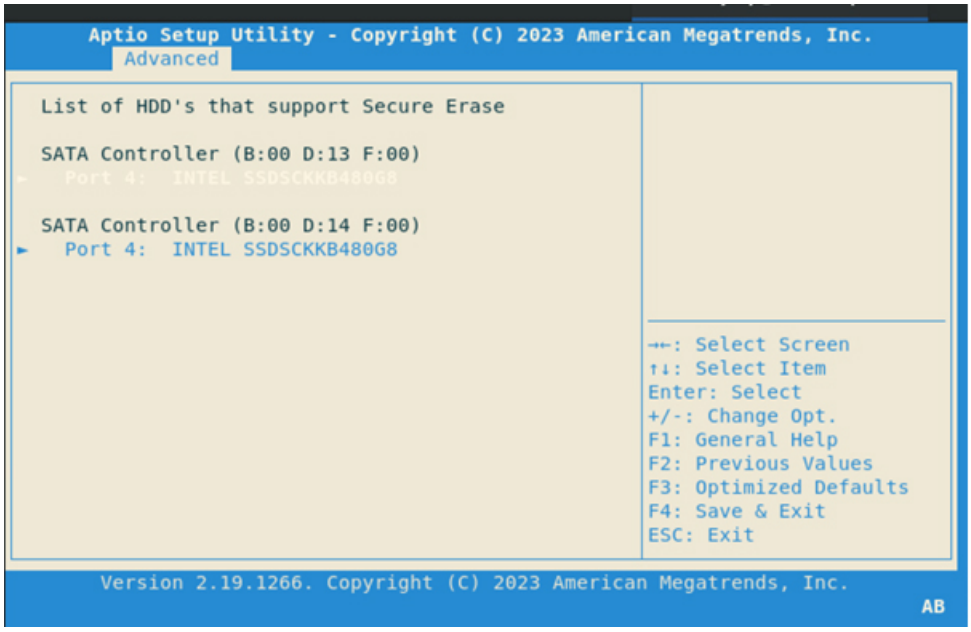
The disk security details such as HDD Secure Erase are displayed in the **Advanced** tab.

Step 3 Select **HDD Secure Erase** to securely erase data.

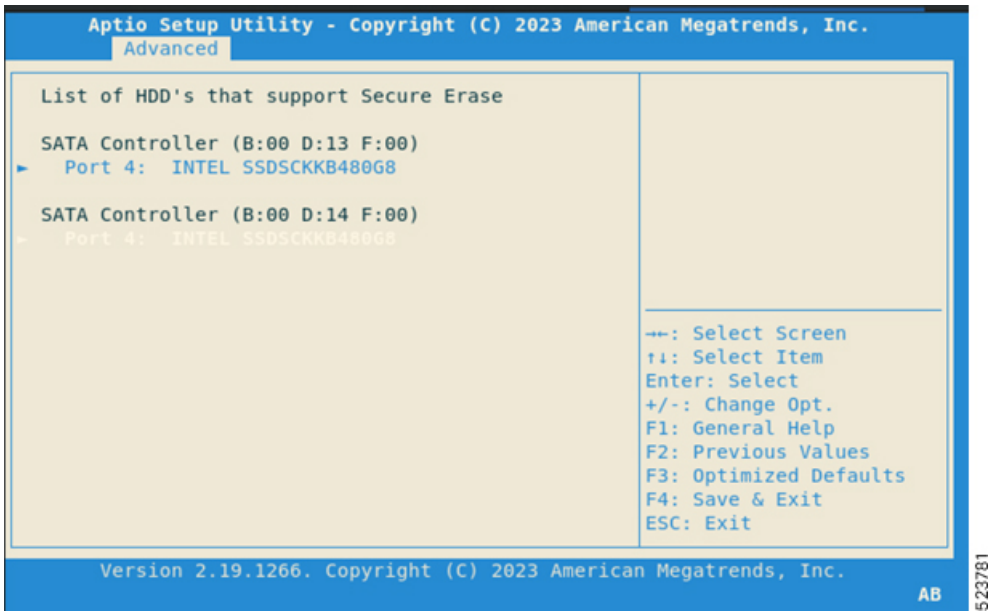


Step 4 Select the SSD using the arrow keys.

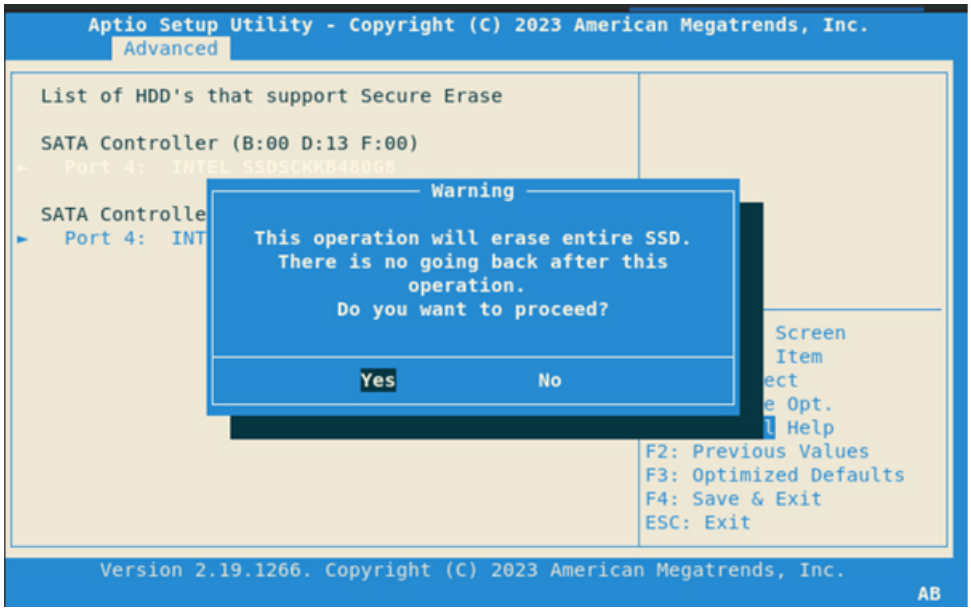
a) Select the SSD under D: 13 for RP SSD erase.



b) Select the SSD under D: 14 for chassis SSD erase.



Step 5 Click **Yes** on the **Warning** message box to erase the selected SSD data.



Remove and Replace the Controller

Use this procedure to remove and replace the controller in the Cisco NCS 1020 chassis.

Note The following procedure also applies to controller filler removal in slot 1.

Procedure

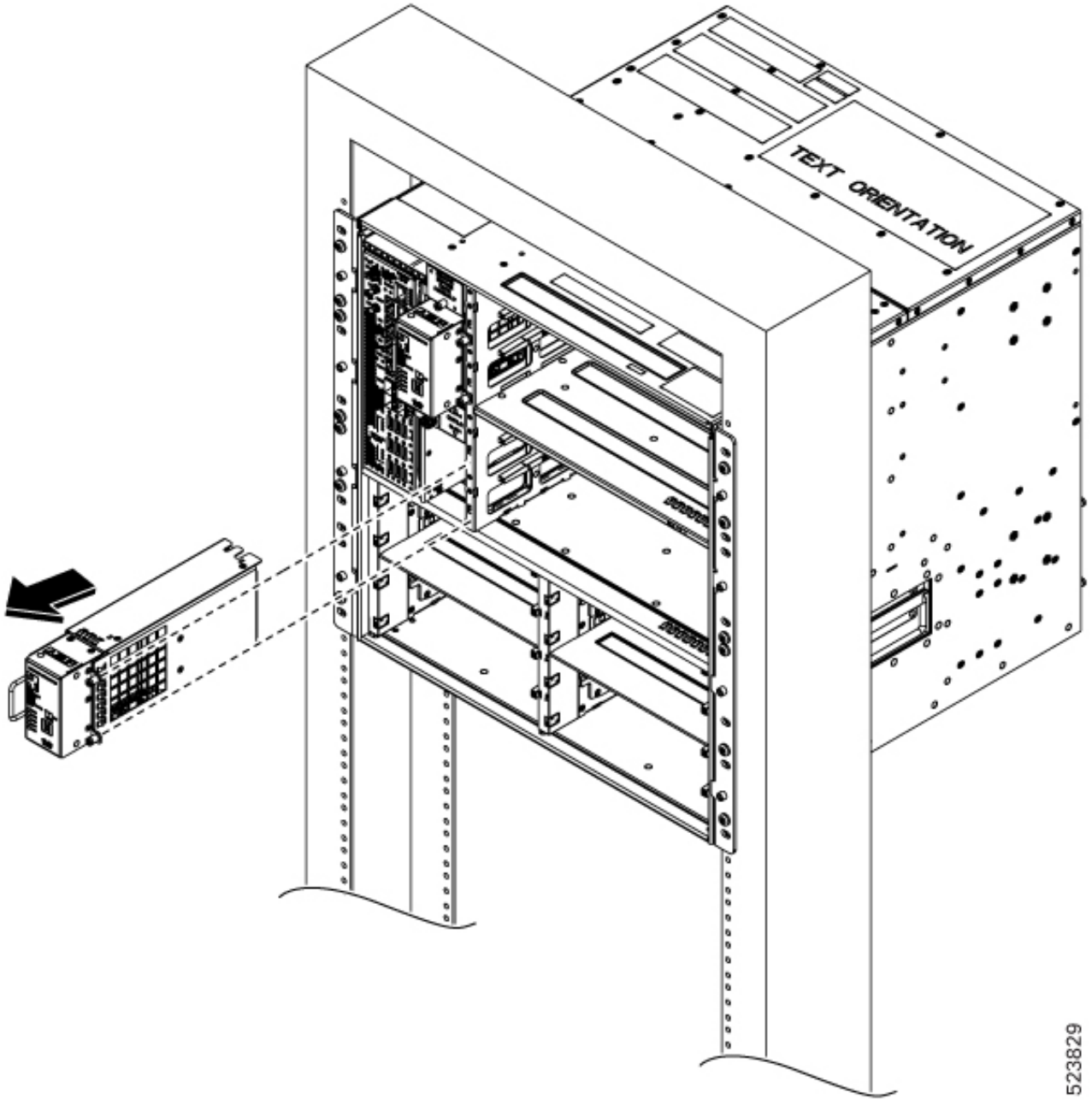
Step 1 Using a screwdriver, unfasten the two captive screws on the controller.

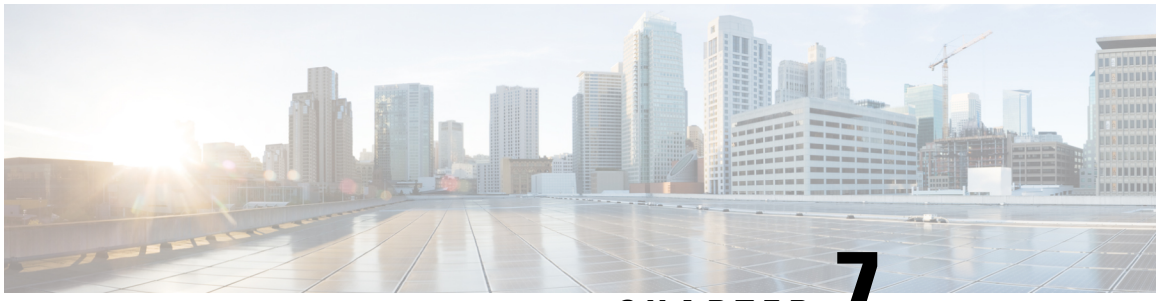
Step 2 Pull out the handle from the controller.

Notice
Controller filler has a fixed handle. You can skip this step.

Step 3 Holding the handle with one hand and supporting the controller with the other, gently remove the controller from the slot.

Figure 64: Removing the Controller





CHAPTER 7

LEDs

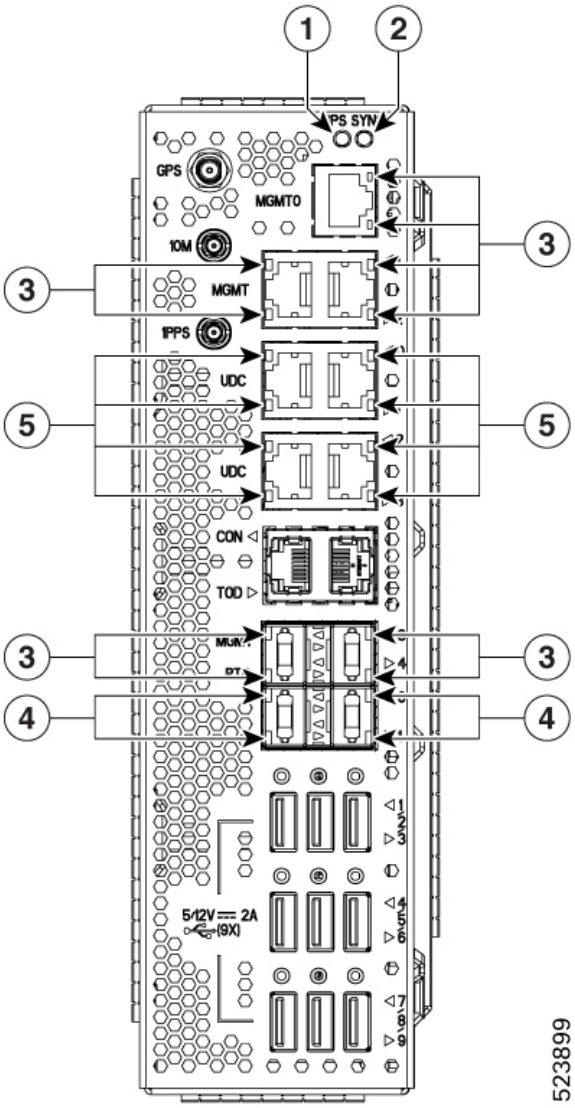
This section provides details of the LEDs in the Cisco NCS 1020 modules, controller unit, and line cards.

- EITU LEDs, on page 105
- Controller LEDs, on page 107
- Type 1 Line Card LEDs, on page 110
- CCMD-16-C and CCMD-16-L Line Card LED, on page 113
- Front Fan Tray LED, on page 114
- Rear Fan Tray LED, on page 115
- Power Supply Unit (PSU) LED, on page 116
- NCS 1020 Front Door LEDs, on page 117

EITU LEDs

The EITU has 24 LEDs indicating the status of its ports.

Figure 65: EITU LEDs



1	GPS LED	4	PTP (Ethernet Optical SFP Ports) LEDs
2	SYNC LED	5	UDC (Ethernet Optical SFP Ports) LEDs
3	MGMT (Ethernet Copper Ports) LEDs		

The following table shows the LEDs of EITU and their status.

Table 19: Status of the EITU LEDs

LED	Color	Status
GPS LED	Green	GPS phase is locked.
	Yellow	GPS is enabled.
	Off	GPS is not enabled.
	Red	GPS is used.
Sync LED	Green	Time core is synchronized to an external source including IEEE1588.
	Flashing green	System is in Synchronous Ethernet mode.
	Amber	Acquiring state or Holdover: Time core is in acquiring state or holdover mode.
	Off	Time core clock synchronization is disabled or in a free-running state.
Ethernet Copper Ports (MGMT 0/1/2/3/4) LEDs	Green	The link is ON.
	Yellow	Link is up but without traffic.
	Flashing yellow	Link is up but with traffic.
Ethernet Optical SFP Ports (PTP0/1, UDC 0/1/2/3) LEDs	Green	Duplex or traffic collision are present.
	Yellow	Link is up but without traffic.
	Flashing yellow	Link is up but with traffic.

Controller LEDs

The controller (NCS1010-CTR2-K9 and NCS1010-CTR2-B-K9) units have one USB port and six LEDs to indicate the system status and the status of the components.

Figure 66: Front View of the NCS1010-CTR2-K9 Controller

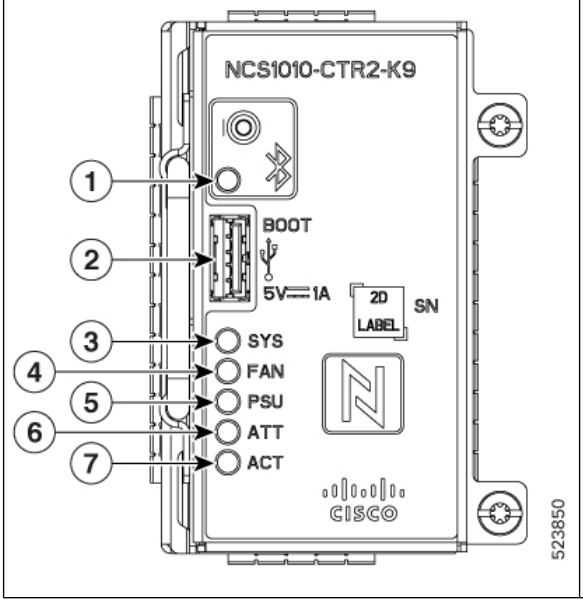
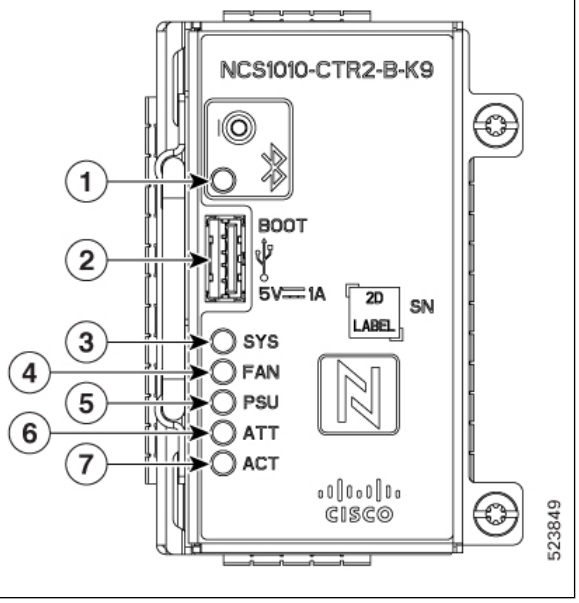


Figure 67: Front View of the NCS1010-CTR2-B-K9 Controller



1	Bluetooth Low Energy (BLE) Status LED	5	Power Supply Status LED
2	USB Interface	6	Attention LED
3	System Status LED	7	ACT LED
4	Fan Status LED		

Table 20: Status of the Controller LEDs

LED	Controller/System Status	Default Status of LED	Color	Status
BLE LED	System is up and running	Off	Green	Idle in Data mode.
			Orange	Idle in Command mode.
			Purple	Waiting for a pairing device.
			Blue	Active and data is transferring.
			Blue (flashing)	Active and connected.

LED	Controller/System Status	Default Status of LED	Color	Status
System LED	During controller boot up	Red	Red	Controller is powering ON.
			Red (flashing slowly)	BIOS loading.
			Yellow (flashing slowly)	Operating system loading.
			Red (flashing fast)	Secure boot failure. Replace the controller.
			Yellow (flashing fast)	Controller is not seated properly. Remove and replace the controller properly.
System LED	Controller is operational	Red	Red	Major or critical alarm is active.
			Yellow	Minor alarm is active.
			Green	The module is operational and has no active alarms.
Fan LED	System is up and running	Red	Green	No alarm is present for the fans.
			Red	Either a fan is missing from its slot or is faulty.
PSU LED	System is up and running	Red	Green	All PSUs present in the chassis are in working condition.
			Red	Either a PSU is missing from its slot or is faulty, or there is no input power.
Attention LED	System is up and running	Off	Blue	Used to identify a specific chassis in a rack or room. Use this LED for troubleshooting purposes such as replacing the fiber and field-replaceable units. You can control it through the software CLI. Use the following command to activate this LED, manually: **hw-module attention-led location 0/RP0/CPU0**

LED	Controller/System Status	Default Status of LED	Color	Status
ACT LED (active controller)	After controller plug-in	Green	Red	Redundant controller unit (RCU) is enabled but the controller is missing from its slot or is faulty.
			Green	RCU is enabled and the controller functions as an active controller.
			Off	RCU is disabled.
ACT LED (backup controller)	After controller plug-in	Off	Red	RCU is enabled but the controller is missing from its slot or is faulty.
			Yellow	RCU is enabled and the controller functions as a backup controller.
			Off	RCU is disabled.

Type 1 Line Card LEDs

The OLT line cards (OLT-C) have two LEDs to indicate the line port alarm status, two LEDs indicating the add/drop port alarm status, and four LEDs indicating the MPO connector ports alarm status. The MPO port LEDs represent multiple ports.

Note The OLT line cards (E-OLT-C) do not have LEDs to indicate the line port alarm status.

Figure 68: Front View of the OLT-C Line Card Faceplate

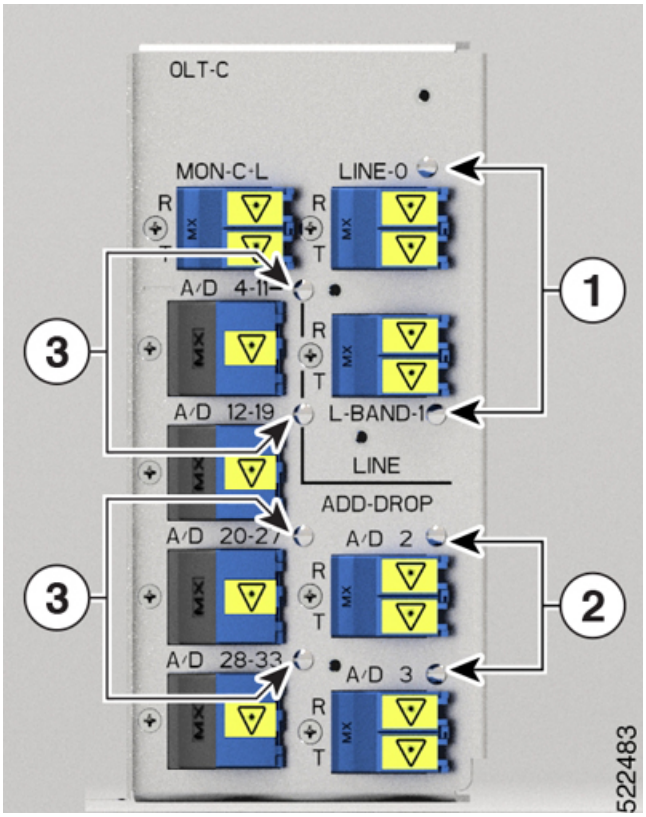
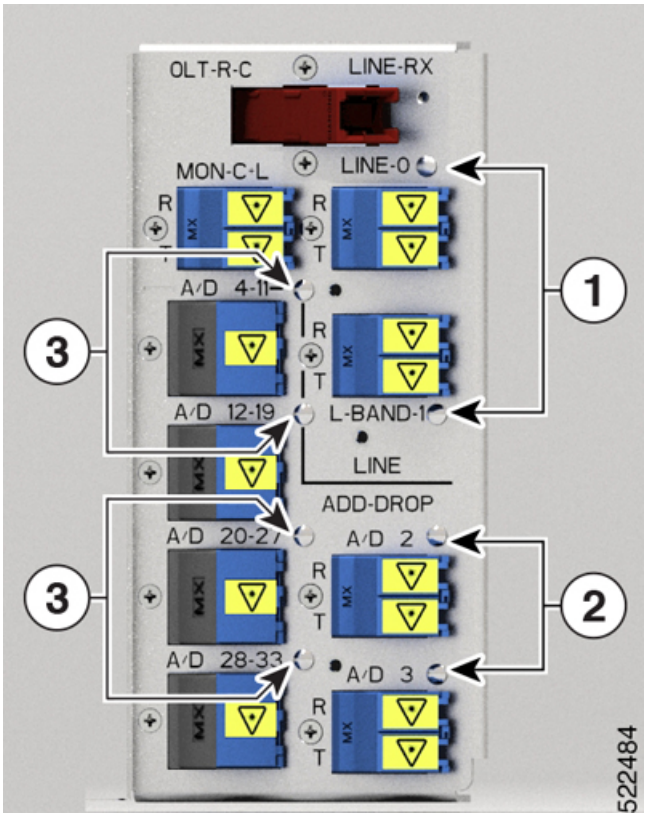


Figure 69: Front View of the OLT-R-C Line Card Faceplate



1	Line port LEDs
2	Add/Drop port LEDs
3	MPO connector LEDs

1	Line port LEDs

Table 21: Status of the Line Card LEDs

LED	Color	Status
Line card LED	Red	Indicates major and critical alarms, which could be a traffic impacting situation. Use the **show alarms brief system active** command to find the active alarms.
	Orange	Indicates a minor alarm. Use the **show alarms brief system active** command to find the active alarms.
	Green	Indicates that the module is operational and has no alarm.

Note The LED color shows the status of line-related alarms. The LED color does not change due to optical application alarms like the RAMAN-TUNE-FAILED alarm.

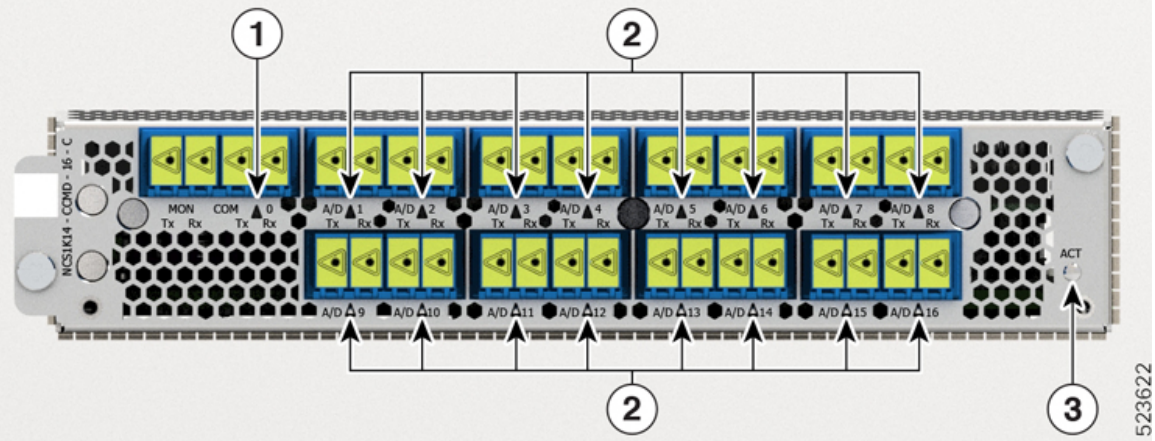
CCMD-16-C and CCMD-16-L Line Card LED

Note In Release 24.2.11, the Cisco NCS 1020 chassis supports the Type 2 CCMD-16-C line card LEDs only.

The CCMD-16-C and CCMD-16-L optical line cards have 18 LEDs each to indicate the system status and the status of the optical ports.

The following information applies to both CCMD-16-C and CCMD-16-L cards.

Figure 70: CCMD-16-C Optical Cards LEDs



Callout	LED
1	COM
2	A/D-1…A/D-16
3	ACT

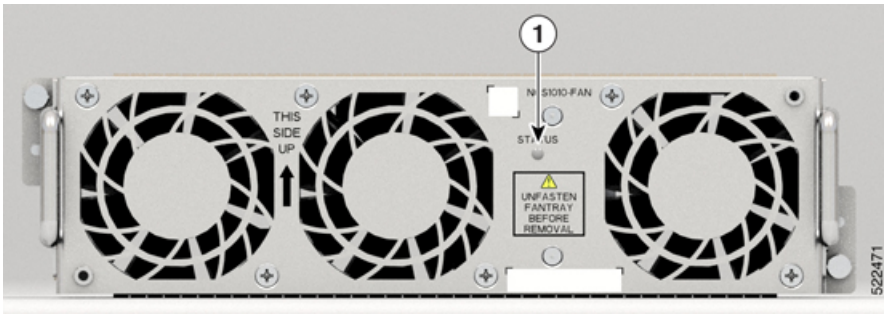
Table 22: Status of the CCMD-16-C and CCMD-16-L Optical Card LEDs

LED	Color	Status
ACT	Amber (solid)	The line card is booting. This color appears when you insert the line card into the chassis.
	Flashing Red	The line card is faulty.
	Green	The line card is up and operational—not associated to the traffic status.
COM, A/D-1…A/D-16	Off	The port is not provisioned.
	Red	Major alarm that could lead to a traffic impacting situation.
	Green	The module is operational and has no alarm.
	Amber (solid)	Minor alarm (such as low Rx or Tx power) that could lead to a traffic impacting situation.
	Amber (flashing)	This is used for troubleshooting, to identify the faulty port of an LC. Use the **controller optics** command in the configuration mode to point to a faulty port in the LC. The port is configured in maintenance mode or the attention LED is enabled for this port. **Note** Attention LED is not supported on ACT LED.

Front Fan Tray LED

The fan tray has one LED to indicate its status.

Figure 71: Front View of the Fan Tray



1	Fan tray LED

The following table has details of the fan tray LED:

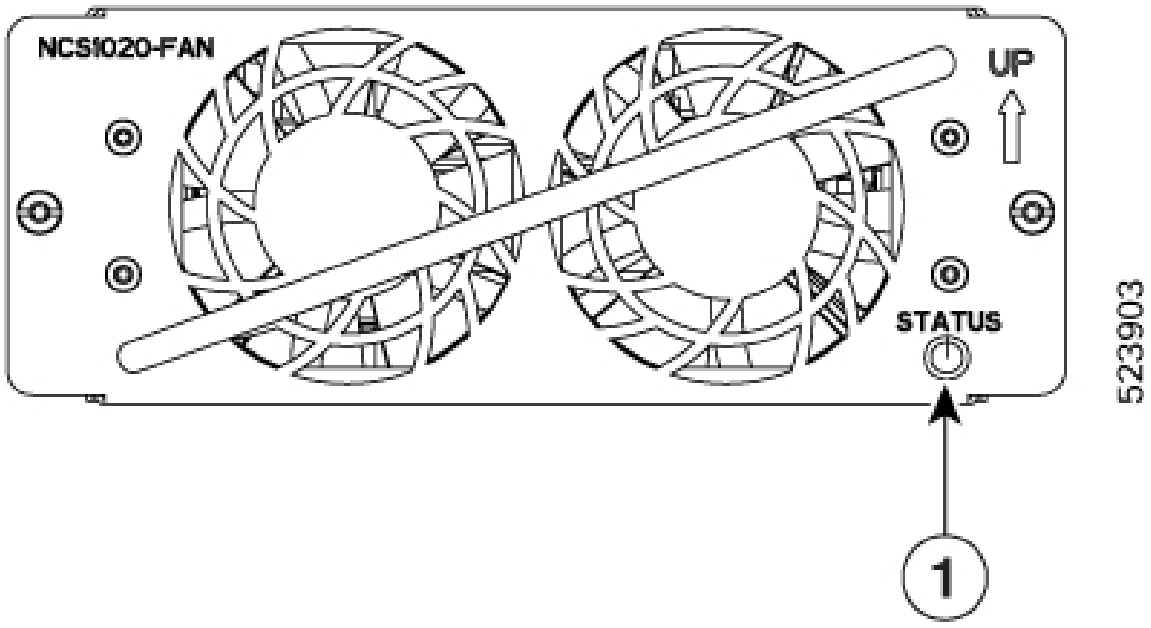
Table 23: Status of the Fan Tray LED

LED	Color	Status
Fan LED	Amber	Indicates that the fan speed is out of expected range such as fan is not rotating. Also, indicates that the fan speed is not readable.
	Red	Indicates a fault in the fan tray.
	Green	Indicates that the fan tray is working fine.

Rear Fan Tray LED

The fan tray has one LED to indicate its status.

Figure 72: Rear Fan Tray Front View



1	Fan tray LED

The following table has details of the fan tray LED:

Table 24: Status of the Fan Tray LED

LED	Color	Status
Fan LED	Amber	Indicates that the fan speed is out of expected range such as fan is not rotating. Also, indicates that the fan speed is not readable.
	Red	Indicates a fault in the fan tray.
	Green	Indicates that the fan tray is working fine.

Power Supply Unit (PSU) LED

The NCS1K4-AC-PSU-2 and NCS1K4-DC-PSU-2 units have one LED each to indicate their status.

Figure 73: Front View of 2.5-kW AC PSU

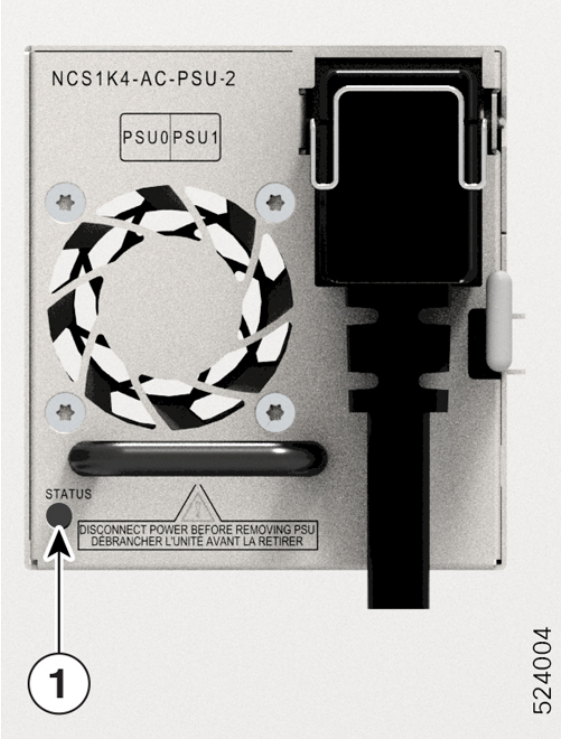
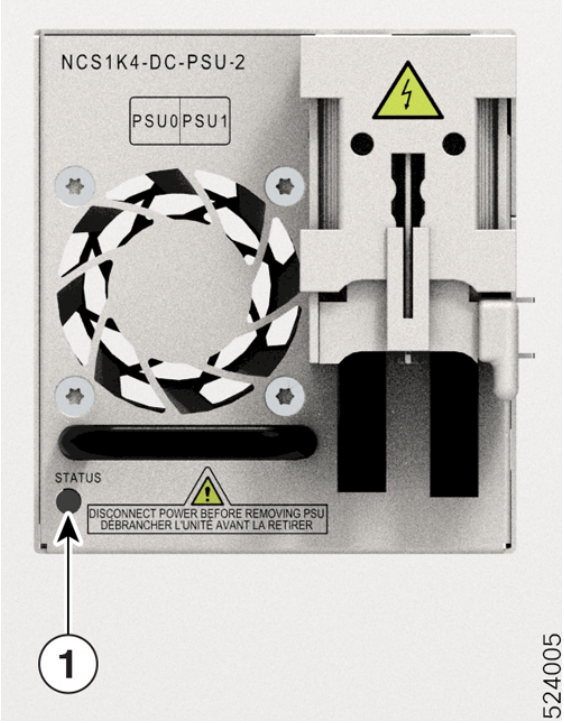


Figure 74: Front View of 2.5-kW DC PSU



1	PSU Unit (STATUS) LED

Table 25: Status of the 2.5-kW PSU LED

Color	Status
Amber	There exists no input to the PSU, provided the other PSU is working.
Off	Both PSUs do not have input.

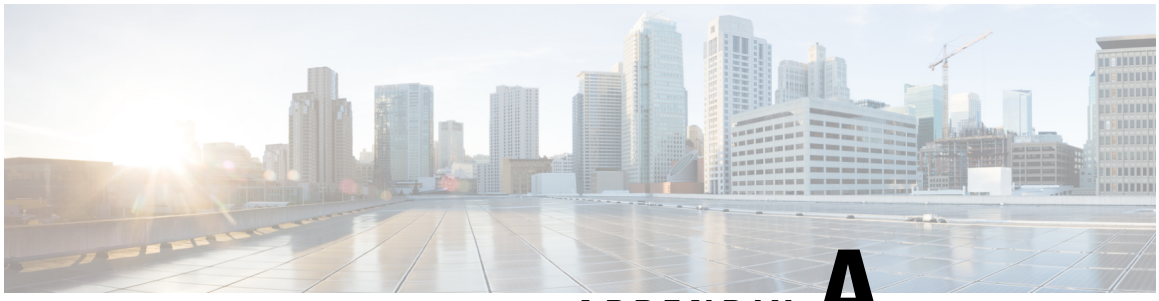
Color	Status
Green	The input to the PSU is valid.

NCS 1020 Front Door LEDs

The Cisco NCS 1020 Front Door (**NCS1020-DR=**) has two LEDs to indicate the system status and identify the chassis in the rack. The door LEDs mimic the ATT and SYS LEDs of the controller. This setup is done to avoid opening the door often to check the status of the chassis.

Note The door LEDs come up only when you have properly mated the chassis connector with door connector.

For LED indications, see the SYS and ATT LEDs of the controller.



APPENDIX A

Cisco NCS 1020 System Specifications

This chapter describes the system specifications for Cisco NCS 1020.

- Environmental Specifications, on page 119
- Power Specifications, on page 119
- Cable Specifications, on page 120

Environmental Specifications

The Cisco NCS 1020 has the following environmental specifications:

Table 26: Environmental Specifications for Cisco NCS 1020

Environmental Conditions	Operating Duration	Operating Temperature	Operating Altitude
Operating at high or low temperature	Short term[1]	–5–55° Celsius	1800 m
Normal Operation	Long term (365 days)	5–40° Celsius	1800 m
Fan failure[2]	Short term	5–40° Celsius	1800 m

1 As per NEBS GR-63-CORE, short term refers to a period of not more than 96 consecutive hours and a total of not more than 15 days in one year (This refers to a total of 360 hours in any given year, but not more than 15 occurrences during that one year)

2
- In the front fan section, a fan failure means that one of the fans on both fan trays stopped working (5 out of 6 fans are working).
- In the rear fan section, a fan failure means that one of the fans on both fan trays stopped working (1 out of 2 fans are working).

Replace a failed fan tray as per the replacement procedure within the OIR time limits.

Power Specifications

The Cisco NCS 1020 has the following power specifications:

Table 27: DC + DC Redundancy

Nominal input voltage	–48…–60 Vdc
Maximum input current	60 A at –48 Vdc
Input voltage range	–40…–72 Vdc (operating)
Input turn ON voltage	–41…–42 Vdc maximum
Recommended protective device rating	90 A maximum per feed

Table 28: AC + DC Redundancy

Input Low Line (LL) Nominal voltage	100–120 V~
Input High Line (HL) Nominal voltage	200–230 V~
Maximum Input current at 100 V~	16 A
Maximum Input current at 200 V~	14 A
Input frequency rating	50/60 Hz
Input LL voltage range	90–140 V~
Input HL voltage range	180–264 V~
Input frequency range	47–63 Hz (nominal 50/60Hz)
Minimum Input turn ON voltage	85 V~ / 175 V~ (LL/ HL)
Maximum Input turn ON voltage	90 V~ / 180 V~ (LL/ HL)
Recommended protective device (HL)	16 A
Recommended protective device (LL)	20 A

Cable Specifications

The Cisco NCS 1020 has the following cable specifications:

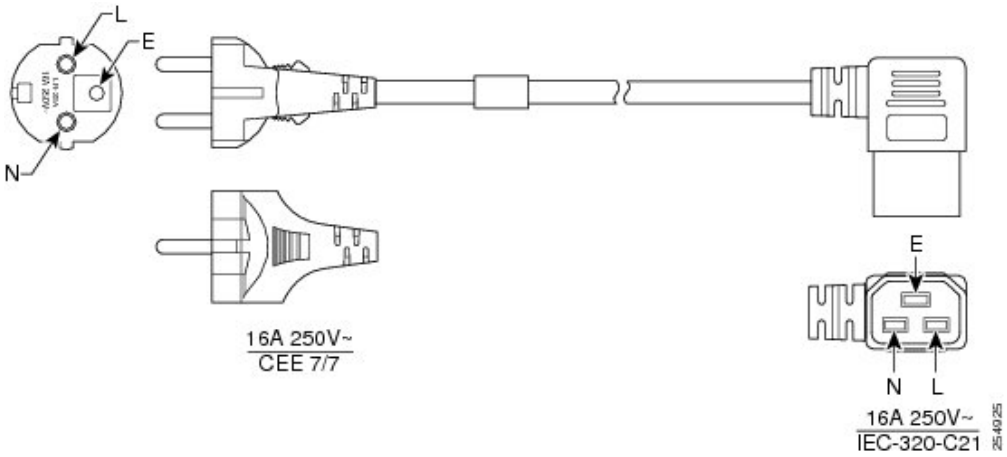
- AC and DC power cables that you have ordered.

  AC chassis—while ordering for an AC chassis, select the power cable type (straight, 90-degree, or jumper) and P1 connector (NEMA or CEE). Based on your choice, you will get a pair of 90 degree, straight, or jumper cables with NEMA or CEE connector for each PSU.

Table 29: Power Cables for the AC Chassis

Type of Cable	Voltage	P1 Connector	P2 Connector	PID	Specs	Cable Length (m)
Straight cable	240 V	NEMA L6-20P	IEC 60320 – C21	NCS1K4-AC-PSU-CBL=	16 A, 250 V	4.250
	240 V	CEE 7/7 (Europe)	IEC 60320 – C21	NCS1K4-AC-CBL-EU=	16 A, 250 V	4.250
90-degree cable	240 V	CEE 7/7 (Europe)	IEC 60320 – C21	NCS1K4-AC-CBL-EU=	16 A, 250 V	4.250
	240 V	NEMA L6-20P	IEC 60320 – C21	NCS1K4-AC-PSU-CBL	16 A, 250 V	4.250
Straight jumper	240 V	IEC 60320 – C14	IEC 60320 – C21	NCS1K4-CBL-4.25M=	16 A, 250 V	4.250
	240 V	IEC 60320 – C14	IEC 60320 – C21	NCS1K4-C21-C14-2M=	16 A, 250 V	2
Straight jumper	240 V	IEC 60320 – C20	IEC 60320 – C21	N1K4-C2021-5F-NA=	16 A, 250 V	1.6 (North America)
	240 V	IEC 60320 – C20	IEC 60320 – C21	N1K4-C2021-5F-EU=	16 A, 250 V	1.6 EU)
	240 V	IEC 60320 – C20	IEC 60320 – C21	N1K4-C2021-5F-IN=	16 A, 250 V	1.6 (India)
Straight jumper	240 V	IEC 60320 – C20	IEC 60320 – C21	N1K4-C2021-4M-NA=	16 A, 250 V	4.25 (North America)
	240 V	IEC 60320 – C20	IEC 60320 – C21	N1K4-C2021-4M-EU=	16 A, 250 V	4.25 (EU)
	240 V	IEC 60320 – C20	IEC 60320 – C21	N1K4-C2021-4M-IN=	16 A, 250 V	4.25 (India)

Figure 75: 90-degree Cable (CEE 7/7)



Cisco NCS 1020 System Specifications

Figure 76: 90-degree Cable (NEMA L6-20P)

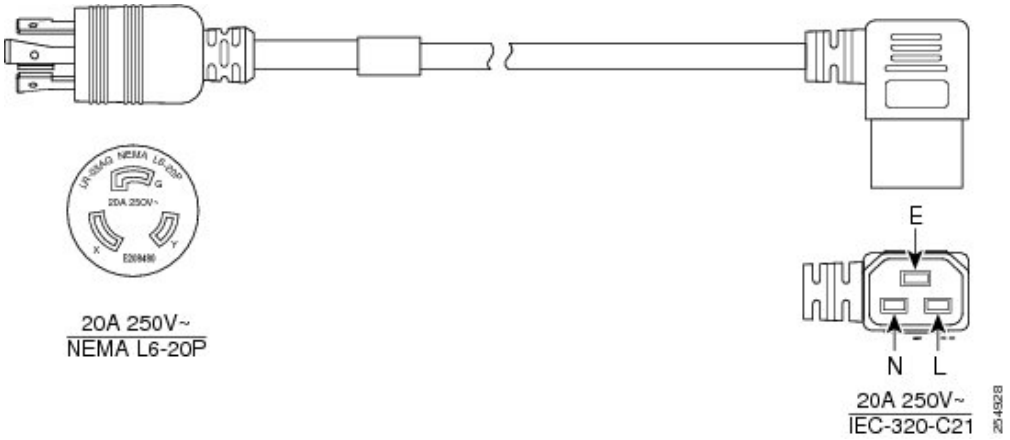


Figure 77: Straight Cable (NEMA L6-20P)

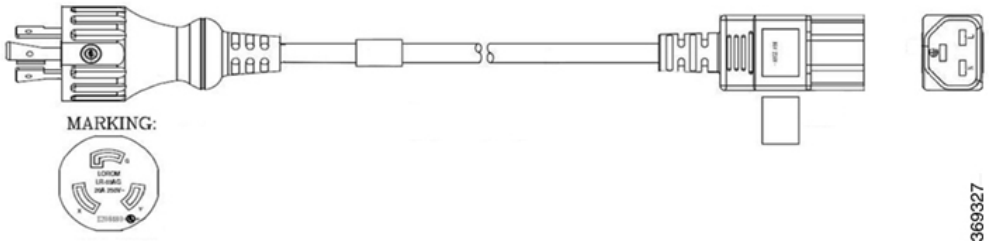
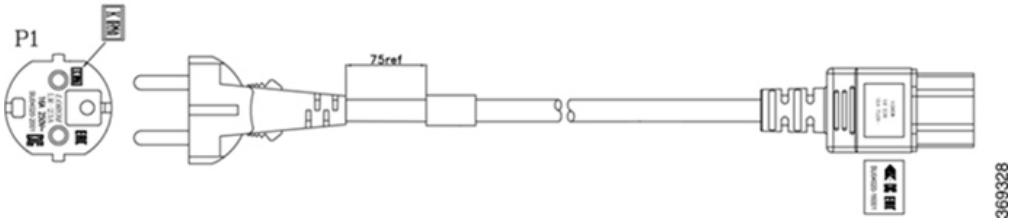


Figure 78: Straight Cable (CEE 7/7)



DC chassis—when you order for a DC chassis, you get four power lugs for each PSU (a pair of 90-degree and a pair of 180-degree lugs). The power lugs are included in the DC PSU package for spare-order. For Assemble-to-order, the power lugs are included in the Accessory kit.

Cisco NCS 1020 System Specifications

Figure 79: DC Power Cable Lug (180-degree)

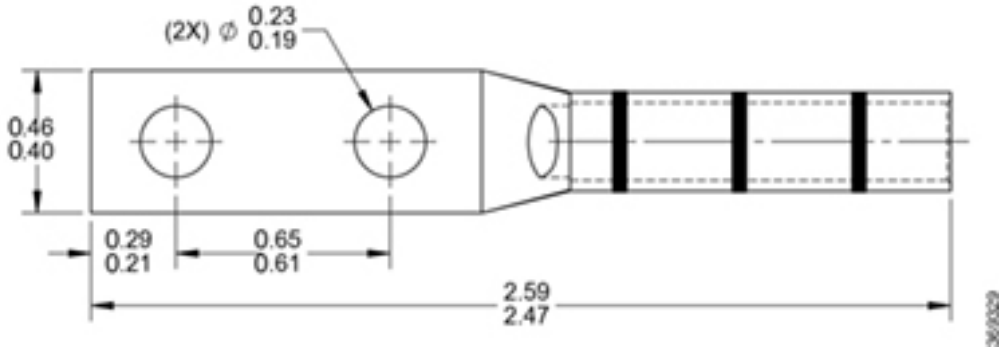


Figure 80: DC Power Cable Lug (90-degree)

