

Hardware Installation Guide for Cisco NCS 1010 and Cisco NCS 1000 Passive Modules

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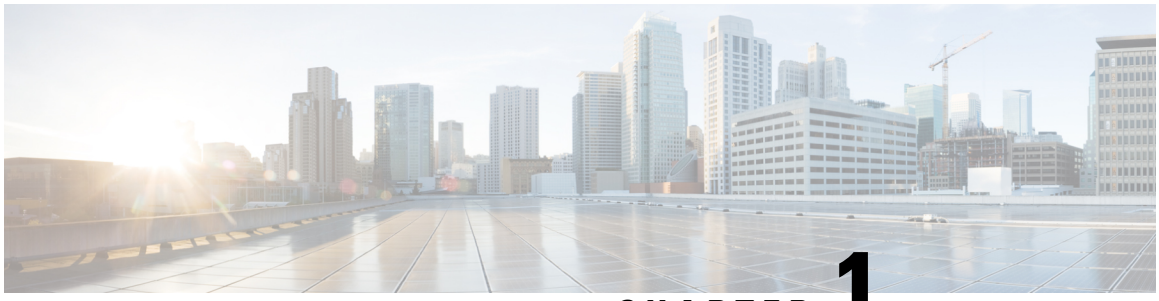
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CHAPTER 1

Cisco NCS 1010 Overview

This chapter provides an overview for Cisco NCS 1010.

Table 1: Feature History

Feature Name	Release Information	Description
LC Ports on OLT and ILA Line Cards	Cisco IOS XR Release 7.10.1	The new OLT and ILA line cards introduce LC ports on their faceplates. These LC ports enable you to directly connect the breakout or multiplexer/demultiplexer modules for degree interconnect or Add/Drop options. The following are the new PIDs introduced for the OLT and ILA line cards: • NCS1K-E-OLT-C • NCS1K-E-OLT-L • NCS1K-E-OLT-R-C • NCS1K-E-ILA-R-C • NCS1K-E-ILA-2R-C

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Cisco NCS 1010 Overview

Cisco NCS 1010 is a next-generation optical line system optimized for ZR/ZR+ WDM router interfaces. Its salient features are:

- Provides point-to-point connectivity between routers with WDM interfaces.
- Multiplexes the signals received from multiple routers over a single fiber.
- With one MPO port, it can be scaled to 8 Degree but if needed node can be scaled to higher than 8 degree, using more EXP MPO ports.
- Caters to C-band WDM transmission to maximize capacity, and can be enhanced to C+L combined band in the future.

Cisco NCS 1010 is a 3RU chassis that has an in-built External Interface Timing Unit (EITU) and the following field-replaceable modules.

- Controller
- Two power supply units
- Two fan trays
- Fan filter
- Line card

  The Cisco NCS 1010 chassis supports the following line cards.

Table 2: Supported Line Cards

Line Card	Description	Release
NCS1K-OLT-C	C-band Optical Line Terminal without Raman	Cisco IOS XR Release 7.7.1
NCS1K-OLT-R-C	C-band Optical Line Terminal with Raman	Cisco IOS XR Release 7.7.1
NCS1K-ILA-C	C-band In-Line Amplifier without Raman	Cisco IOS XR Release 7.7.1
NCS1K-ILA-R-C	C-band In-Line Amplifier with one side Raman	Cisco IOS XR Release 7.7.1
NCS1K-ILA-2R-C	C-band In-Line Amplifier with both sides Raman	Cisco IOS XR Release 7.7.1
NCS1K-OLT-L	L-band Optical Line Terminal without Raman	Cisco IOS XR Release 7.9.1

Line Card	Description	Release
NCS1K-ILA-L	L-band In-Line Amplifier without Raman	Cisco IOS XR Release 7.9.1
NCS1K-E-OLT-C	C-band Optical Line Terminal without Raman, Enhanced	Cisco IOS XR Release 7.10.1
NCS1K-E-OLT-R-C	C-band Optical Line Terminal with Raman, Enhanced	Cisco IOS XR Release 7.10.1
NCS1K-E-OT-L	L-band Optical Line Terminal without Raman, Enhanced	Cisco IOS XR Release 7.10.1
NCS1K-E-ILA-R-C	C-band In-Line Amplifier with East-facing Raman, Enhanced	Cisco IOS XR Release 7.10.1
NCS1K-E-ILA-2R-C	C-band In-Line Amplifier with both sides Raman, Enhanced	Cisco IOS XR Release 7.10.1
NCS1K-E-ILA-R-C-2	C-band In Line Amplifier with West-facing Raman, Enhanced	Cisco IOS XR Release 7.11.1

For more information about the Cisco NCS 1010 chassis, see Cisco NCS 1010 Data Sheet.

Figure 1: Cisco NCS 1010 Front View

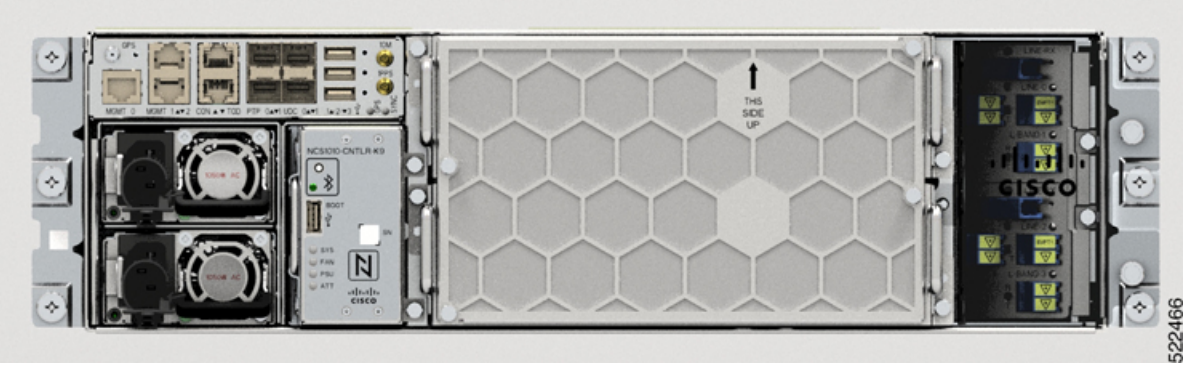
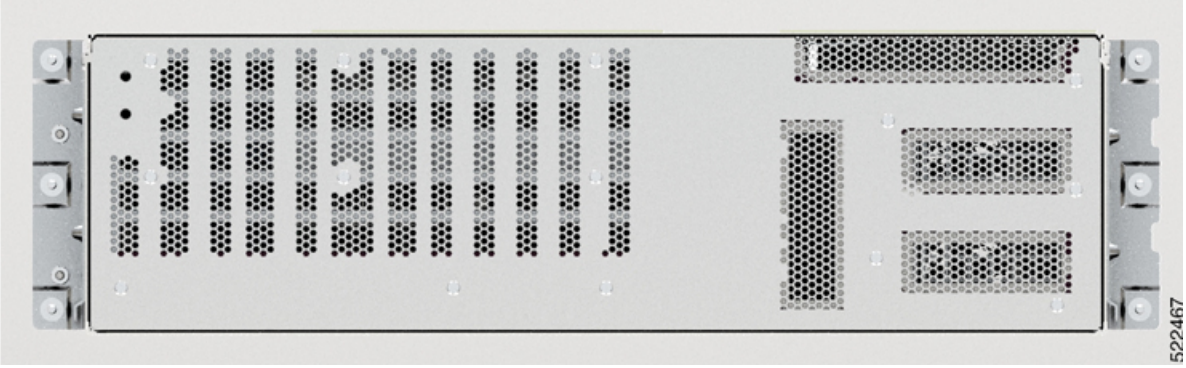
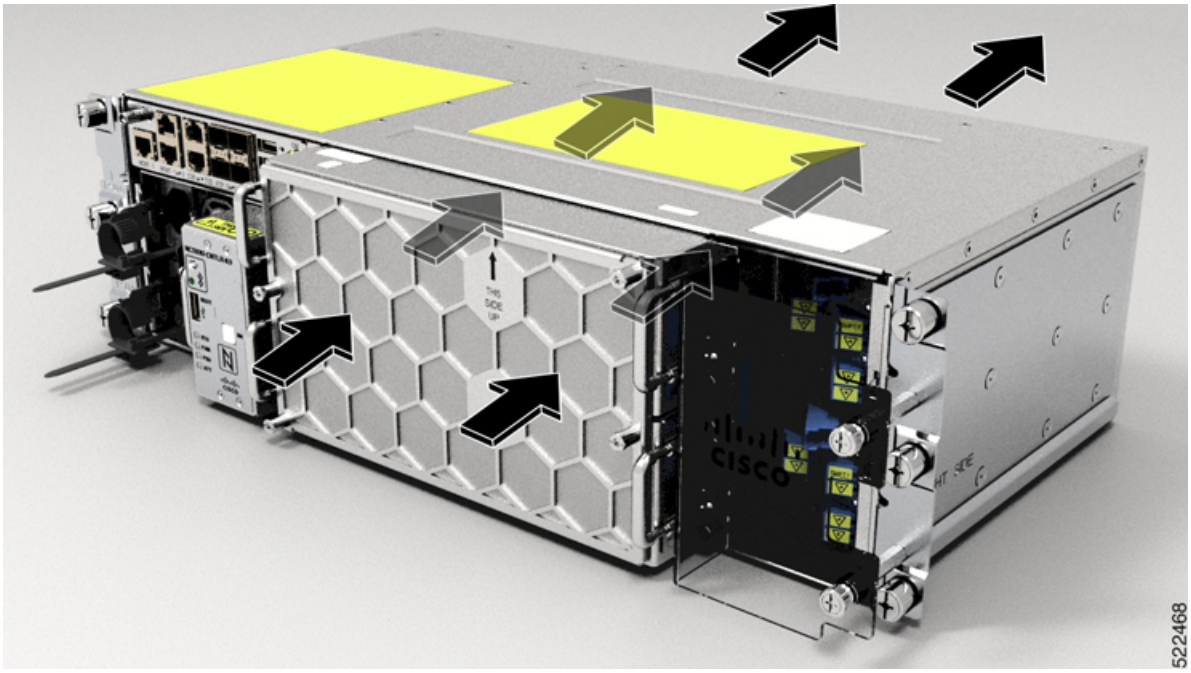


Figure 2: Cisco NCS 1010 Rear View



The airflow on Cisco NCS 1010 is front to back. Cool air enters the chassis through the fan trays and exhausts through the rear end of the chassis.

Figure 3: Airflow in Cisco NCS 1010



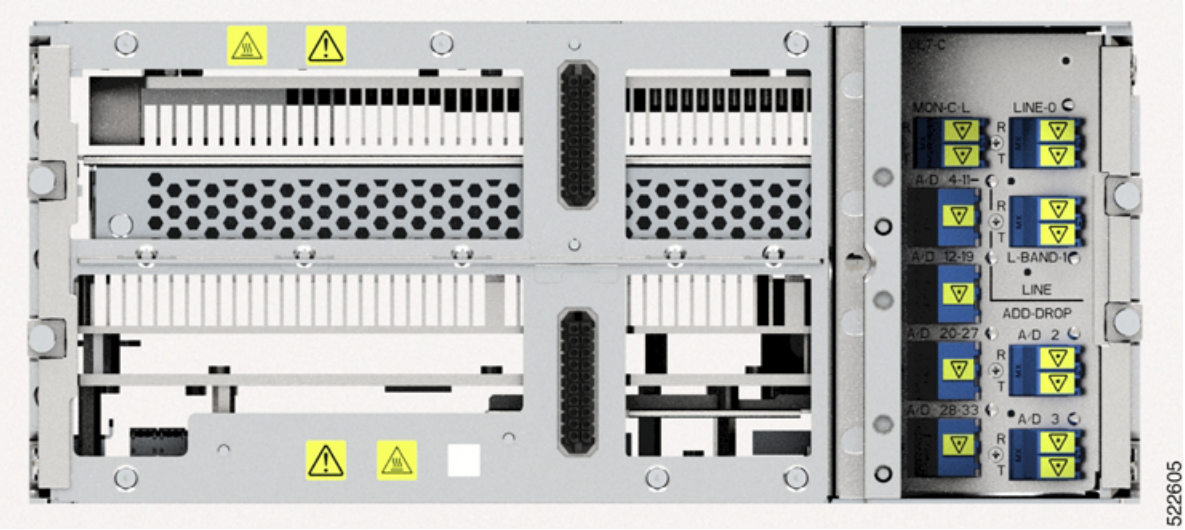
OLT-C Line Card

The C-band Optical Line Terminal without Raman (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 4: Front View of OLT-C Line Card



For details of the OLT-C line card ports, see #unique_18 unique_18_Connect_42_fig_jsr_rfd_qtb.

Figure 5: Perspective View of OLT-C Line Card



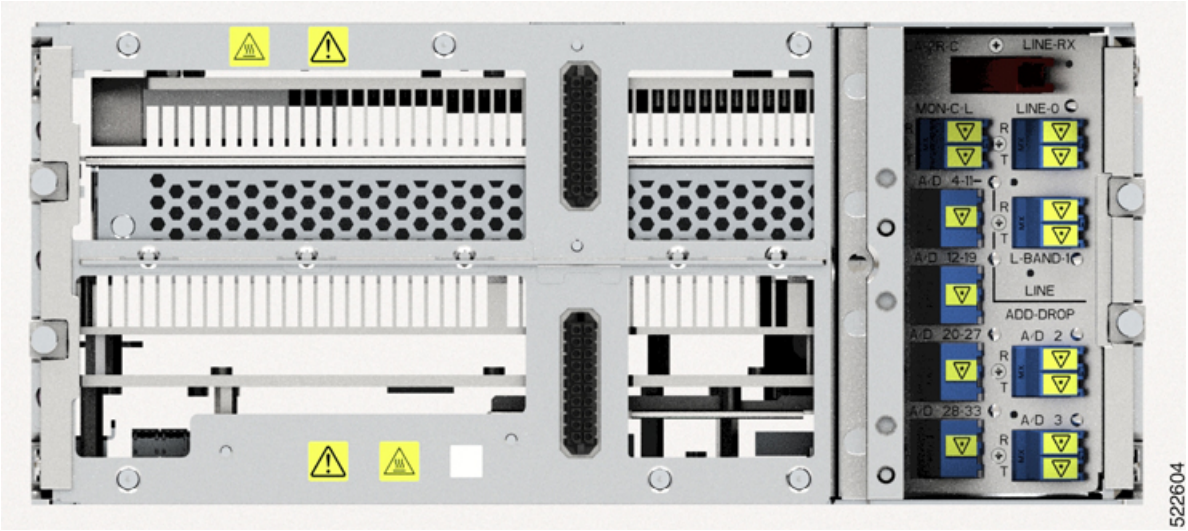
OLT-R-C Line Card

The C-band Optical Line Terminal with Raman (OLT-R-C) line card includes the features of the OLT-C line card along with the Raman amplifier.

The following are the features of the Raman amplifier:

- Five different pump wavelengths for supporting C+L Raman amplification
- Embedded Distributed Feedback (DFB) laser at 1568.77 nm (class 1M) to be used for optical safety (link continuity)
- Full monitoring of pumps, DFB laser and signal power
- Raman pump back-reflection detector
- Meets class 1M Laser safety.
- Additional Photodiode (PD) to monitor remnant pump power at the far end

Figure 6: Front View of OLT-R-C Line Card



For details of the OLT-R-C line card ports, see Figure 39: Front View of the OLT-R-C Line Card Faceplate, on page 36.

Figure 7: Perspective View of OLT-R-C Line Card



OLT-L Line Card

Table 3: Feature History

Feature Name	Release Information	Description
NCS1K-OLT-L Line Card	Cisco IOS XR Release 7.9.1	The new NCS1K-OLT-L line card for the NCS 1010 optical line system performs the add/drop function for the L-band traffic. The OLT-L card acts as expansion equipment for the OLT-C units and connects to the L-band expansion port in the OLT-C unit. By supporting L-band traffic, the OLT-L line card improves fiber utilization by enabling the existing OLT-C node to send both C-band and L-band traffic.

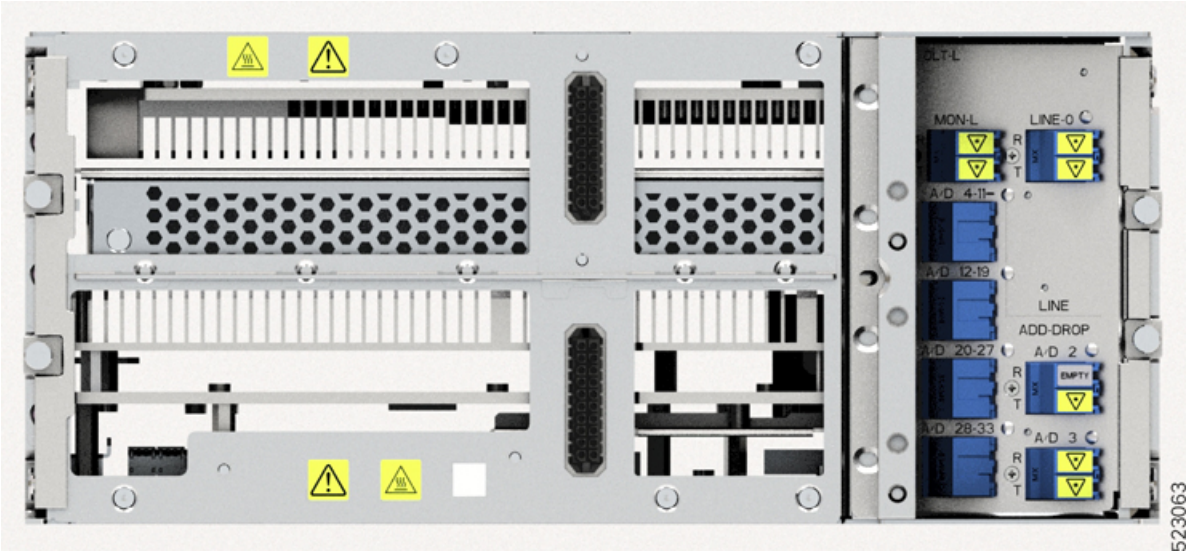
The OLT-L line card connects to the L-band expansion ports in the OLT-C unit to add, drop, and route the L-band traffic in the existing fiber. This card cannot be deployed as a standalone unit. It can be used as an expansion equipment for both variants of the OLT-C unit. This card enhances the fiber capacity of the existing OLT-C nodes to send both C- and L-band traffic. Supporting L-band traffic, this unit expands the C-band only nodes to C+L-band nodes.

The L-band Optical Line Terminal (OLT-L) 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
- 24.5-dBm line boost-amplifier TVG EDFA single gain range

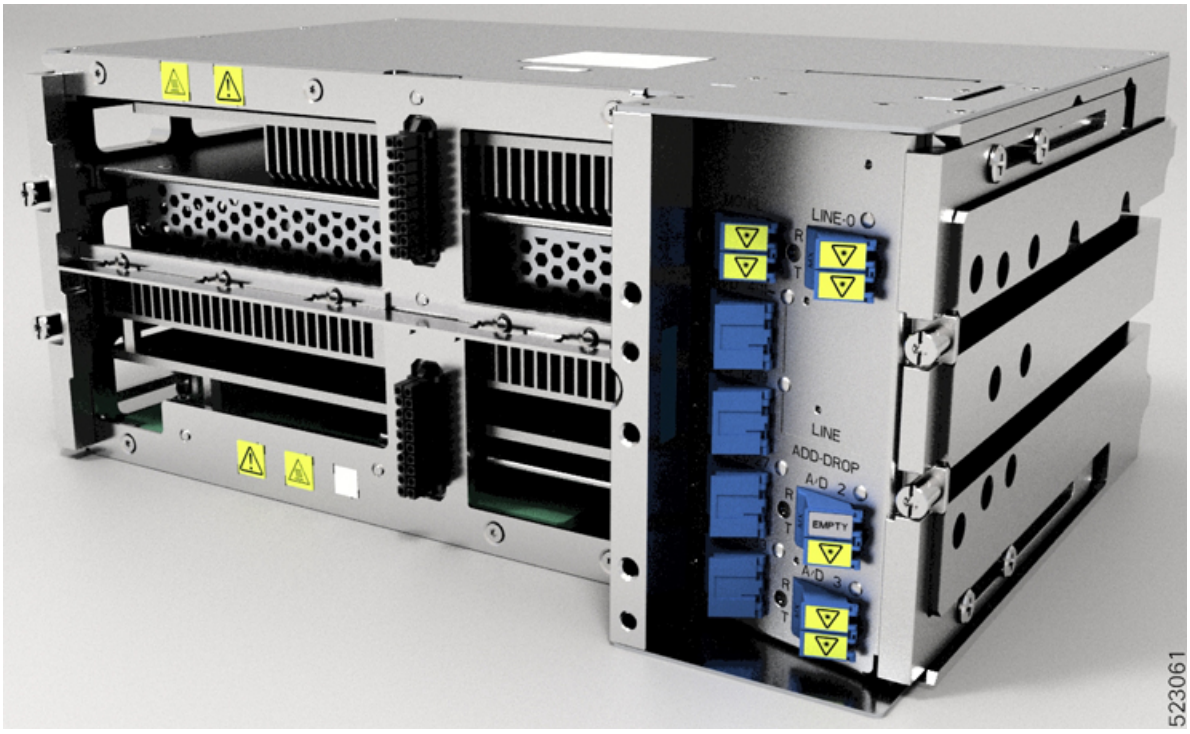
- 15-dBm ADD-side boost-amplifier TVG EDFA with single gain range of 16 dB
- Dedicated EDFA for noise loading
- 37 ports Optical Channel Monitoring (OCM)
- Dedicated Tunable Laser (TL) enabling Connection Verification (CV) and patch cord discovery features
- Up to 30 EXP ports
- Embedded Optical Service Channel at Fast Ethernet (FE) at 184.45 THz (1625.33 nm)
- Multiplexing and demultiplexing of odd and even channels
- 2x2 switch to reverse send direction of Optical Service Channel OSC-L.

Figure 8: Front View of OLT-L Line Card



For details of the OLT-L line card ports, see Figure 40: Front View of the OLT-L Line Card Faceplate, on page 37.

Figure 9: Perspective View of OLT-L Line Card

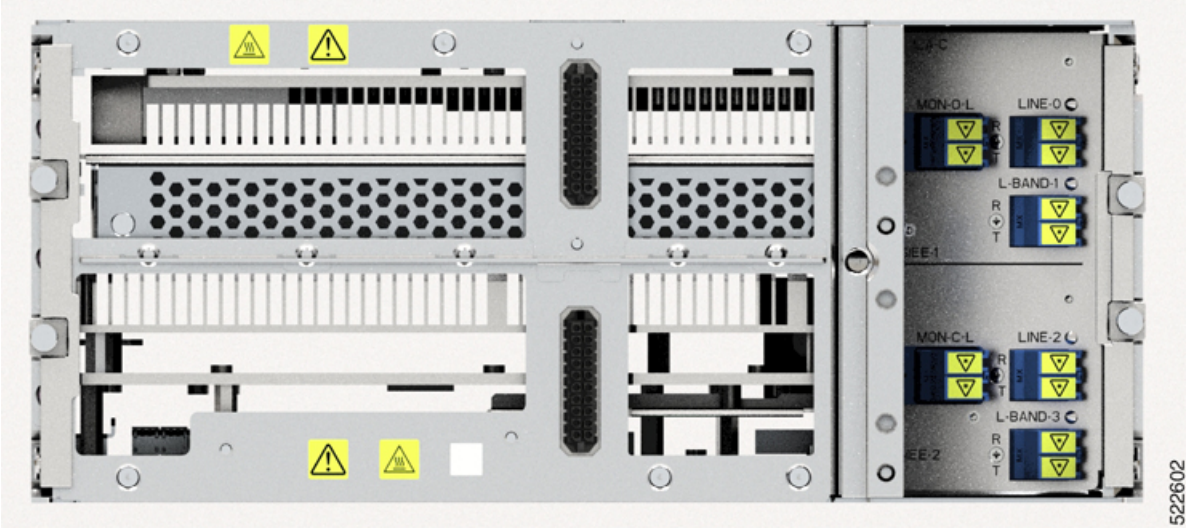


ILA-C Line Card

The C-band In Line Amplifier without Raman (ILA-C) line card includes the following features:

- Two independent TVG EDFA block, covering full operative gain ranging 8–36 dB
- Each EDFA block can provide up to 23dBm output power
- Dynamic Gain Equalization (DGE) embedded capability to compensate for line tilt and ripple
- Embedded OTDR for line1/2-RX/TX monitoring
- Four-ports OCM for channels monitoring
- Embedded Optical Service Channel at Fast Ethernet (FE)
- C+L combiner for multiplexing/demultiplexing L-band channels
- Dedicated ports for amplifiers output monitoring
- 2x2 switch to reverse transmit direction of OSC-C for both directions
- Fiber reflectors to support fiber end detection by OTDR

Figure 10: Front View of ILA-C Line Card



For details of the ILA-C line card ports, see Figure 41: Front View of the ILA-C Line Card Faceplate, on page 38

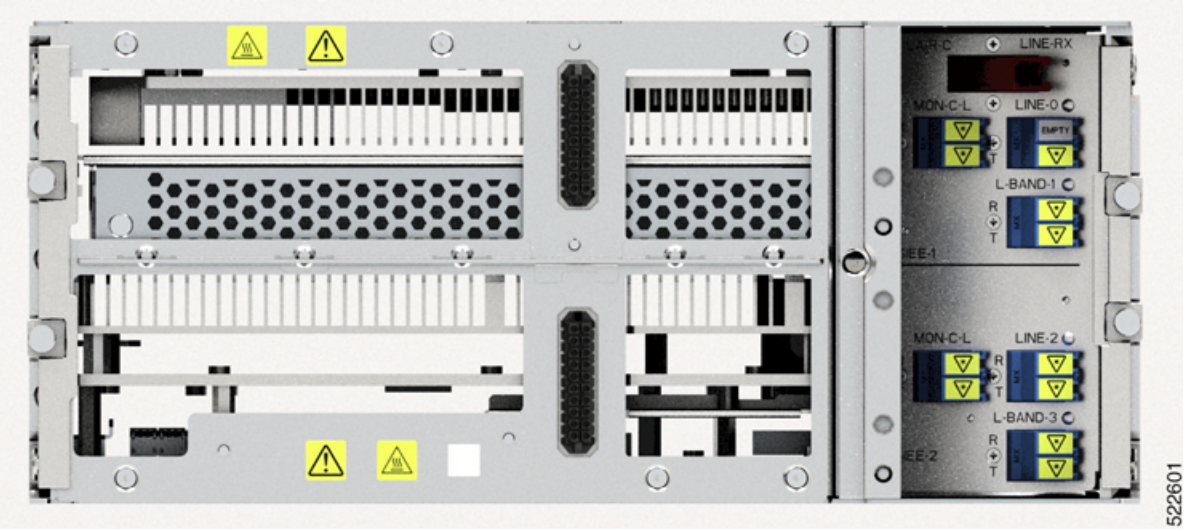
Figure 11: Perspective View of ILA-C Line Card



ILA-R-C Line Card

The C-band In Line Amplifier with Raman (ILA-R-C) line card includes the features of ILA-C and Raman amplifier.

Figure 12: Front View of ILA-R-C Line Card



For details of the ILA-R-C line card ports, see Figure 42: Front View of the ILA-R-C Line Card Faceplate, on page 39.

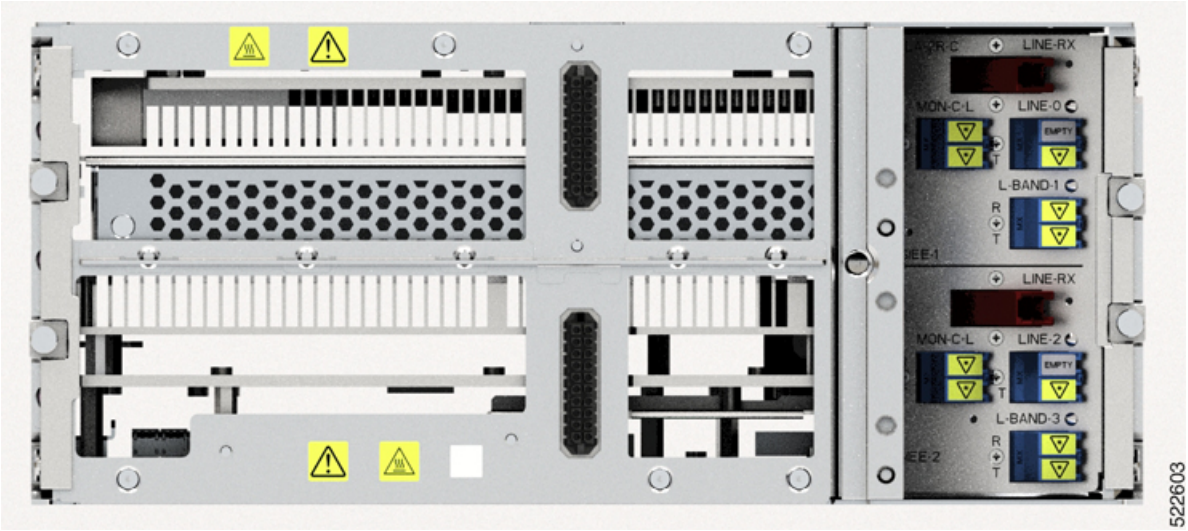
Figure 13: Perspective View of ILA-R-C Line Card



ILA-2R-C

The C-band In-Line Amplifier with two Raman (ILA-2R-C) line card includes the features of the ILA-C and Raman amplifier.

Figure 14: Front View of ILA-2R-C Line Card



For details of the ILA-2R-C line card ports, see Figure 43: Front View of the ILA-2R-C Line Card Faceplate, on page 40.

Figure 15: Perspective View of ILA-2R-C Line Card



ILA-L Line Card

Table 4: Feature History

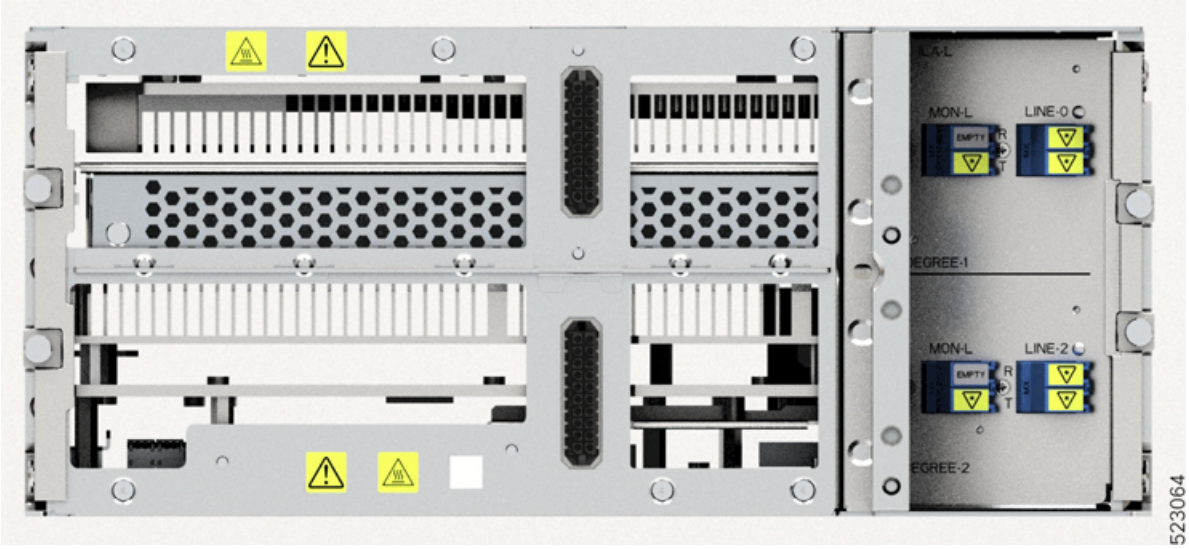
Feature Name	Release Information	Description
NCS1K-ILA-L Line Card	Cisco IOS XR Release 7.9.1	The new NCS1K-ILA-L line card for the NCS 1010 optical line system amplifies L-band traffic. The ILA-L card acts as expansion equipment for the ILA-C units and connects to the L-band expansion port in the ILA-C unit. The ILA-L enables sending the low-loss L-Band through the existing ILA-C node to enhance the fiber capacity and effectively upgrade the C-band only node to a C+L band node.

The ILA-L must always be connected to the L-band expansion ports in the ILA-C unit to amplify the L-band traffic that is traveling together with the C-band traffic in the fiber. The ILA-L unit cannot be deployed as standalone. It can always be used as an expansion equipment for all variants of the ILA-C unit, with or without Raman amplification in one or both direction. The Raman module in the ILA-C unit provides amplification for both C- and L-band signals in long-distance transmission.

The L-band In Line Amplifier (ILA-L) line card includes the following features:

- Two independent TVG EDFA block, covering full operative gain ranging 10.8–32.8 dB
- Each EDFA block can provide up to 24.5-dBm total output power
- Dynamic Gain Equalization (DGE) embedded capability to compensate for line tilt and ripple
- Four-ports OCM for channels monitoring
- Embedded Optical Service Channel at Fast Ethernet (FE)
- Dedicated ports for amplifiers output monitoring
- 2x2 switch to reverse transmit direction of OSC-L for both directions

Figure 16: Front View of ILA-L Line Card



For details of the ILA-L line card ports, see Figure 47: Front View of the ILA-L Line Card Faceplate, on page 44

Figure 17: Perspective View of ILA-L 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 18: E-OLT-C Line Card

Figure 19: Front View of E-OLT-C Line Card

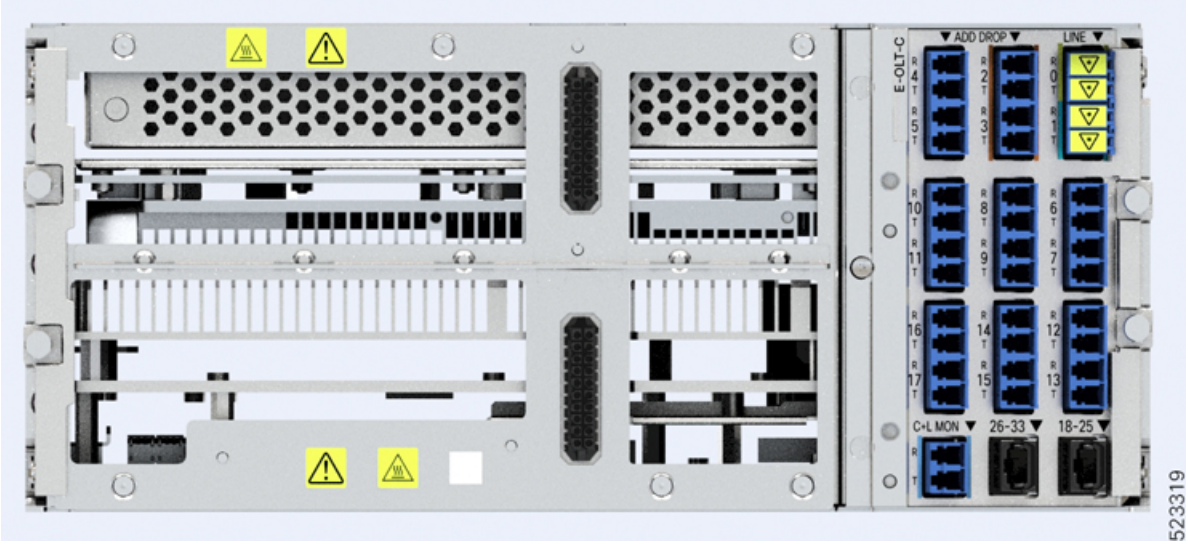
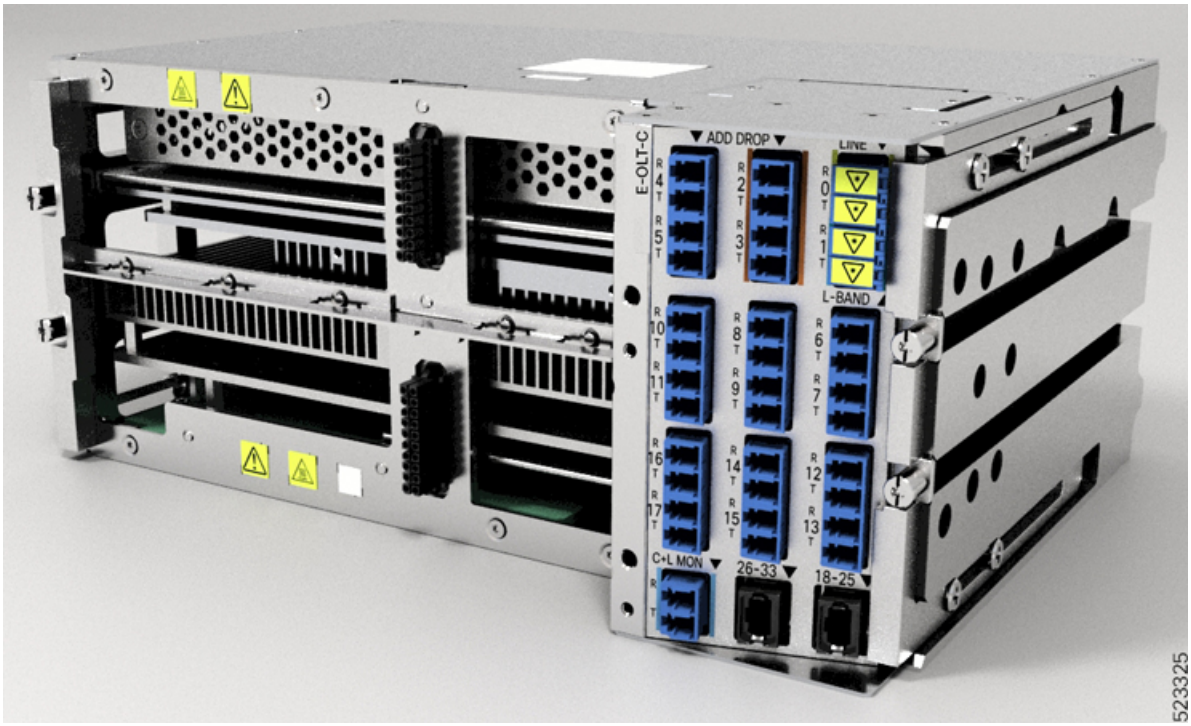


Figure 20: Perspective View of E-OLT-C Line Card



E-OLT-R-C Line Card

The C-band Optical Line Terminal with Raman, Enhanced (E-OLT-R-C) line card includes the features of the OLT-C line card along with the Raman amplifier.

The following are the features of the Raman amplifier:

- Five different pump wavelengths for supporting C+L Raman amplification
- Embedded Distributed Feedback (DFB) laser at 1568.77 nm (class 1M) to be used for optical safety (link continuity)
- Full monitoring of pumps, DFB laser and signal power
- Raman pump back-reflection detector
- Meets class 1M Laser safety.
- Additional Photodiode (PD) to monitor remnant pump power at the far end

Figure 21: E-OLT-R-C Line Card

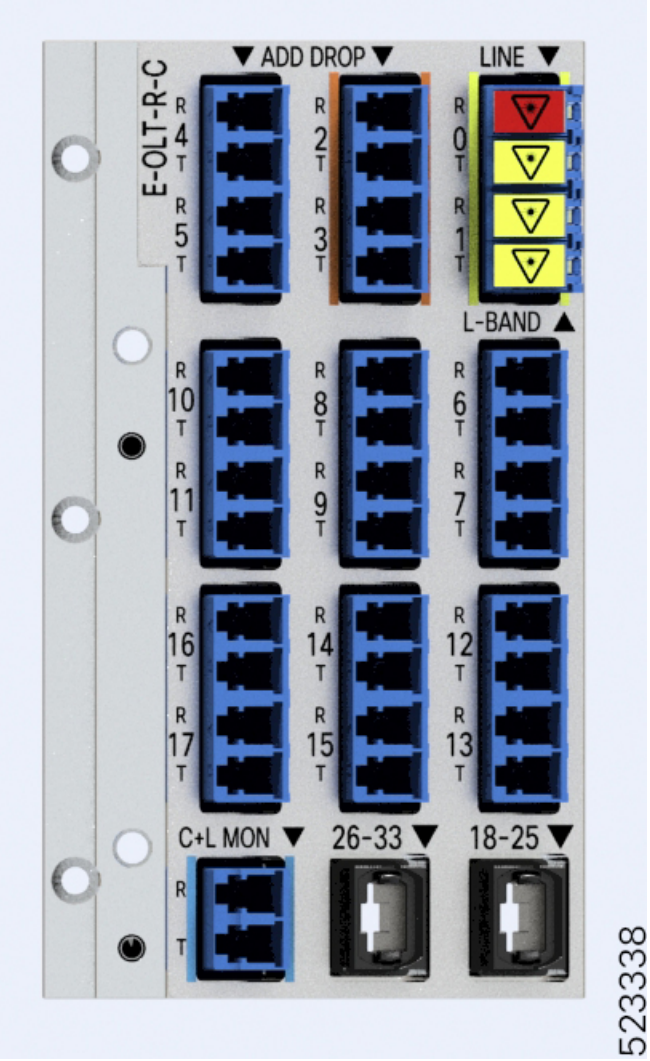


Figure 22: Front View of E-OLT-R-C Line Card

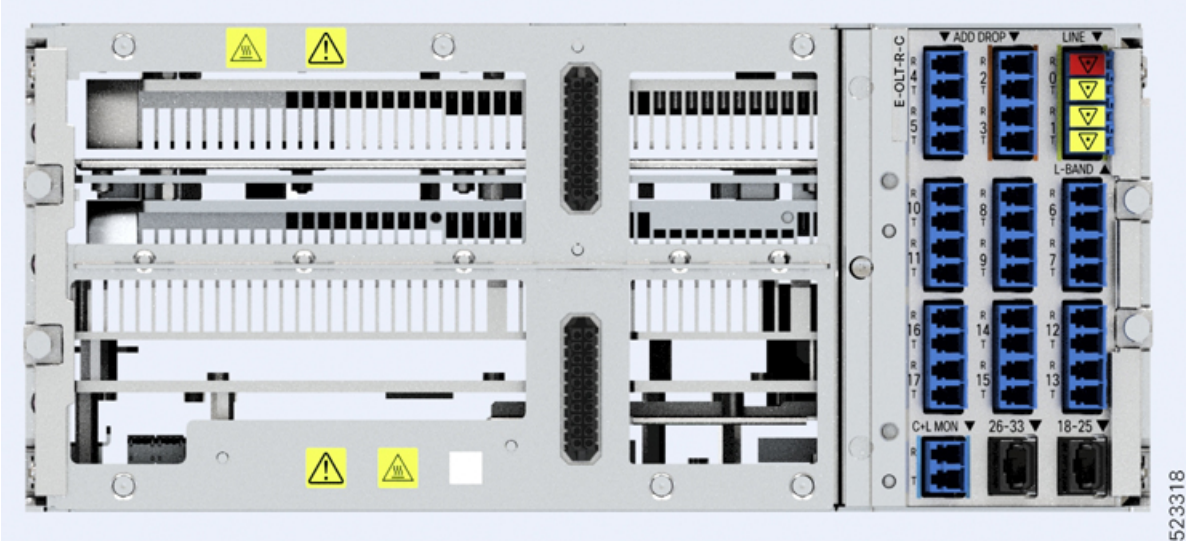
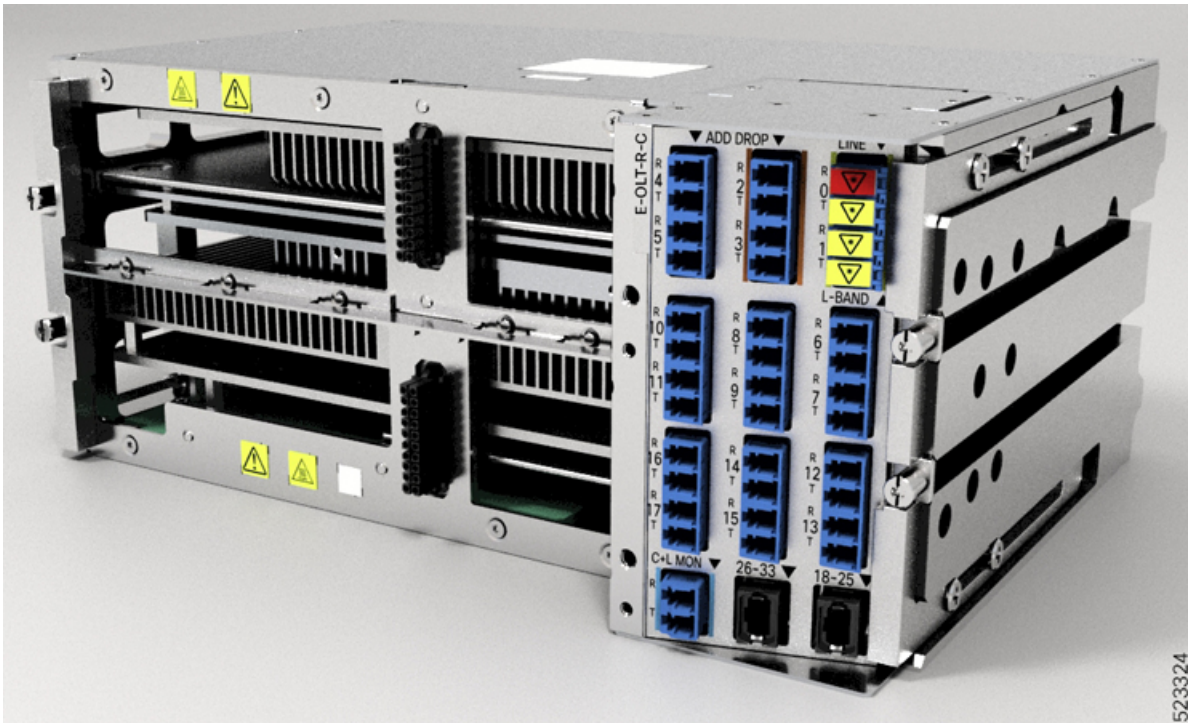


Figure 23: Perspective View of E-OLT-R-C Line Card



E-OLT-L Line Card

The L-band Optical Line Terminal, Enhanced (E-OLT-L) 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
- 24.5-dBm line boost-amplifier TVG EDFA single gain range
- 15-dBm ADD-side boost-amplifier TVG EDFA with single gain range of 16 dB
- Dedicated EDFA for noise loading
- 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) at 184.45 THz (1625.33 nm)
- Multiplexing and demultiplexing of odd and even channels
- 2x2 switch to reverse send direction of Optical Service Channel OSC-L.

Figure 24: E-OLT-L Line Card

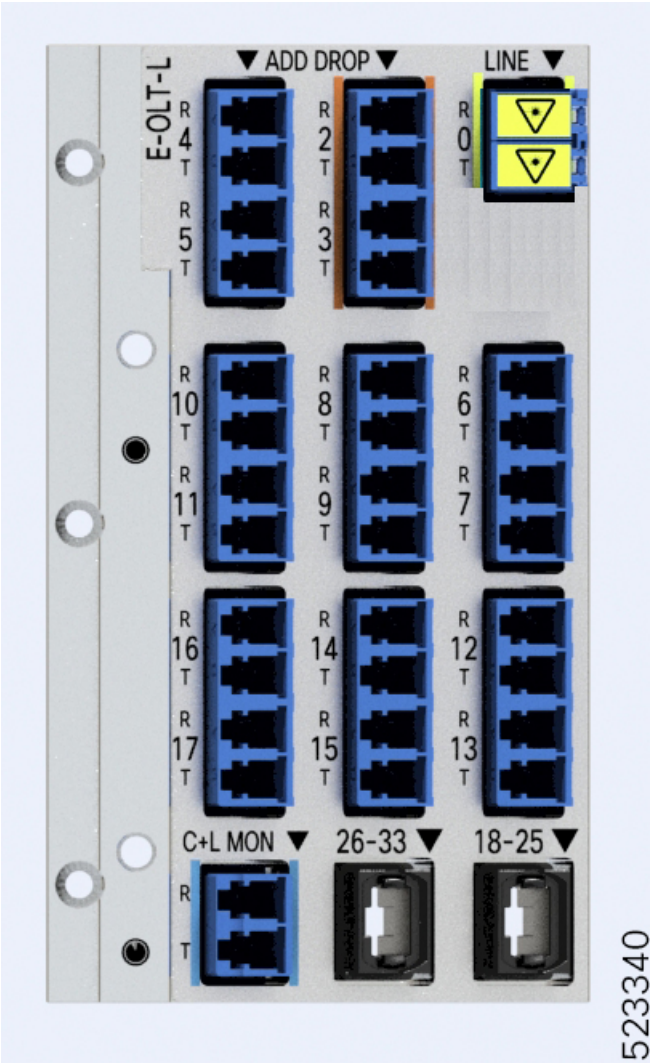


Figure 25: Front View of E-OLT-L Line Card

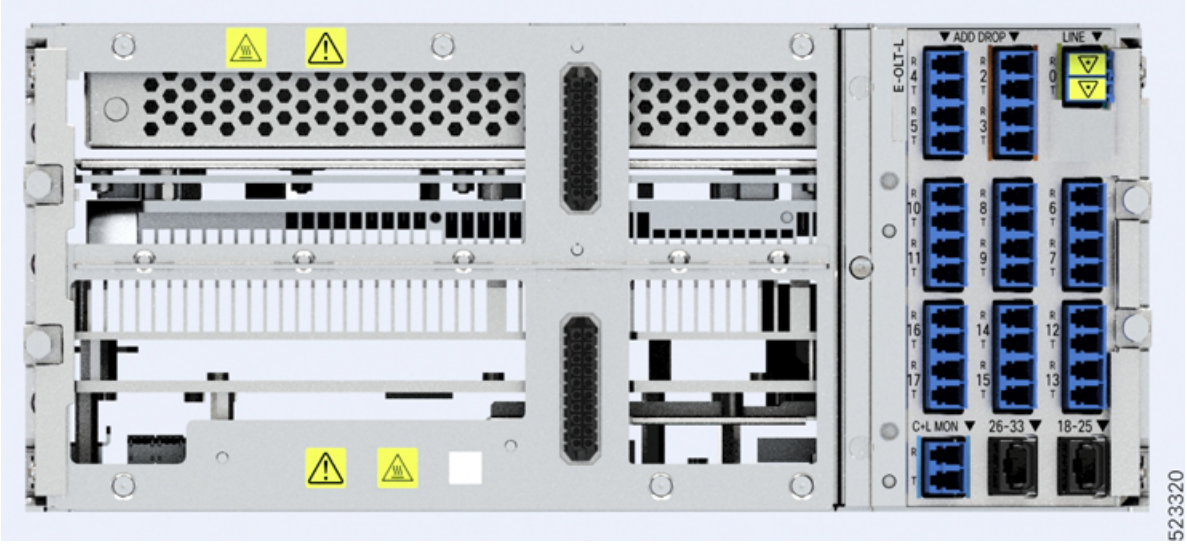
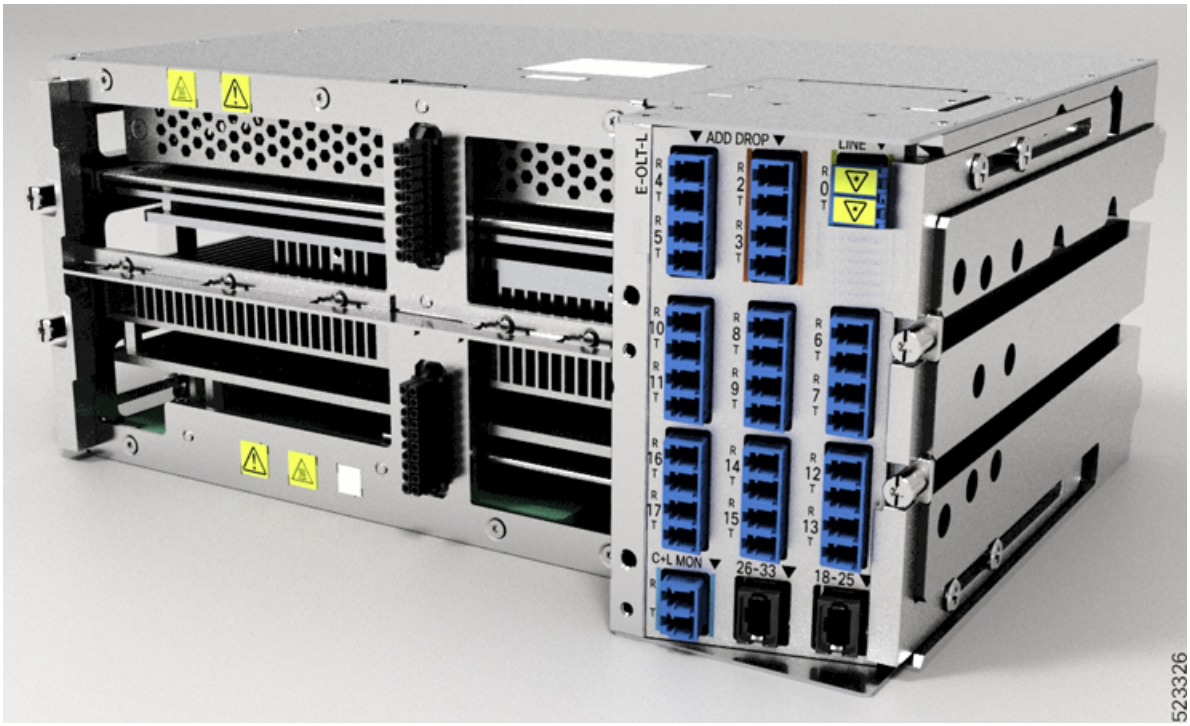


Figure 26: Perspective View of E-OLT-L Line Card



E-ILA-R-C Line Card

The C-band In Line Amplifier with Raman, Enhanced (E-ILA-R-C) line card includes the features of E-ILA-C and Raman amplifier.

Figure 27: E-ILA-R-C Line Card

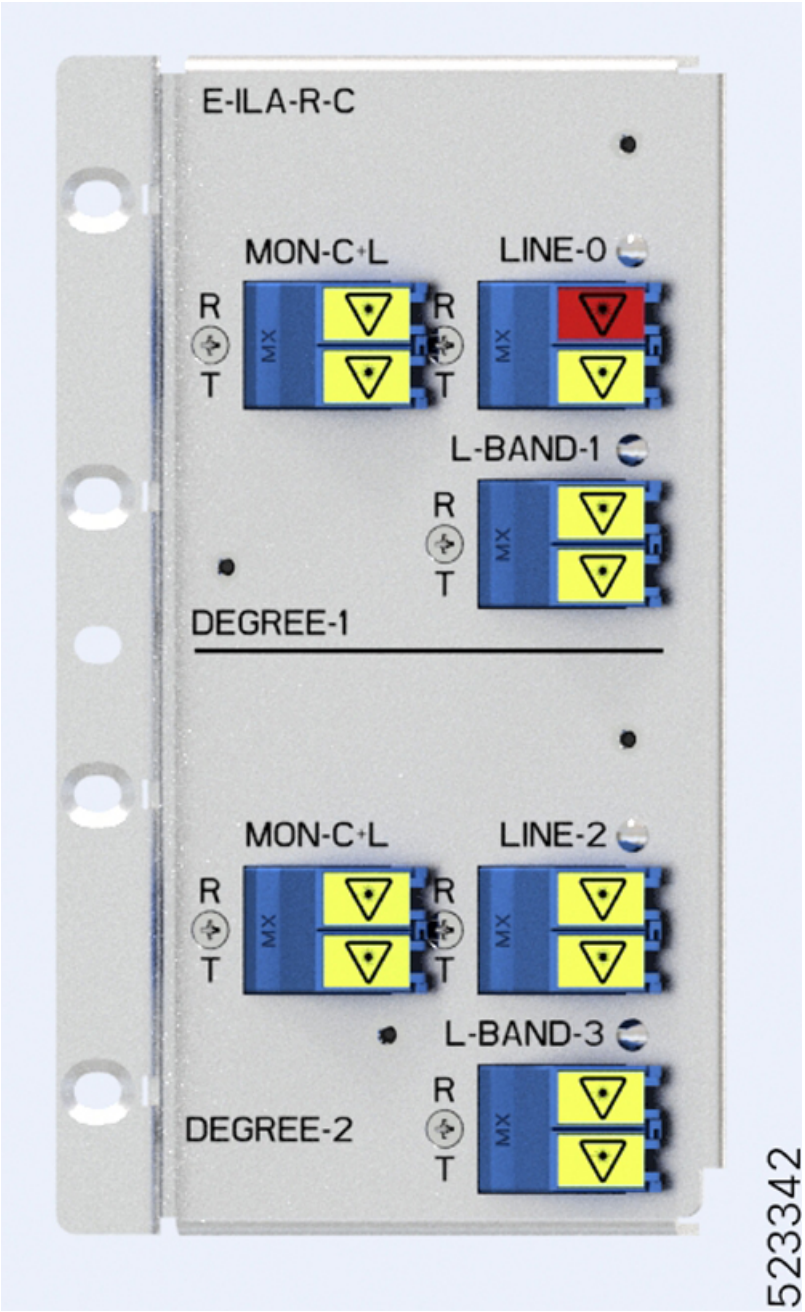
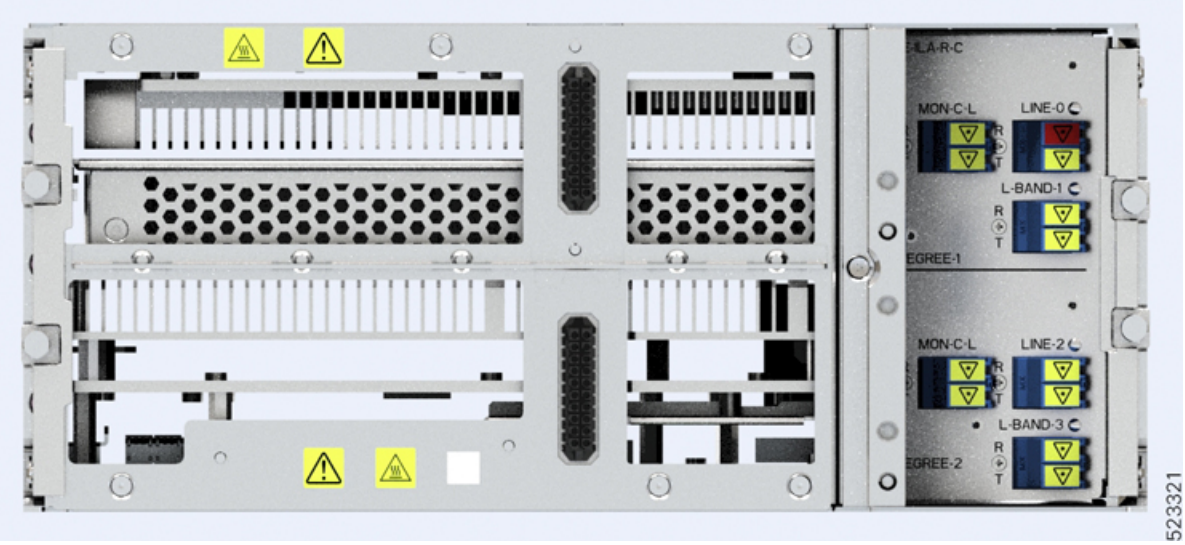
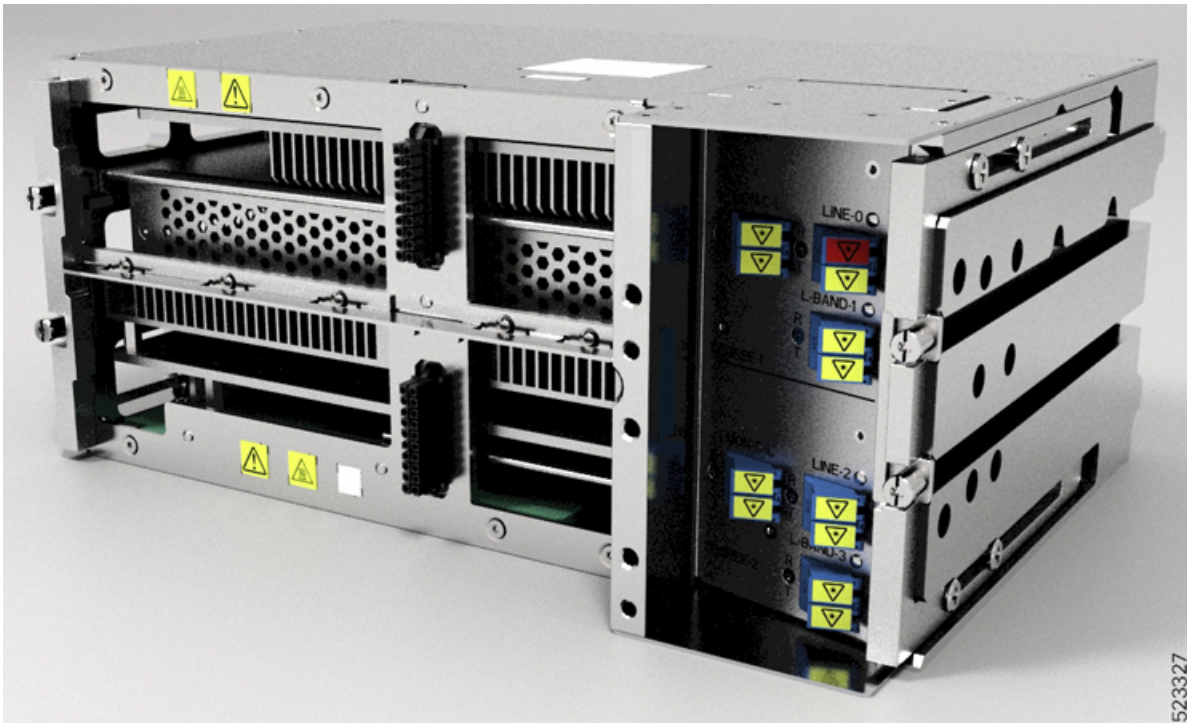


Figure 28: Front View of E-ILA-R-C Line Card



For details of the E-ILA-R-C line card ports, see Figure 44: Front View of the E-ILA-R-C Line Card Faceplate, on page 41.

Figure 29: Perspective View of E-ILA-R-C Line Card



E-ILA-2R-C Line Card

The C-band In-Line Amplifier with two Raman, Enhanced (E-ILA-2R-C) line card includes the features of the E-ILA-C and Raman amplifier.

Figure 30: E-ILA-2R-C Line Card

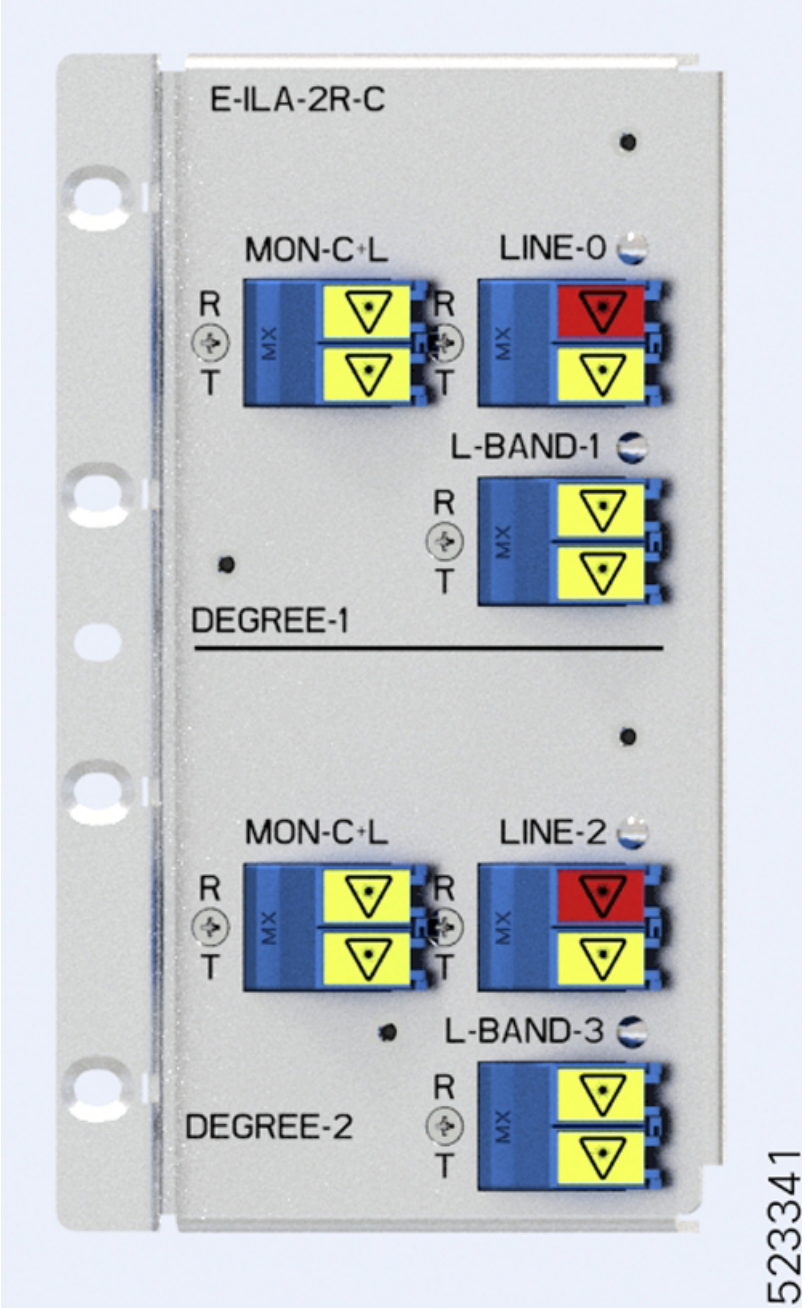
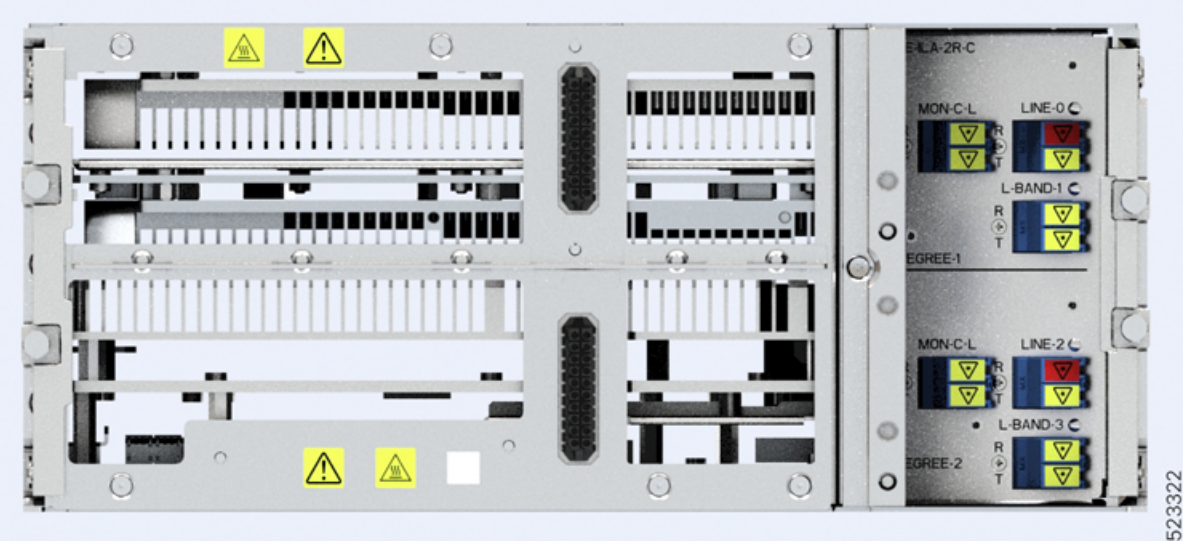


Figure 31: Front View of E-ILA-2R-C Line Card



For details of the E-ILA-R-C line card ports, see Figure 45: Front View of the E-ILA-2R-C Line Card Faceplate, on page 42.

Figure 32: Perspective View of E-ILA-2R-C Line Card



E-ILA-R-C-2 Line Card

Table 5: Feature History

Feature Name	Release Information	Description
NCS1K-E-ILA-R-C-2 Line Card	Cisco IOS XR Release 7.11.1	**NCS1K-E-ILA-R-C-2** line card is a new addition to the NCS 1010 ILA line cards family. With an inbuilt West-facing Raman amplifier, it amplifies the C-band and C+L-band traffic received from the west direction.

The C-band In Line Amplifier with West-facing Raman, Enhanced (E-ILA-R-C-2) line card includes the features of ILA-C and Raman amplifier.

Figure 33: E-ILA-R-C-2 Line Card

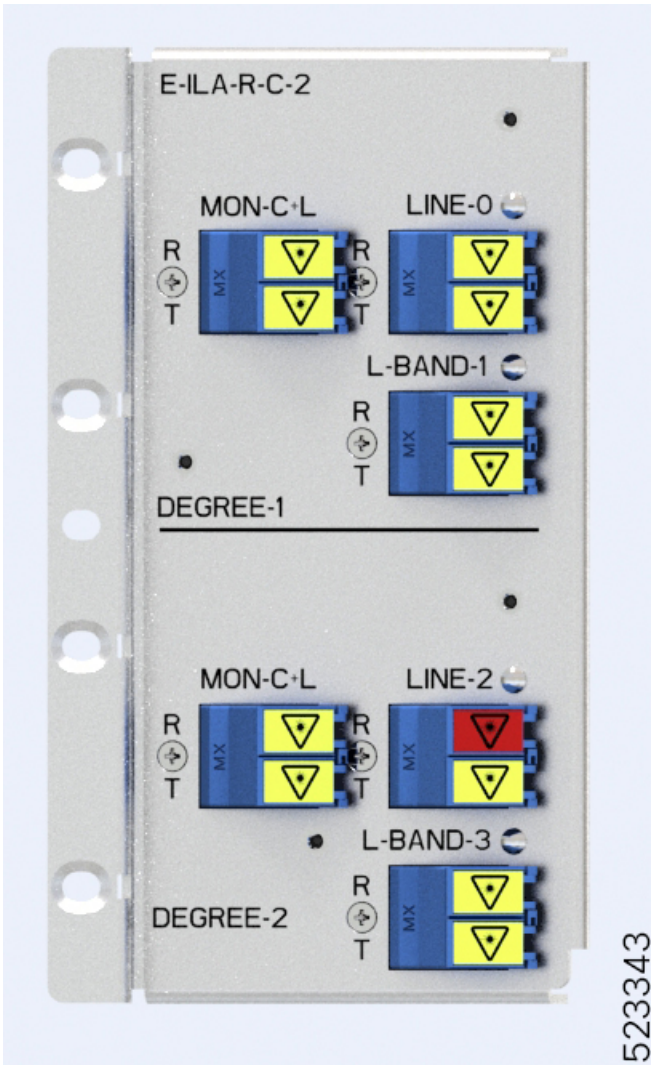
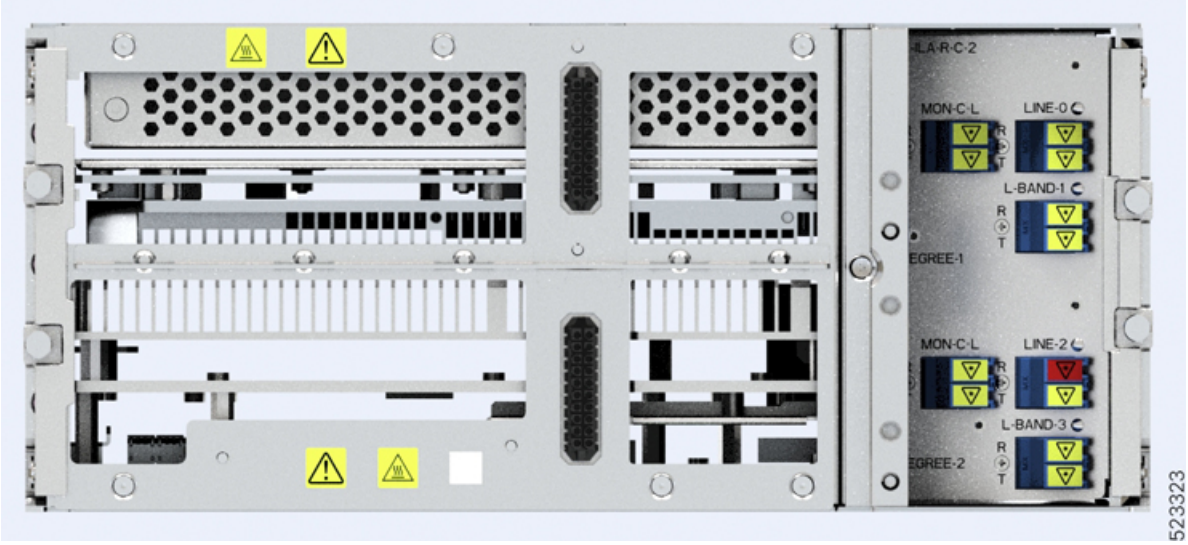
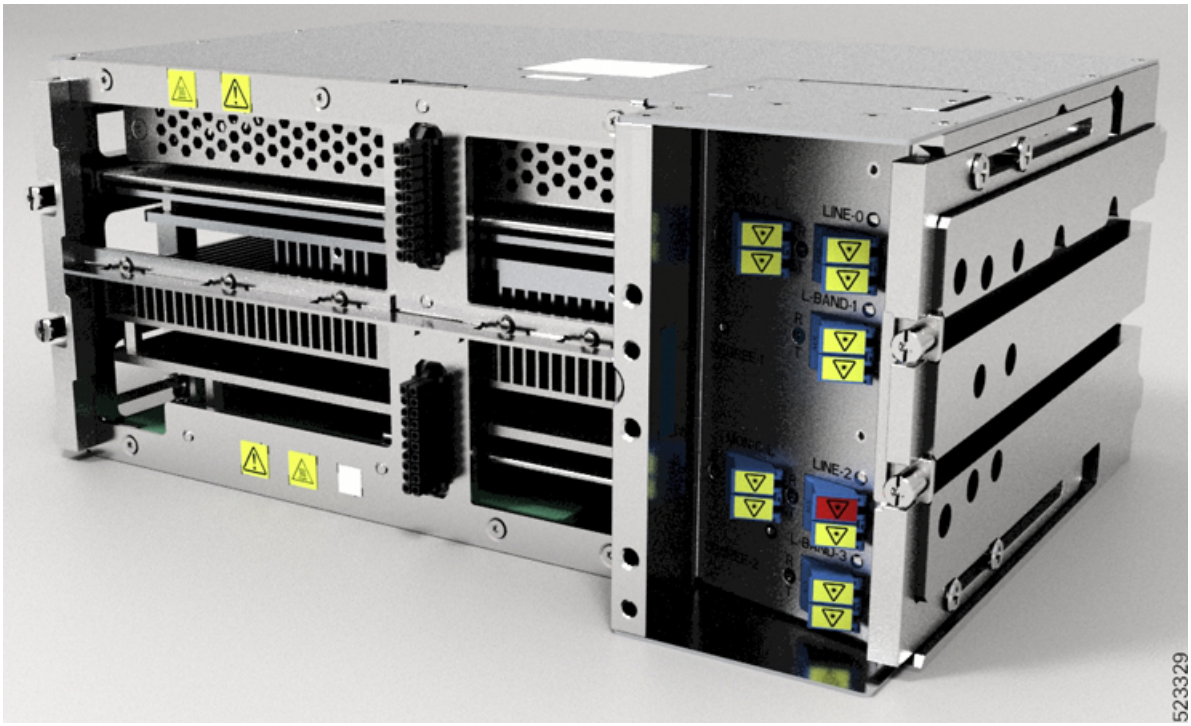


Figure 34: Front View of E-ILA-R-C-2 Line Card



For details of the E-ILA-R-C line card ports, see Figure 46: Front View of the E-ILA-R-C-2 Line Card Faceplate, on page 43.

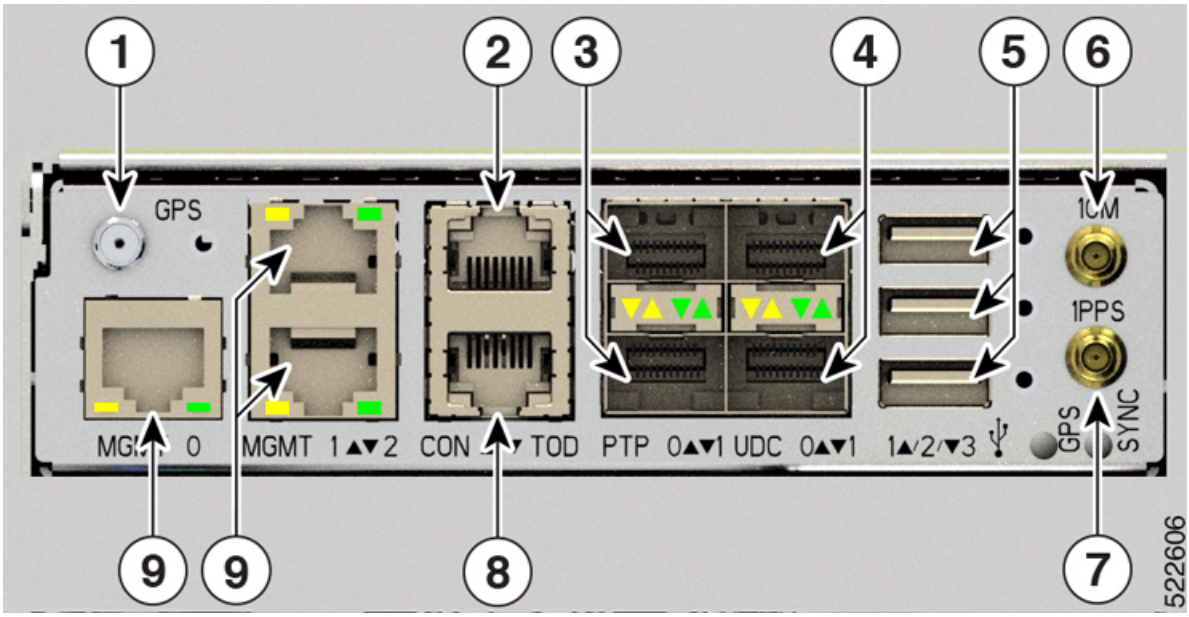
Figure 35: Perspective View of E-ILA-R-C-2 Line Card



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 10G Ethernet bus.

Figure 36: Front View of EITU



The following is the list of the available user interfaces:

1	Coaxial connector for GPS antenna RF input (with +5V antenna power, if necessary) (1x)
2	Console/Universal Asynchronous Receiver/Transmitter (UART) Interface (1x)
3	SFP for 1GE optical PTP port (1588 and SyncE) (2x)
4	SFP for 1GE optical User Data Channels (UDC) (2x)
5	USB 2.0 type A, 1.8A max at 5V/12V (with Cisco NCS 1000 Breakout Patch Panel support) (3x) **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.

6	Coaxial connector for 10MHz sync signal (bidirectional) (1x)
7	Coaxial connector for 1PPS sync signal (bidirectional) (1x)
8	RJ45 for 1588 TOD (1x)
9	10/100/1000 RJ-45 Ethernet management ports and Interconnection Link (ILINK) (3x)

Supported Modules

Cisco NCS 1010 supports the following passive modules.

- Cisco NCS 1000 Breakout Patch Panel

  The breakout panel supports the following passive optical modules:

  - NCS1K-BRK-8
  - NCS1K-BRK-16
  - NCS1K-BRK-24

- Cisco NCS 1000 32-Channel Mux/Demux Patch Panel

For more information on the passive modules, see Cisco NCS 1000 Breakout Patch Panel and Modules Overview , on page 113 and Cisco NCS 1000 32-Channel Mux/Demux Patch Panel Overview, on page 161.

Supported Controller Cards

Table 6: Feature History

Feature Name	Release Information	Description
NCS1K10-CNTLR-B-K9 Controller Card	Cisco IOS XR Release 7.10.1	The new NCS1010-CTLR-B-K9 controller card for the NCS 1010 optical line system supports a default baud rate of 9600 bps on the RS232 console port. It runs on BIOS version 4.40 and later.

The Cisco NCS 1010 supports the following controller cards:

- **NCS1K10-CNTLR-K9**

  The NCS1K10-CNTLR-K9 controller card supports a default of 115200 bps baud rate on the RS232 console port. For details of the NCS1K10-CNTLR-K9 controller card, see Figure 37: Front View of the NCS1010-CNTLR-K9 Controller, on page 33

- **NCS1K10-CTLR-B-K9**

The NCS1K10-CNTLR-B-K9 controller card supports a default of 9600 bps baud rate on the RS232 console port. For details of the NCS1K10-CNTLR-B-K9 controller card, see Figure 38: Front View of the NCS1010-CTLR-B-K9 Controller, on page 34

Cisco NCS 1010 LEDs

Cisco NCS 1010 includes multiple LEDs to determine the overall state of the system and to verify the status of specific connections, ports, and system components.

Controller LEDs

Thecontroller (NCS1010-CNTLR-K9 and NCS1010-CTLR-B-K9) units have five LEDs to indicate the system status and the status of the components.

Figure 37: Front View of the NCS1010-CNTLR-K9 Controller

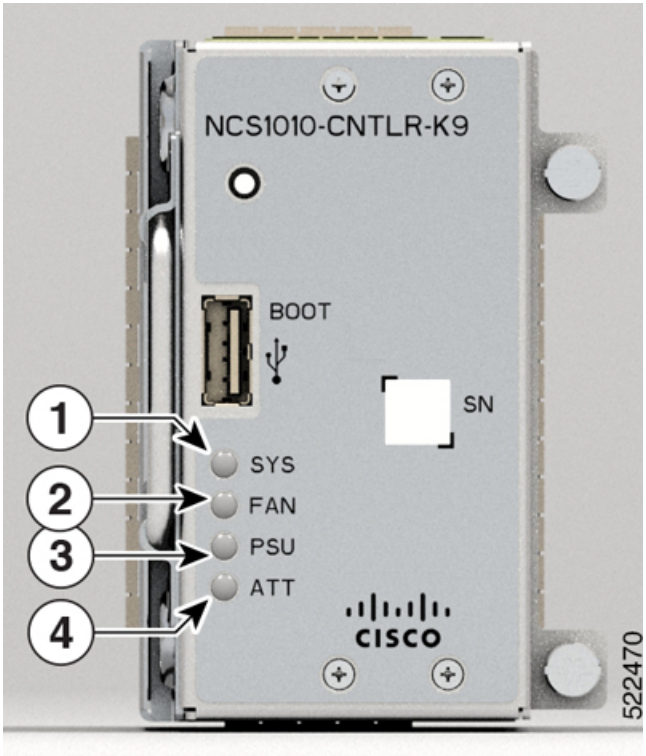
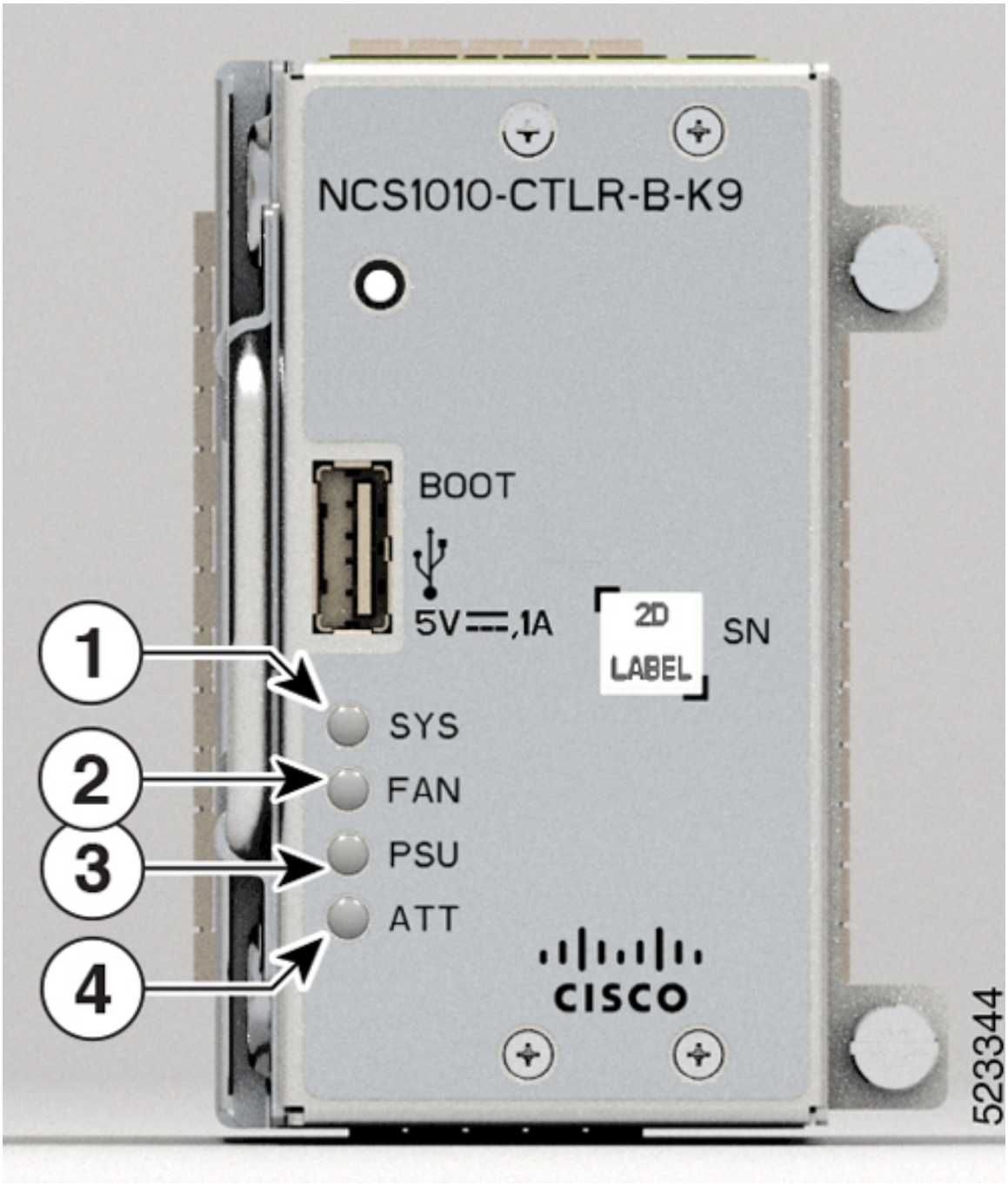


Figure 38: Front View of the NCS1010-CTLR-B-K9 Controller



1	System Status LED
2	Fan Status LED
3	Power Supply Status LED

4	Attention LED

Table 7: Status of the Controller LEDs

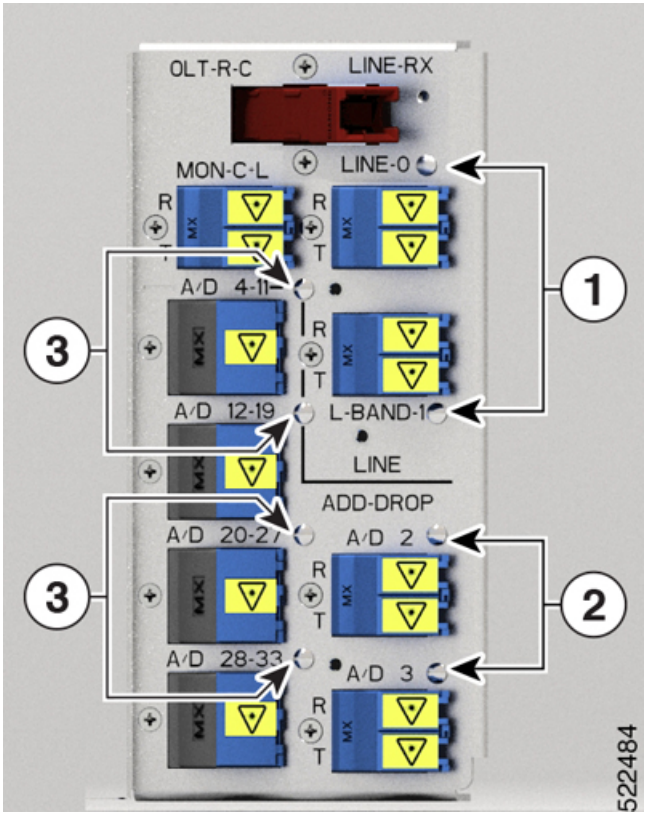
LED	Default Status of LED (At the time of Power On and when the System is not Up)	Color	Status
System LED (during controller boot up)	Red	Red	Indicates that the controller unit is powering ON.
		Red (flashing slowly)	Indicates BIOS loading.
		Yellow (flashing slowly)	Indicates operating system loading.
		Red (flashing fast)	Indicates secure boot failure. Replace the controller.
		Yellow (flashing fast)	Indicates that the controller unit is not seated properly. Remove and replace the controller properly.
System LED (controller is operational)	Red	Red	Indicates a major or critical alarm.
		Yellow	Indicates a minor alarm.
		Green	The module is operational and has no active alarms.
Fan LED	Red	Green	Indicates all fans present in the chassis are in working condition.
		Red	Indicates either a fan is missing from its slot or is faulty.
PSU LED	Red	Green	Indicates all PSUs' present in the chassis are in working condition.
		Red	Indicates either a PSU is missing from its slot or is faulty, or there is no input power.
Attention LED	Off	Blue	Used to identify a specific chassis in a rack or room. This is used for troubleshooting purposes such as replacing the fiber and field-replaceable units. It can be controlled through the software CLI. Use the following command to activate this LED, manually: **hw-module attention-led location 0/RP0/CPU0**

Line Card LEDs

The OLT line cards (OLT-C, OLT-R-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.

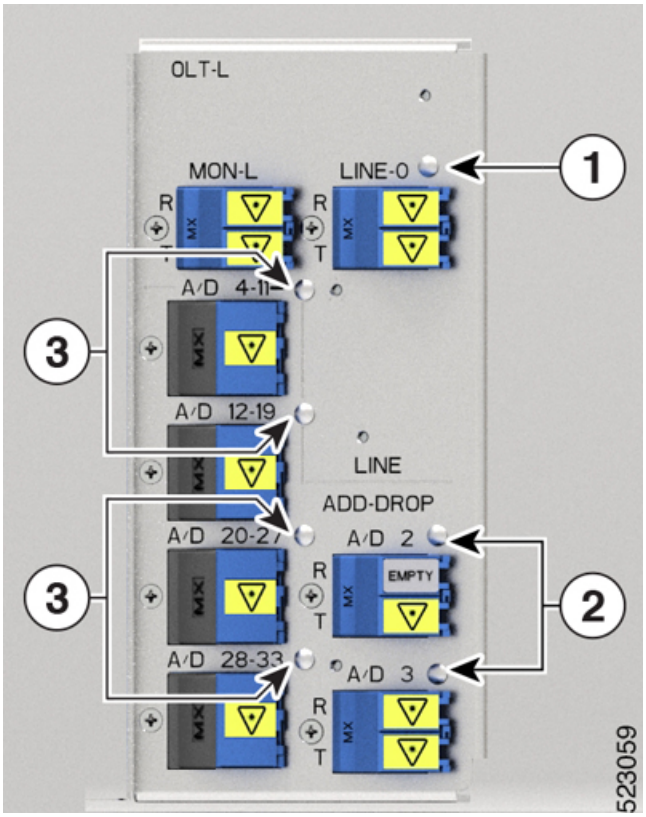
Note The OLT line cards (E-OLT-C, E-OLT-R-C, E-OLT-L) do not have LEDs to indicate the line port alarm status.

Figure 39: Front View of the OLT-R-C Line Card Faceplate



The OLT-L line card has only one LED 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.

Figure 40: Front View of the OLT-L Line Card Faceplate



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

The ILA line cards (ILA-C, ILA-R-C, ILA-2R-C, ILA-R-C, ILA-2R-C, ILA-R-C-2) have four LEDs to indicate the line port alarm status.

Figure 41: Front View of the ILA-C Line Card Faceplate

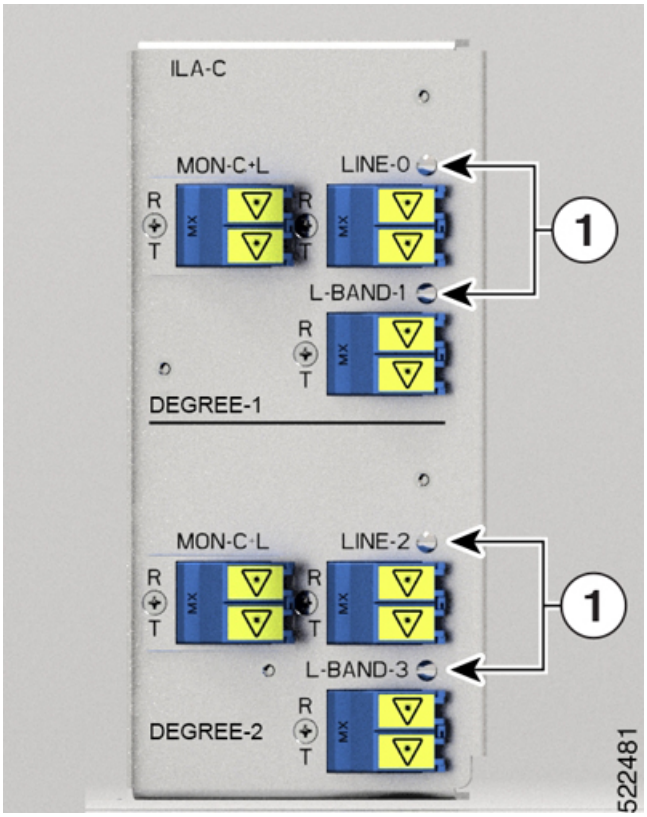


Figure 42: Front View of the ILA-R-C Line Card Faceplate

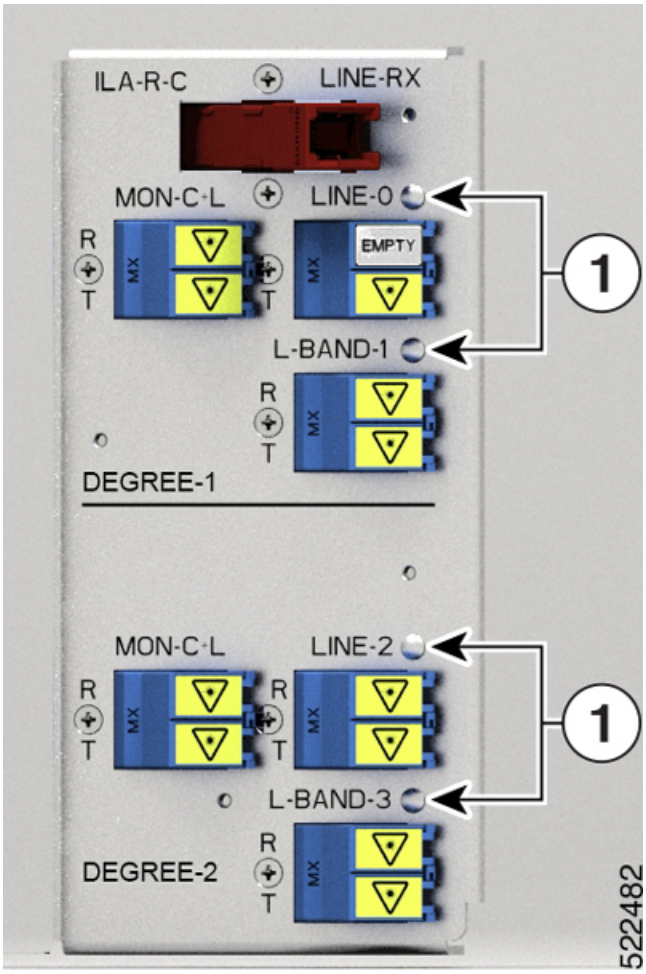


Figure 43: Front View of the ILA-2R-C Line Card Faceplate

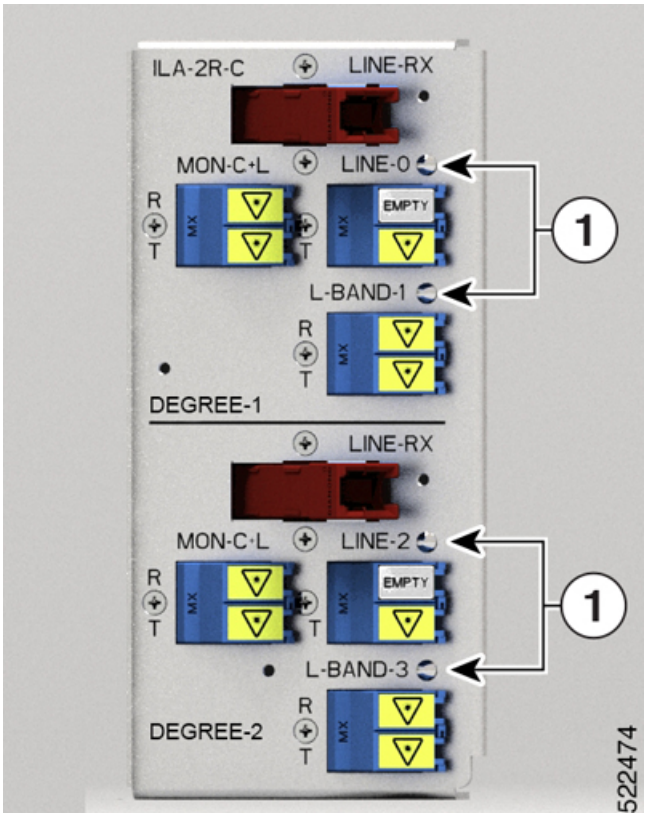


Figure 44: Front View of the E-ILA-R-C Line Card Faceplate

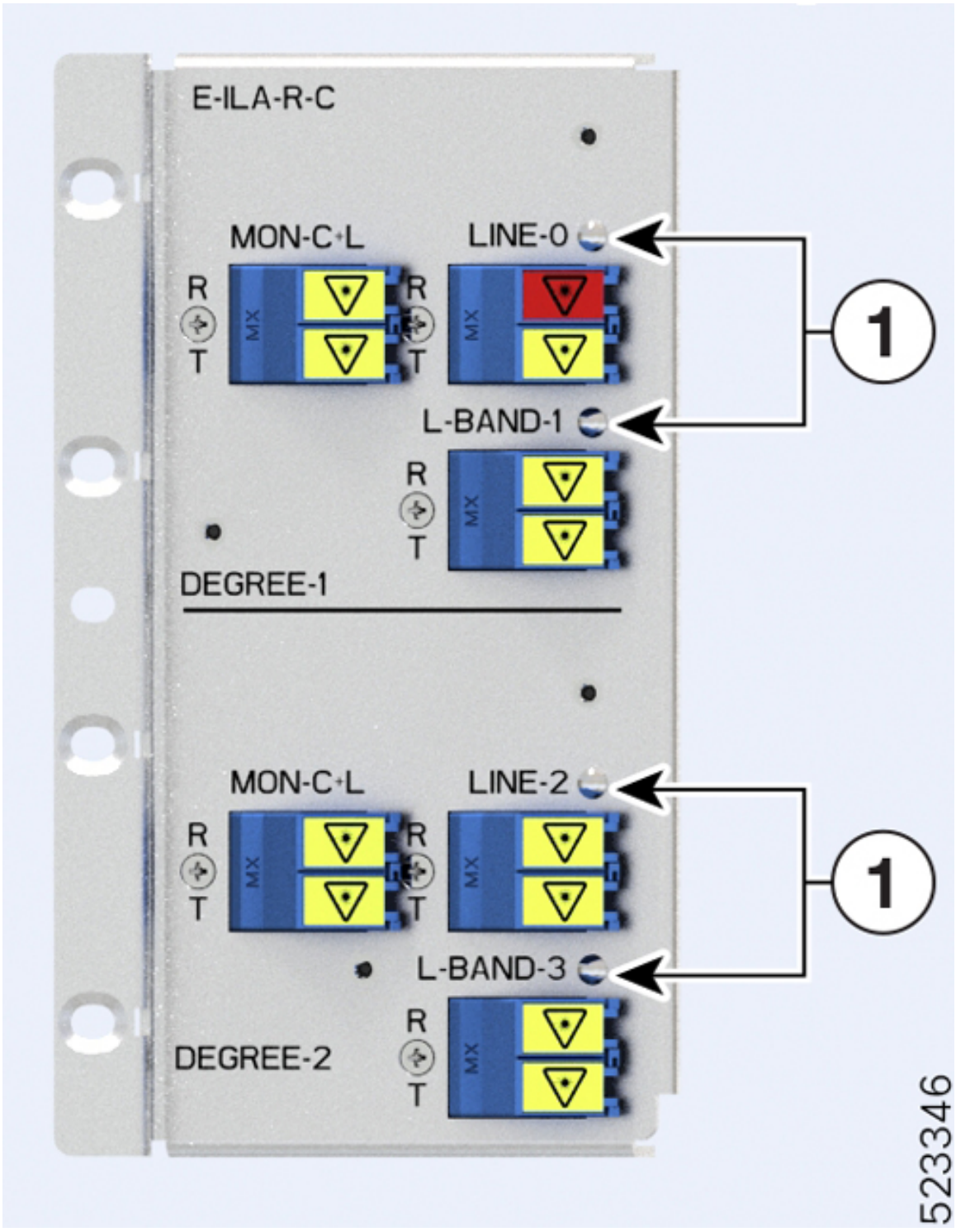


Figure 45: Front View of the E-ILA-2R-C Line Card Faceplate

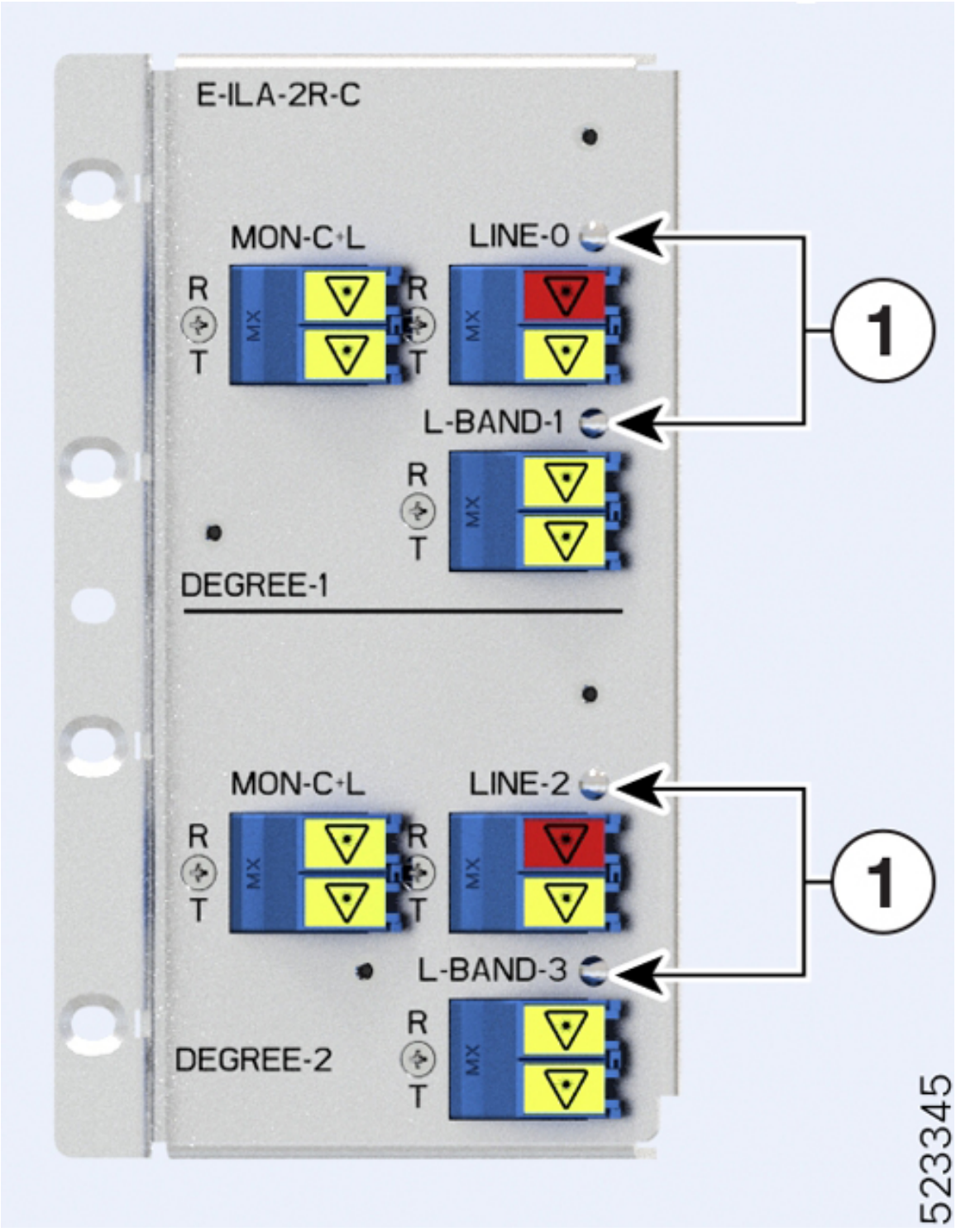
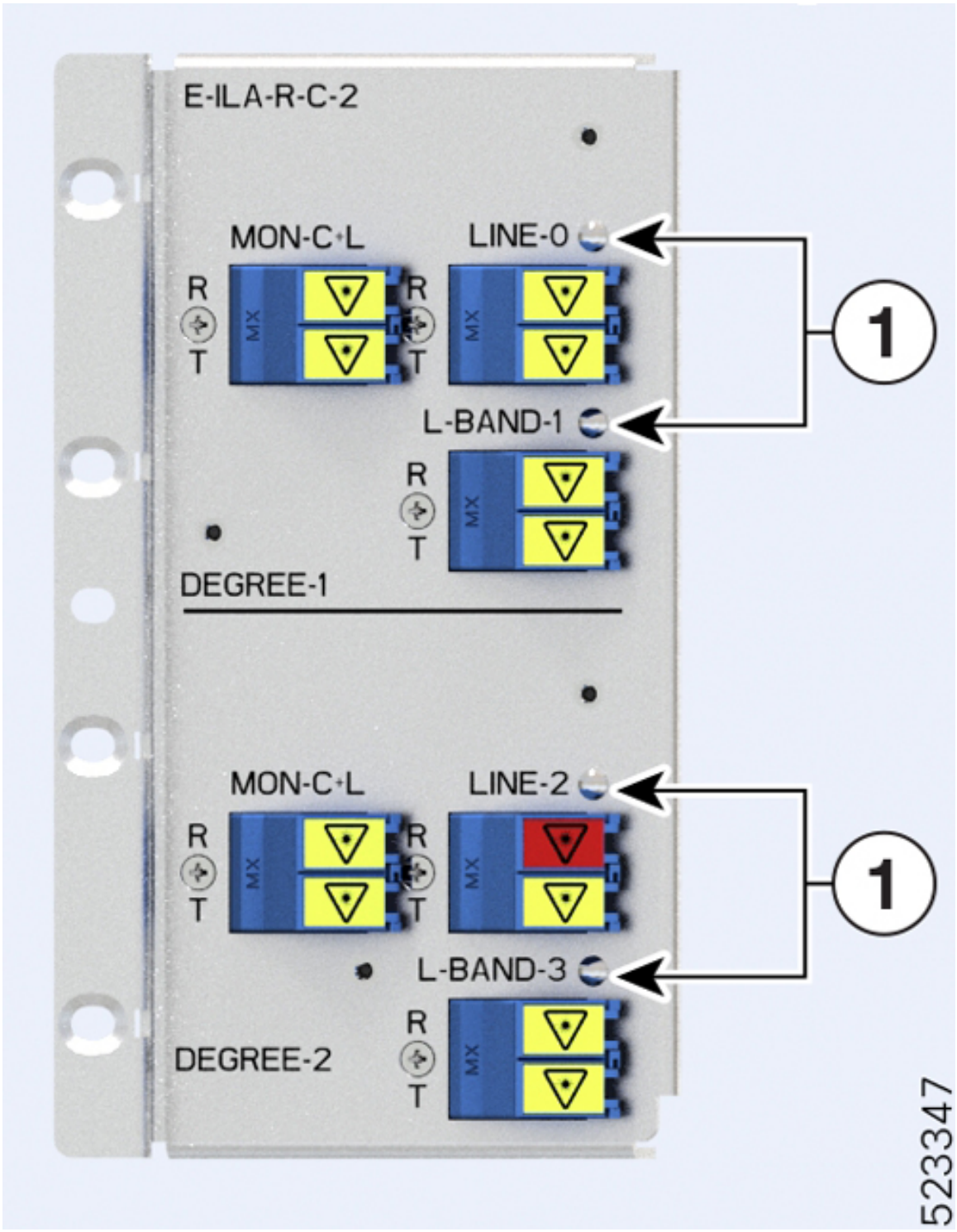
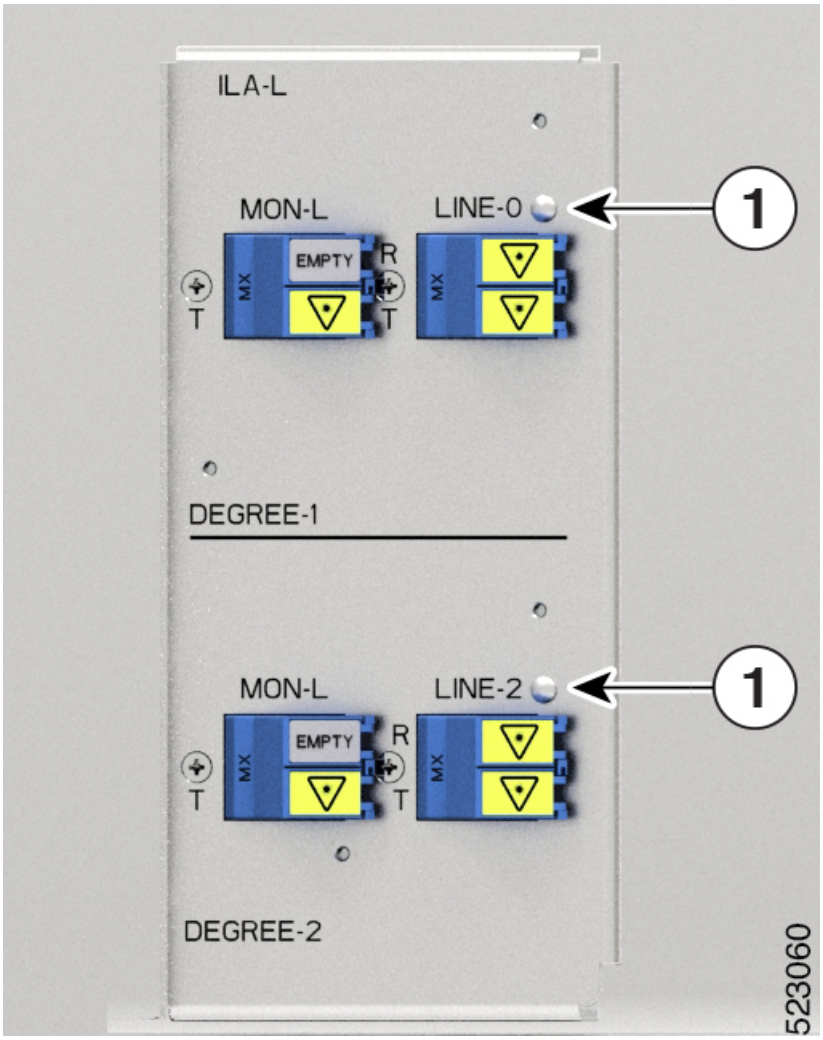


Figure 46: Front View of the E-ILA-R-C-2 Line Card Faceplate



The ILA-L line card has two LEDs to indicate the line port alarm status.

Figure 47: Front View of the ILA-L Line Card Faceplate



1	Line port LEDs

Table 8: 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.

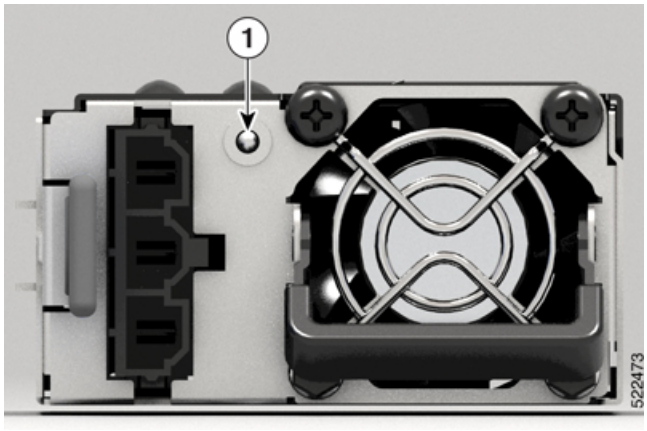
PSU LED

The PSU has one LED to indicate its status.

Figure 48: Front View of AC PSU



Figure 49: Front View of DC PSU



1	LED

The following table has details of the PSU LED:

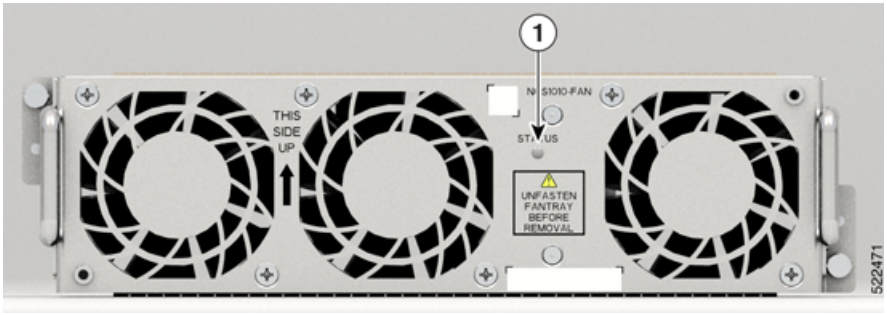
Table 9: Status of the PSU LED

LED	color	Status
PSU LED	Amber	Indicates that there is no input to the PSU, provided the other PSU is working.
	Off	Both PSUs do not have input.
	Green	Indicates that the input to the PSU is valid.

Fan Tray LED

The fan tray has one LED to indicate its status.

Figure 50: Front View of the Fan Tray



1	Fan tray LED

The following table has details of the fan tray LED:

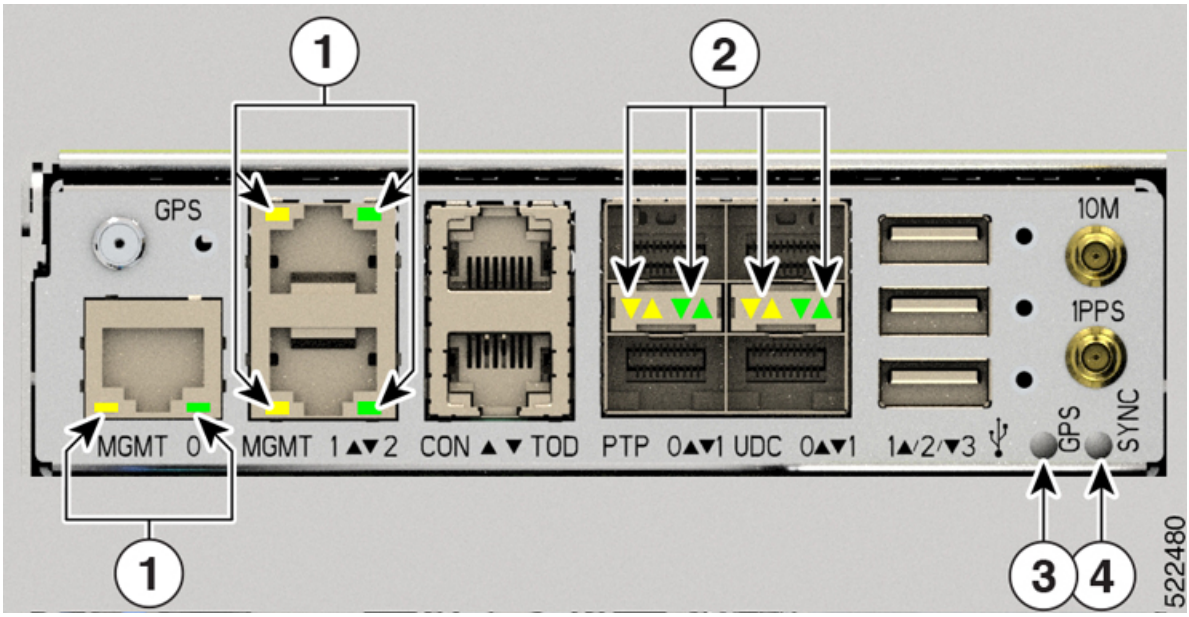
Table 10: Status of the Fan Tray LED

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.

EITU LEDs

The EITU has 12 LEDs indicating the status of its ports.

Figure 51: Front View of the EITU

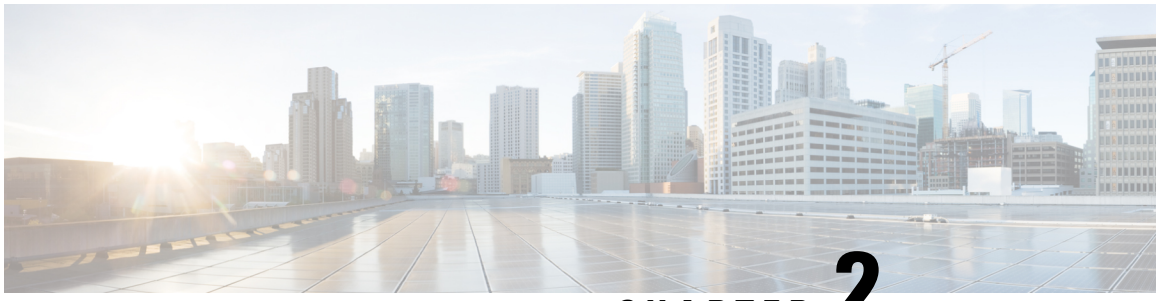


1	Ethernet Copper Ports LEDs
2	Ethernet Optical SFP Ports LEDs
3	GPS LED
4	SYNC LED

Table 11: 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.

LED	Color	Status
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 free-running state.
Ethernet Copper Ports (MGMT 0/1/2) 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) LEDs	Green	Indicates the presence of duplex or traffic collision.
	Yellow	LINK is up but without traffic.
	Flashing yellow	LINK is up but with traffic.



CHAPTER 2

Safety Guidelines and Warnings

Before you perform any task 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 - Cisco Network Convergence System 1010*.

- Standard Warning Statements, on page 49
- General Safety Guidelines for Personal Safety and Equipment Protection, on page 51
- Safety Precaution for Module Installation and Removal, on page 52
- Safety with Electricity, on page 53
- Ground Connection Warnings, on page 53
- Safety Precaution for Energy Hazard, on page 54
- Safety Precaution for Laser Radiation, on page 54
- Prevent Electrostatic Discharge Damage , on page 55
- Network Equipment-Building System (NEBS) Statements, on page 55

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.

Note For more information on all the applicable statements and their translations, see *Regulatory Compliance and Safety Information - Cisco Network Convergence System 1010*.

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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 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.

General Safety Guidelines for Personal Safety and Equipment Protection

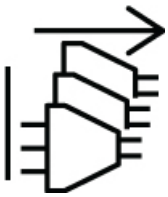
- To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:
  - This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
  - 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.

- To reduce risk of electric shock and fire, take care when connecting units to the supply circuit so that wiring is not overloaded.
- Two persons 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.
- To reduce the risk of fire or bodily injury, do not operate the unit in an area that exceeds the maximum recommended ambient temperature of 104F or 40C.
- The rack stabilizing mechanism must be in place, or the rack must be bolted to the floor before installation or servicing. Failure to stabilize the rack can cause bodily injury.
- To reduce the risk of bodily injury, the chassis should be mounted on a rack that is permanently affixed to the building.

Safety Precaution for Module Installation and Removal

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.

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.



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.

Safety with Electricity



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.



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.

Ground Connection Warnings

Take note of the following ground connection warnings:

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.

Safety Precaution for Energy Hazard

Cisco NCS 1010 can be configured for a DC power source. Do not touch terminals with body parts or conductive objects while they are energized.

Safety Precaution for Laser Radiation

Cisco NCS 1010 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.

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.



Figure 52: Class 1M Laser Product Label



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.

Network Equipment-Building System (NEBS) Statements

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

The following NEBS statements apply to Cisco NCS 1010:



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. Statement 7011

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 7003—**Shielded Cable Requirements for Intrabuilding Lightning Surge

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

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



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

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

The following ports are considered intrabuilding ports on the equipment:



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

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

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

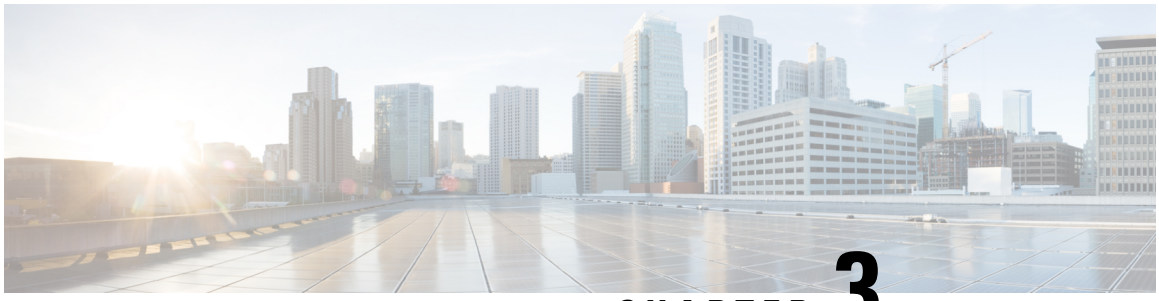
This equipment is suitable for installations using the CBN.

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

This equipment is suitable for installation in network telecommunications facilities.

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

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



CHAPTER 3

Prepare to Install Cisco NCS 1010

This chapter explains how to prepare for the Cisco NCS 1010 installation.

- Package Contents, on page 59
- Unpack and Verify Cisco NCS 1010, on page 61

Package Contents

You can order Cisco NCS 1010 as an assembled chassis (NCS1010-SYS) or as an empty chassis (NCS1010-SA) along with the components. See PIDs, on page 189 for all PIDs of the NCS 1010 components.

The shipped package contains the following:

- Cisco NCS 1010 chassis.
- Accessory kit (NCS1010-ACC-KIT)—Includes all the hardware necessary for the chassis installation on the 19" rack. You can order the accessory kits for ETSI (NCS1010-ETSI-KIT) and 23" ANSI (NCS1010-23-KIT) racks as required. From R7.10.1, you can order the accessory kit (NCS1010-E-ACC-KIT) for the ehanced faceplate design line cards for the chassis installation on the 19" rack. The following table describes the contents of the accessory kits.

Table 12: Accessory Kit Contents

Accessory Kit	Contents
NCS1010-ACC-KIT	This kit has the following items for chassis installation on a 19" rack: • Double hole ground lug (1x) • M5 Pan head screws (2x) • 12–24 Pan head screws (8x) • External tooth washers (2x) • Standoffs (2x) • Left slide rail (1x) • Right slide rail (1x) • Protection cover (1x)

Accessory Kit	Contents
NCS1010-E-ACC-KIT	This kit has the following items for chassis installation on a 19" rack: • Double hole ground lug (1x) • M5 Pan head screws (2x) • 12–24 Pan head screws (8x) • External tooth washers (2x) • Left slide rail (1x) • Right slide rail (1x)
NCS1010-23-KIT	This kit has the following items for chassis installation on an ANSI 23" rack: • 23" rack to 19" rack adapter • 12–24 Screws (14x)
NCS1010-ETSI-KIT	This kit has the following items for chassis installation on an ETSI rack: • ETSI rack to 19" rack adapter • M6 screws (8x) • Ground adapter

The following table shows the 19" accessory kits applicable for each line cards.

Accessory Kit	Line card
NCS1010-ACC-KIT	• NCS1K-OLT-C • NCS1K-OLT-R-C • NCS1K-ILA-C • NCS1K-ILA-R-C • NCS1K-ILA-2R-C • NCS1K-OLT-L= • NCS1K-ILA-L= • NCS1K-E-ILA-R-C= • NCS1K-E-ILA-2R-C= • NCS1K-E-ILA-R-C-2=

Accessory Kit	Line card
NCS1010-E-ACC-KIT	• NCS1K-E-OLT-R-C= • NCS1K-E-OLT-C= • NCS1K-E-OLT-L=

- Field replaceable modules such as PSUs, controller, fan trays, air filter, and line card (the variant of line card that you have ordered).
- AC and DC power cables that you have ordered. See Supported Cables, on page 193.

Unpack and Verify Cisco NCS 1010

Use this task to unpack and check if all the chassis modules that are required for installation have been shipped.

Procedure

Step 1 When you receive Cisco NCS 1010 equipment at the installation site, open the top of the box.

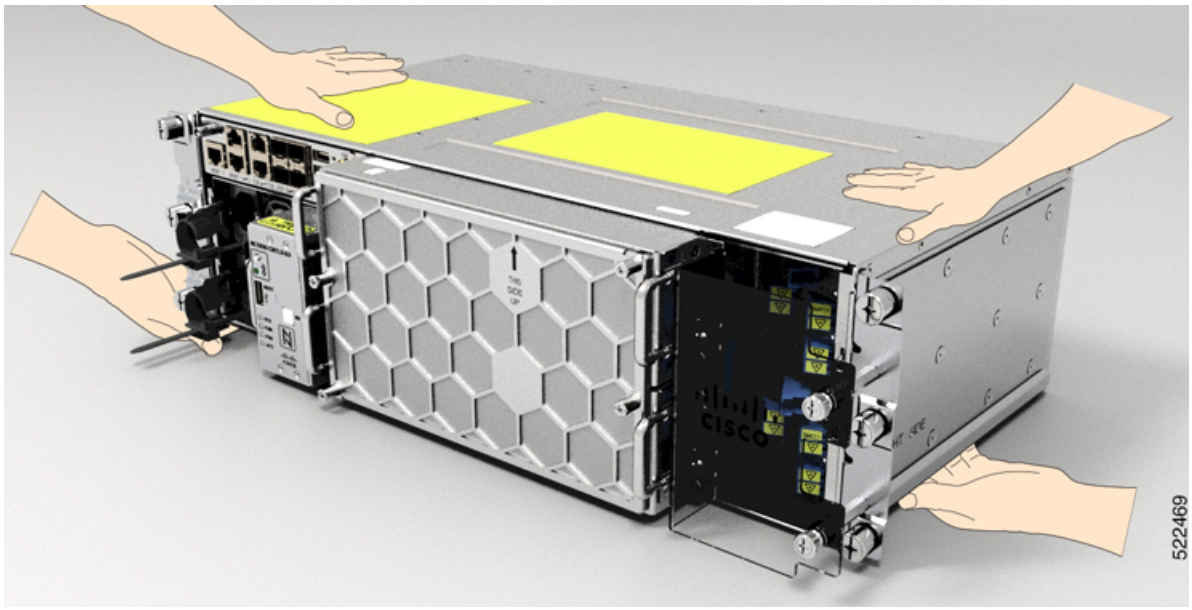
Step 2 Remove the accessory kits and foam inserts in the box. The box contains Cisco NCS 1010 and other items that are needed for installation.

Step 3 To remove the chassis from the packaging, grasp the side of the chassis and lift it out of the box.

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

- Do not lift equipment alone; have another person help you to lift the equipment.

Figure 53: Lifting Cisco NCS 1010



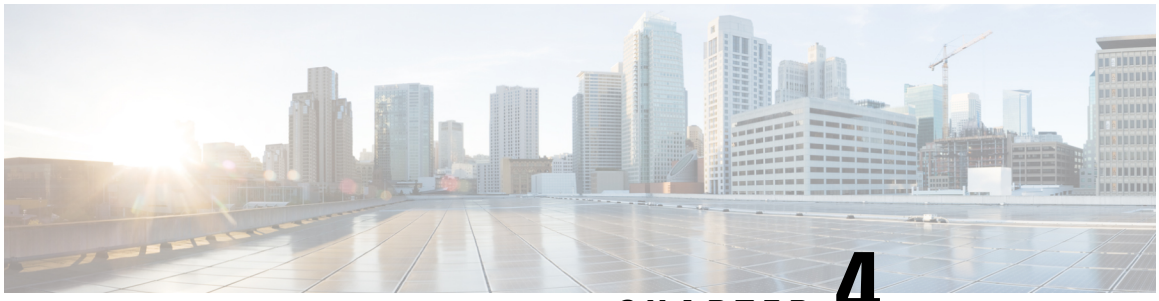
A fully loaded chassis can weigh as much as 19 kg (42 lb).

- 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 4 Verify the following:

- Cisco NCS 1010 is not damaged. Check for a scratch, bend, discoloration, or deformation on the Cisco NCS 1010 chassis.
- The modules that are shipped with the chassis or separately are not damaged.

Step 5 If there is any damage to the chassis or the modules, call your Cisco sales engineer for a replacement.



CHAPTER 4

Install Cisco NCS 1010

This chapter contains tasks to install Cisco NCS 1010.

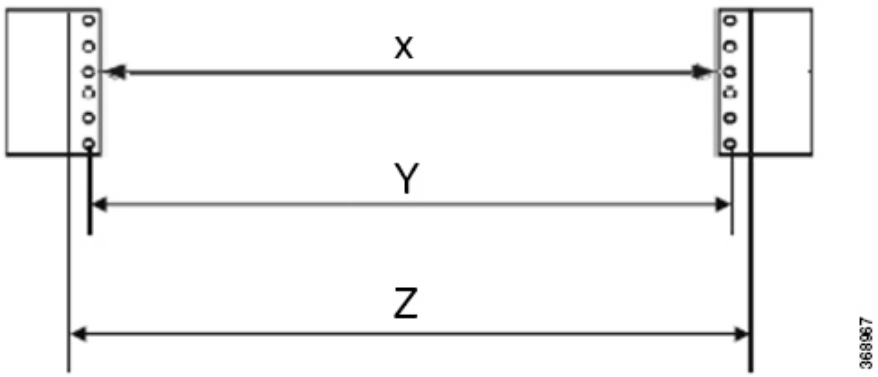
- Rack Compatibility, on page 63
- Install Slide Rail into the Rack, on page 64
- General Power and Grounding Requirements, on page 68
- Equipment Installation to Power Warnings, on page 72
- Rack-Mount Warnings, on page 74
- Install Cisco NCS 1010 on an EIA/ANSI/ETSI Rack, on page 74

Rack Compatibility

The NCS1010 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 54: 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")
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")

Install Slide Rail into the Rack

The length of the slide rail fits only in the front posts of the four-post rack. Therefore, the same slide rails can be used for both two-post and four-post racks.

- Install Slide Rail into an EIA 19" Rack, on page 64
- Install Slide Rail into an ANSI 23" Rack, on page 65
- Install Slide Rail into an ETSI Rack, on page 66

Install Slide Rail into an EIA 19" Rack

Use the following task to install the slide rail into two-post or four-post EIA rack.

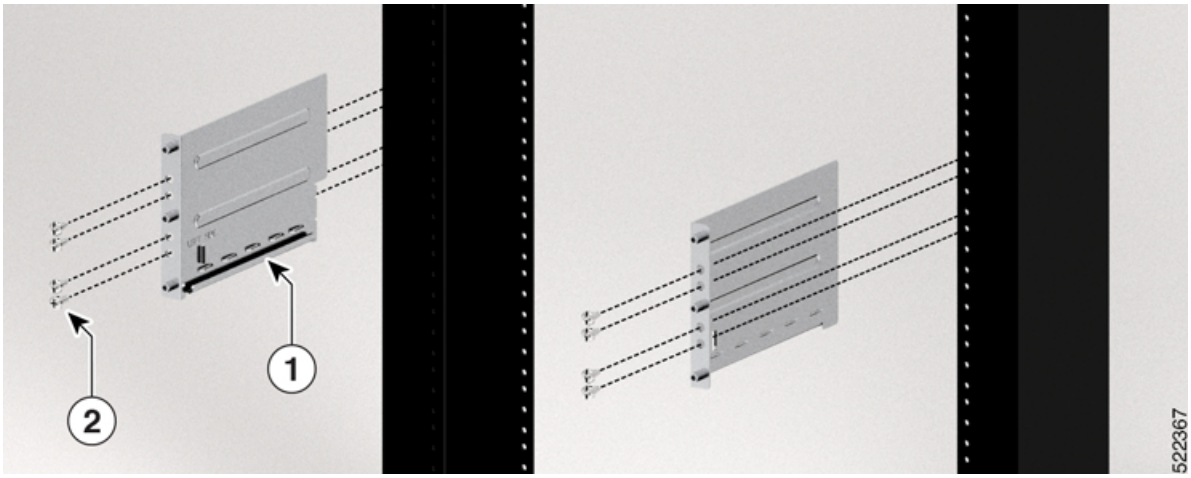
Procedure

Step 1 Identify the left side and right side slide rail.

Step 2 On the left side front post of the rack, place the left side slide rail.

Step 3 Insert all the four screws into the slide rail, one by one.

Figure 55: Slide Rail Integration - EIA Rack



1	Slide rail
2	8x 12–24 Pan head screws

Step 4 Tighten the screws to a torque value of 4.65 N-m (41 lbs-in).

Step 5 Similarly, fix the right side slide rail on the right side front post.

Install Slide Rail into an ANSI 23" Rack

Use the following task to install the slide rail into a two-post or four-post ANSI rack.

Procedure

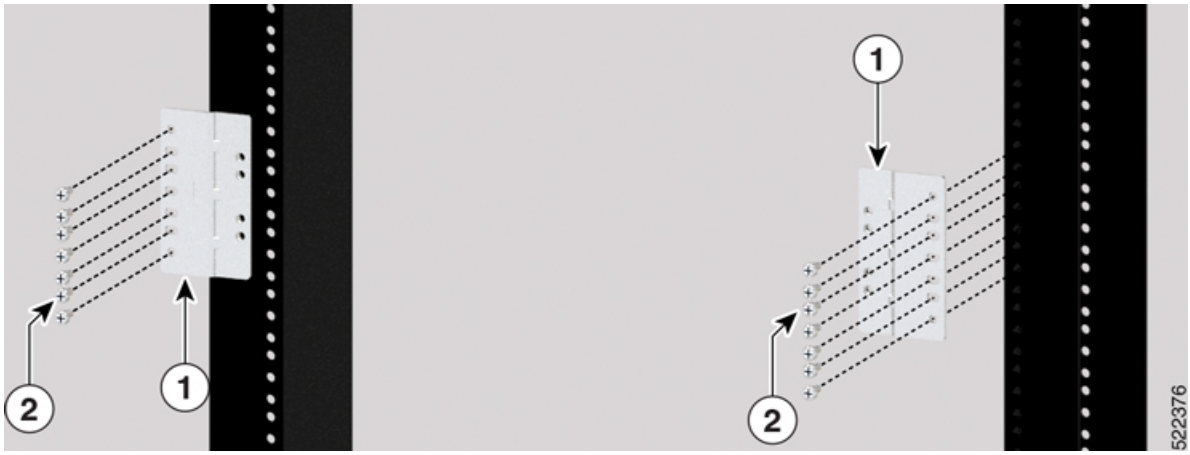
Step 1 Identify the left side and right side slide rails.

The slide rail is fitted on to an ANSI rack using a 23" rack to 19" rack adapter.

Step 2 Identify the left side and right side adapters.

Step 3 Fix the adapters on both the left side and right side posts using the 12–24 screws that are available in the accessory kit (NCS1010-23-KIT).

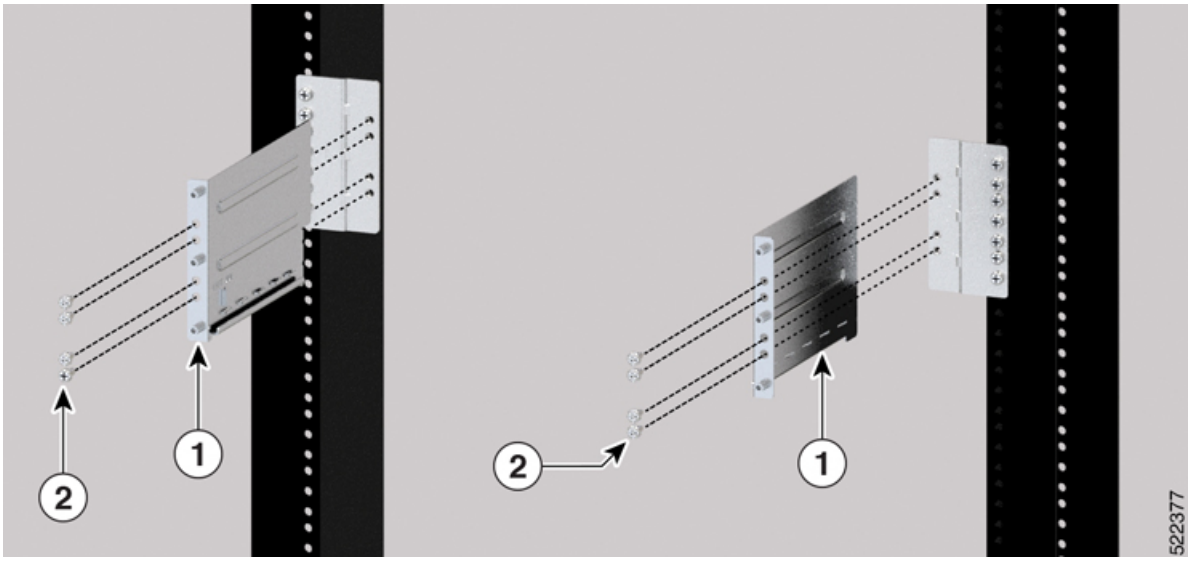
Figure 56: Fixing 23" Adapter



1	23" rack to 19" rack adapter
2	12–24 screws (14x)

Step 4 On the left side adapter, place the left side slide rail and insert the 12–24 pan head screws.

Figure 57: Slide Rail Integration



1	Slide rail
2	12–24 Pan head screws (8x)

Step 5 Tighten the screws to a torque value of 4.65 N-m (41 lbs-in).

Step 6 Similarly, fix the right side slide rail on the right side post.

Install Slide Rail into an ETSI Rack

Use the following task to install the slide rail into a two-post or four-post ETSI rack.

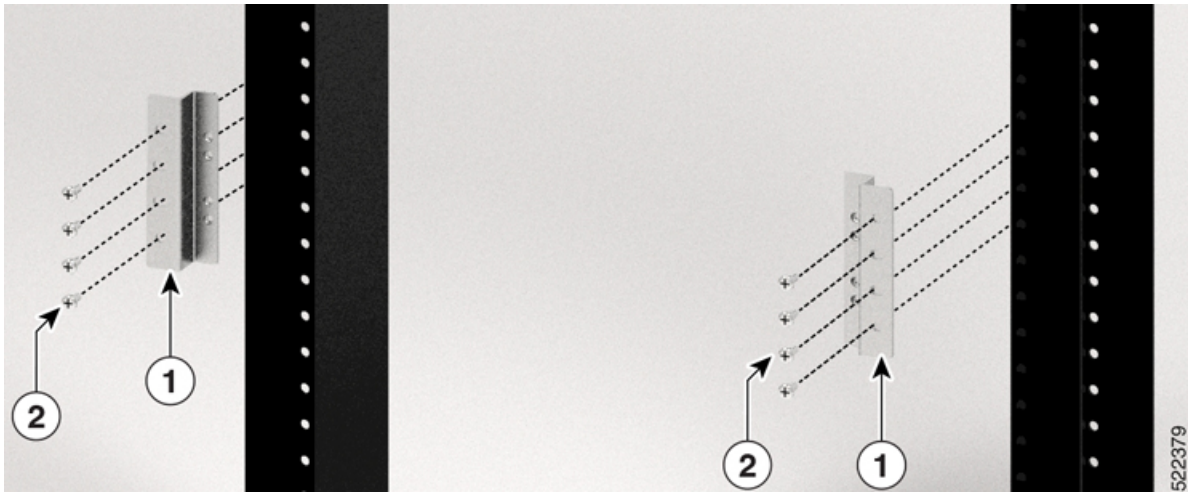
Procedure

Step 1 Identify the left side and right side slide rail.

The slide rail is fitted on to an ETSI rack using an ETSI to 19" adapter. The same adapter can be used for both left and right sides.

Step 2 Fix the adapters on both the left side and right side posts using the M6 four screws available in the accessory kit (NCS1010-ETSI-KIT).

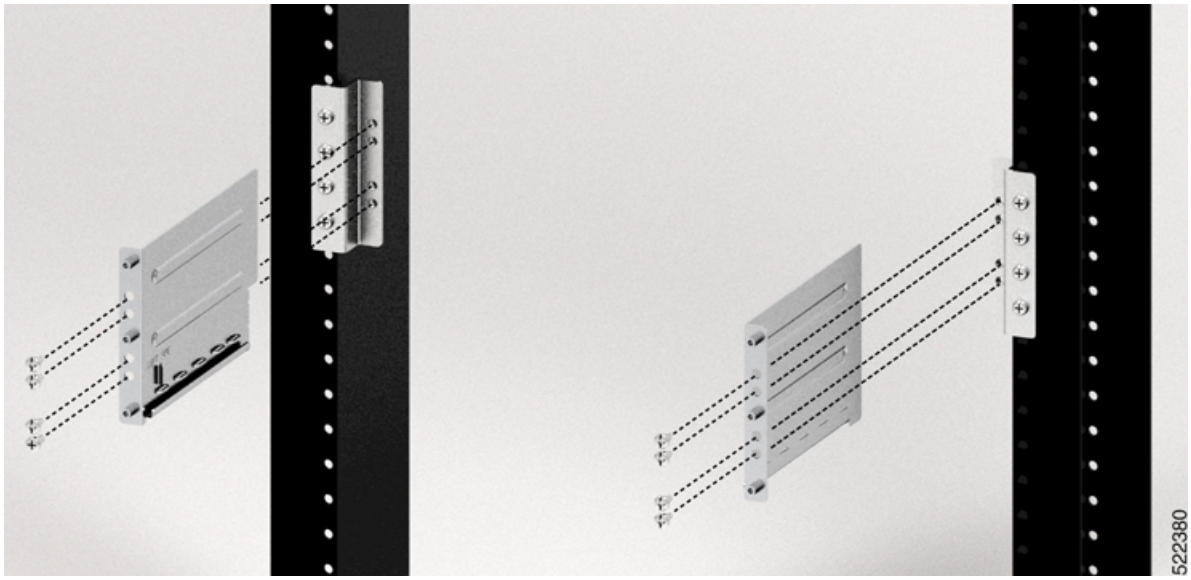
Figure 58: Fixing 19'' to ETSI Adapter



1	ETSI rack to 19" rack adapter
2	M6 screws (8x)

Step 3 On the left side adapter, place the left side slide rail and insert the12–24 pan head screws (4x).

Figure 59: Slide Rail Integration - ETSI Rack



Step 4 Tighten the screws to a torque value of 4.65 N-m (41 lbs-in).

Step 5 Similarly, fasten the right side slide rail on the right side adapter.

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 *Regulatory Compliance and Safety Information - Cisco Network Convergence System 1010* before attempting to install the chassis.

Ground Connection Warnings

Take note of the following ground connection warnings:

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.

Ground Cisco NCS 1010

In the installation of the chassis, the ground lug must be connected first.

This task provides the grounding details for the Cisco NCS 1010 chassis. In the installation of the chassis, connect the ground lug first.

Warning **Statement 1099—**Before Connecting to System Power Supply

High touch/leakage current—Permanently connected protective earth ground is essential before connecting to the system power supply.

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

Note The ground lug must be attached before energizing the chassis.

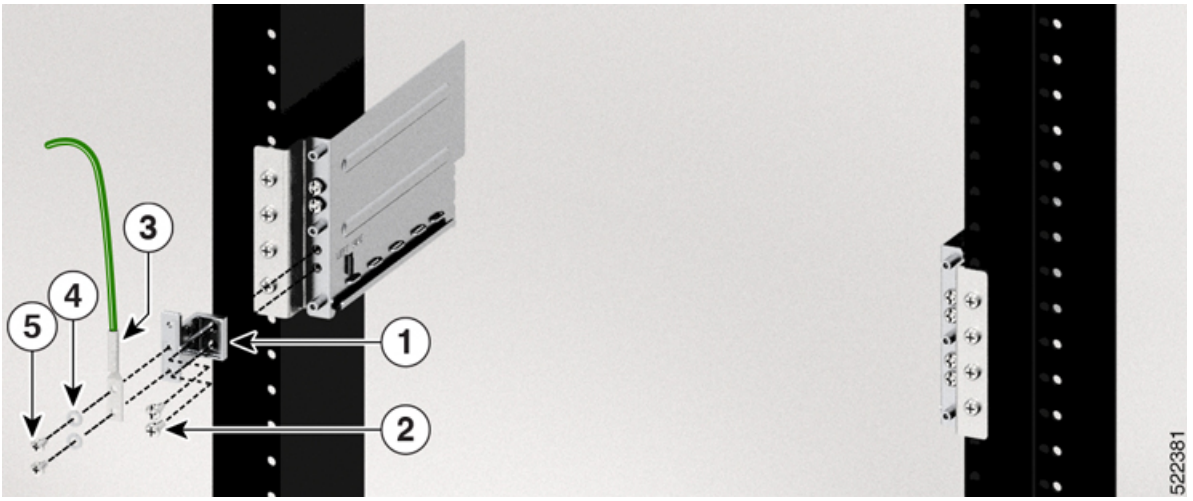
Procedure

Step 1 Connect the ground lug in one of the following ways as per your requirement:

a. To connect the ground lug in the front side:

- Fix the upper two screws of the left slide rail.
- Align the ground adapter (provided with ETSI accessory kit (NCS1010-ETSI-KIT)), with the lower two screw holes of the slide rail.
- Fix the lower screws using a screw driver to a torque value of 4.65 N-m (41 lbs-in). These screws hold both the ground adapter and the slide rail.
- Place the ground lug on the ground adapter and insert the two screws with the washers.
- Tighten the screws by using a screw driver to a torque value of 3.1 N-m (27.4 lbs-in).

Figure 60: Fixing Ground Lug on the Ground Adapter - ETSI Rack



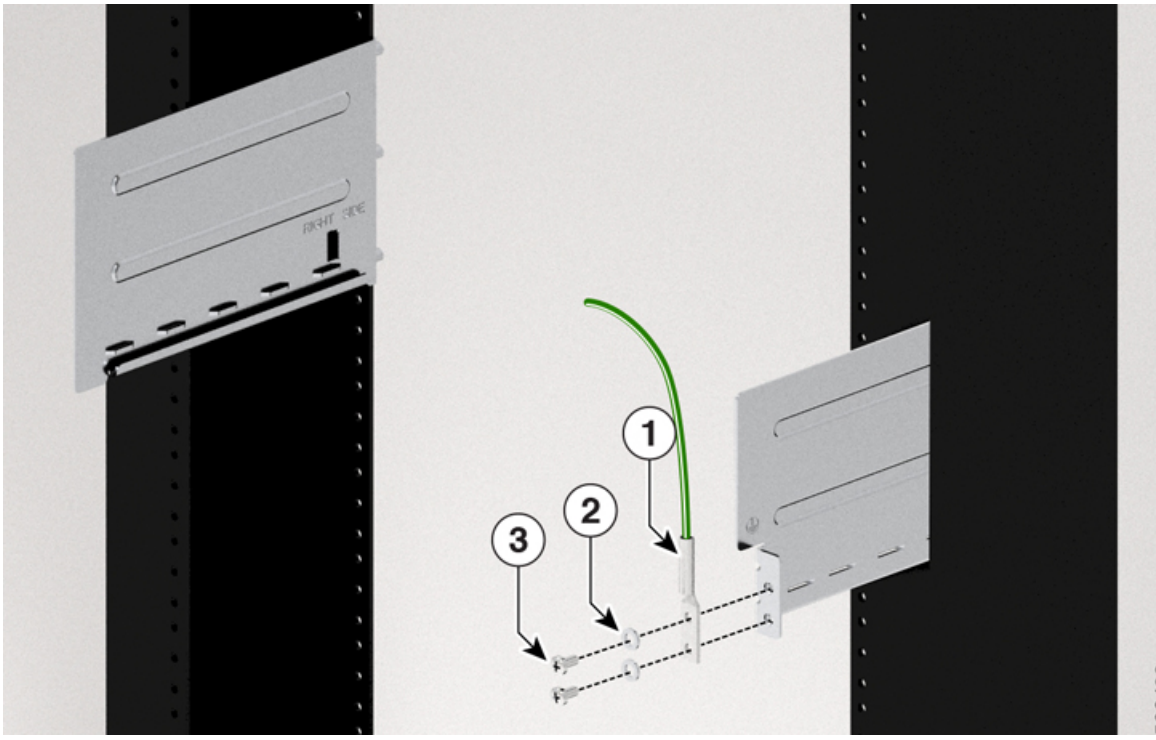
1	Ground adapter
2	12–24 Pan head screws
3	Ground lug
4	Washers (2x)
5	M5X10mmL Screws (2x)

Note
You can use the preceding option 'a' only for the ETSI rack.

b. To connect the ground lug in the front side:

- Place the lug on the provision at the rear side of the left slide rail.
- Fix the M5X10mmL screws with the washers, by using a screw driver to a torque value of 3.1 N-m (27.4 lbs-in).

Figure 61: Fixing Ground Lug in the Rear Side of the Slide Rail



1	Ground lug
2	Washers (2x)
3	M5X10mmL screws (2x)

c. To fix the ground lug at the rear side of the chassis:

- Place the lug on that provision at the rear left side of the chassis. You can see a grounding symbol next to the provision for the ground lug.
- Fix the M5X10mmL screws with the washers by using a screw driver to a torque value of 3.1 N-m (27.4 lbs-in).

Figure 62: Fixing Ground Lug in the Rear Side of the Chassis



1	Ground lug
2	Washers (2x)
3	M5X10mmL Screws (2x)

Note
When you use the options 'a' and 'b', the ground lug remains attached to the slide rails. This allows you to remove the chassis without needing to remove the ground lug.

Note
If the ETSI rack does not have rear access, front ground lug (option 'a') must be attached before mounting the NCS1010 chassis on the slide rails. In all other cases, you can use the two rear ground lug options (option s 'b' and 'c") that can be assembled after the chassis is mounted on slide rails.

Step 2 Verify that the office ground cable is connected to the top of the rack and the office ground, according to local site practice.

Step 3 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 appropriate antioxidant compound to the bare conductors.

Step 4 Attach one end of the shelf ground cable (#6 AWG cable) to the ground point using the lug.

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

Equipment Installation to Power Warnings

Take note of the following power safety warnings:

Warning **Statement 1003—**DC Power Disconnection

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

Warning **Statement 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 40A for DC.

Warning **Statement 1017—**Restricted Area

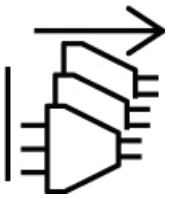
This unit is intended for installation in restricted access areas. Only skilled, instructed, or qualified personnel can access a restricted access area.

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.

Rack-Mount Warnings

Take note of the following rack-mount safety warnings.

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

Two 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 Cisco NCS 1010 on an EIA/ANSI/ETSI Rack

Use this task to mount the Cisco NCS 1010 chassis on an EIA/ANSI/ETSI rack.

Caution

- You must support the chassis with your hand during installation and replacement in a rack post.
- The slide rails are used only for positioning the chassis. To prevent accidental fall of the chassis, ensure that you fix the chassis in the slide rail using the captive screws.

Before you begin

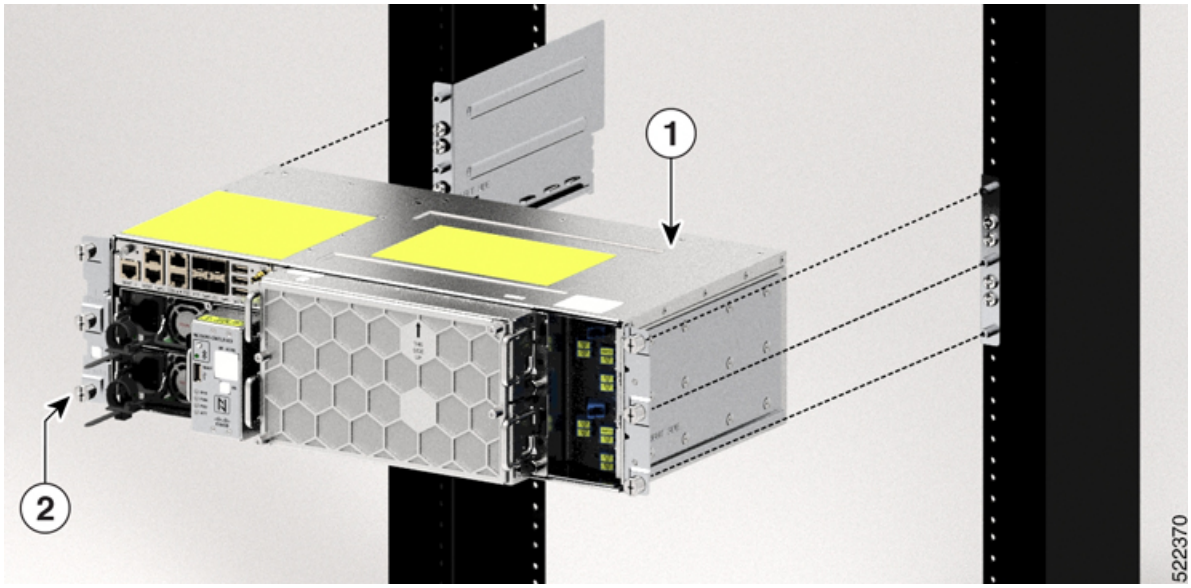
Ensure that the rack is compatible. See Rack Compatibility, on page 63.

Procedure

Step 1 Install Slide Rail into the Rack, on page 64.

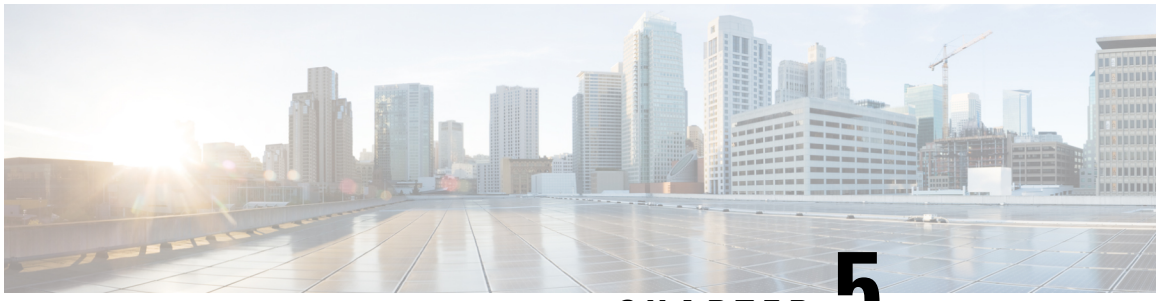
Step 2 Insert the chassis onto the slide rails assembled on the rack.

Figure 63: Mounting the Chassis on the Rack



1	Cisco NCS 1010 chassis
2	Captive screws

Step 3 After the chassis is completely inserted, tighten the captive screws into the standoffs available on each side of the slide rail, using a number-2 Phillips screwdriver to a torque value of 1.5 N-m (13.3 lbs-in).



CHAPTER 5

Install Cisco NCS 1010 Modules

This chapter describes the tasks to install Cisco NCS 1010 modules.

Caution Always populate the modular slots in the Cisco NCS 1010 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 Celsius. Complete the OIR of modules within five minutes to prevent overheating of the components.

WARNING: DO NOT INTRODUCE BODY OR OBJECT IN THE CHASSIS / PSU / FAN TRAY/LC SLOTS WHEN INSTALLING OR REMOVING A MODULE. EXPOSED CIRCUITRY IS AN ENERGY HAZARD.

ATTENTION: ÉVITEZ TOUT CONTACT ENTRE VOTRE CORPS OU UN OBJET EXTERNE ET L'INTÉRIEUR DU CHÂSSIS, DU BLOC D'ALIMENTATION,LA FENTE DE VENTILATION DU PLATEAU,OU DE LA FENTE PDS LORSQUE VOUS INSTALLEZ OU RETIREZ UN MODULE. LES CIRCUITS EXPOSÉS CONSTITUENT UN RISQUE D'ÉLECTROCUTION.

522406

- Install PSU, on page 77
- Install Controller, on page 82
- Install Line Card, on page 83
- Install Fan Tray, on page 85
- Install Fan Filter, on page 87
- Install the Protection Cover, on page 88

Install PSU

Use this task to install PSU into the Cisco NCS 1010 chassis. You can install two AC PSUs or two DC PSUs in a chassis.

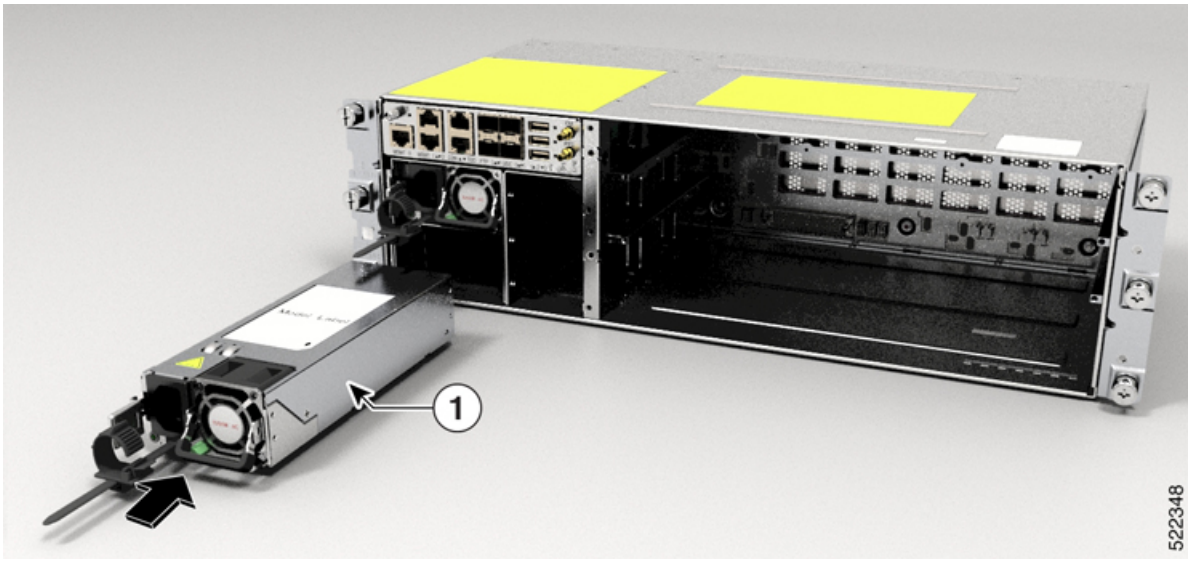
Procedure

Step 1 Orient the PSU correctly before inserting.

Step 2 Using the handle, slide the PSU into the slot (support the PSU at the bottom with your hand) and push it in until you hear a click sound; direction of insertion is shown in the following figure. The click sound indicates that the unit has been latched. .

Note
The locking latch must be pressed and released only for removing the PSU.

Figure 64: Installing the PSU

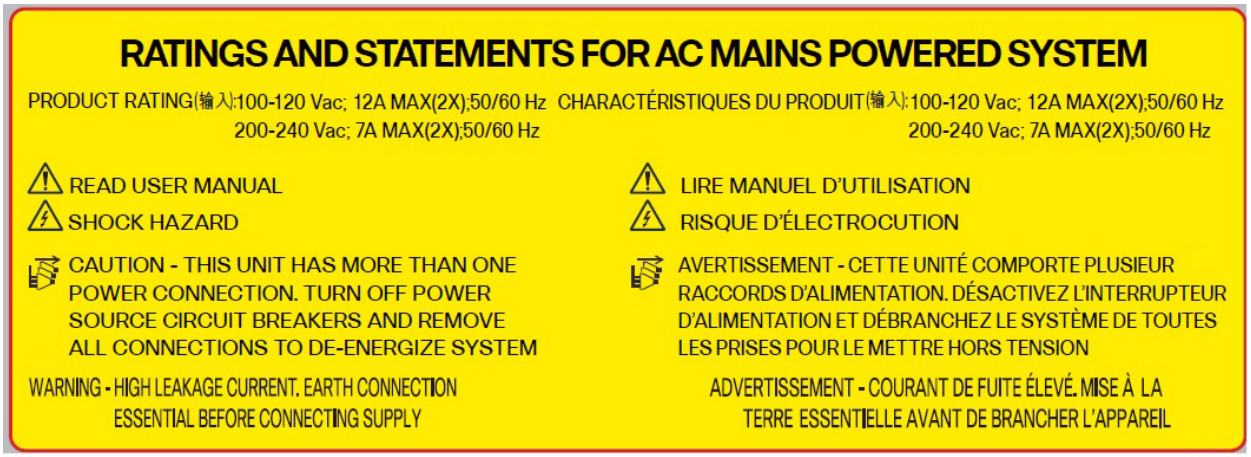


1	PSU unit

Connect AC Power to Cisco NCS 1010

Caution Cisco NCS 1010 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 65: Rating Label for AC Power



AC power ratings: The voltage rating value for AC power ranges either 200–240 or 100–127 V depending on the standards in various countries.

- Input: 100-120Vac, 12A, 50-60HzDC

  Outputs: +12V, 67A Max. +12Vsb, 3A Max. Total output power 800W.

- Input: 200-240Vac, 7A, 50-60HzDC

  Outputs: +12V, 87.5A Max. +12Vsb, 3A Max. Total output power 1050W.

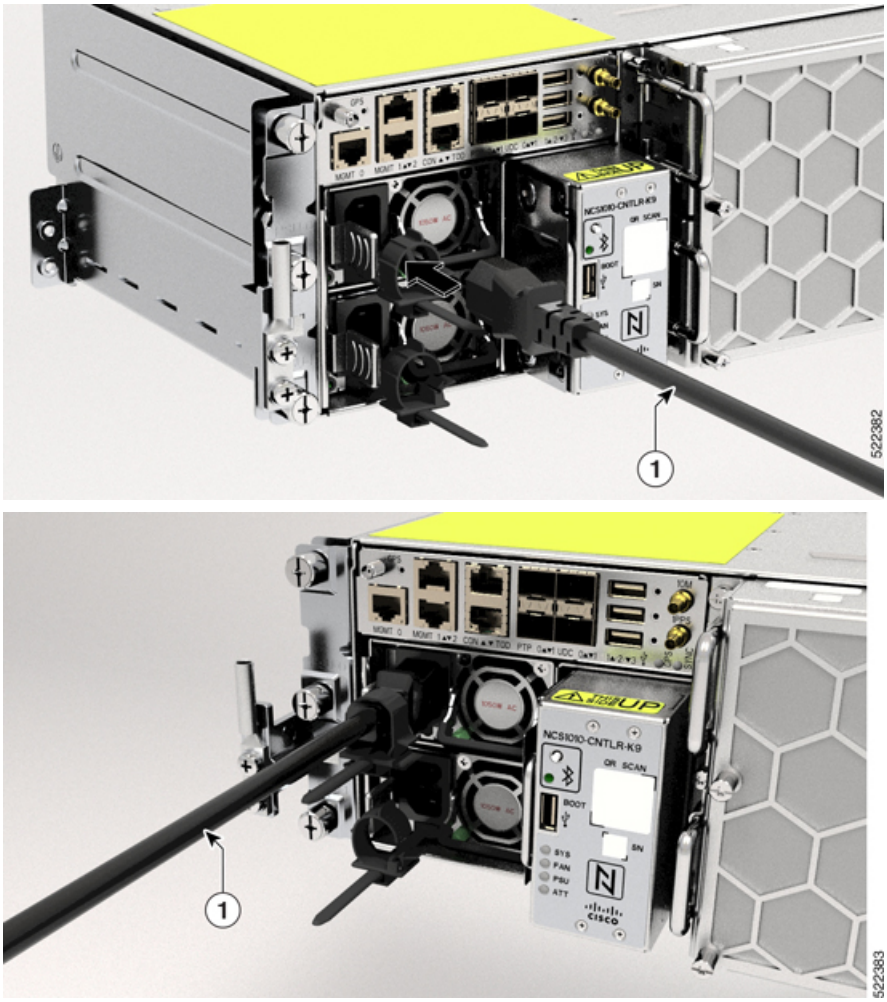
Note A dual pole breaker is needed for the installation. The rating of the dual pole breaker for each feed is 16A for input voltage 200–240 Vac, and 20A for input voltage 100–127 Vac.

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. See Power Cable Specifications, on page 193 for the supported AC power cables.

Figure 66: Connecting AC Power Cable



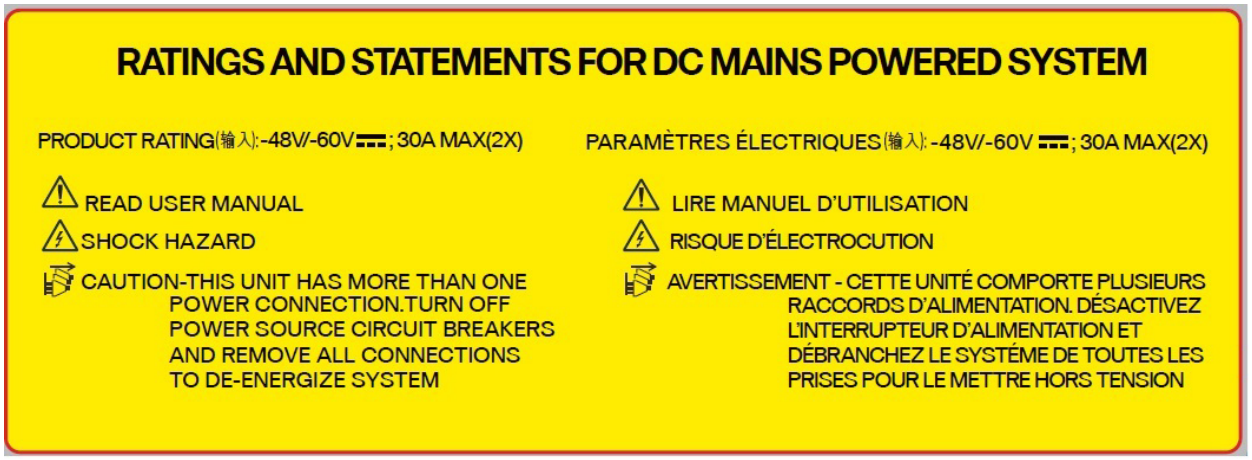
1	AC power cable

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

Connect DC Power to Cisco NCS 1010

Caution Cisco NCS 1010 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 67: Rating Label for DC Power



DC power ratings:

- Input: 48-60Vdc, 30A.
- DC output: +12V, 87.5A Max. +12Vsb, 3A Max. Total output power must not exceed 1050W.

Before you begin

1. In the installation of the chassis, the ground lug must be connected first.
2. The ground lug must be attached before energizing the chassis.

Procedure

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

Step 2 Measure and cut the cables as required to reach Cisco NCS 1010 from the fuse panel.

Step 3 Connect the office battery and return cables according to the fuse panel engineering specifications.

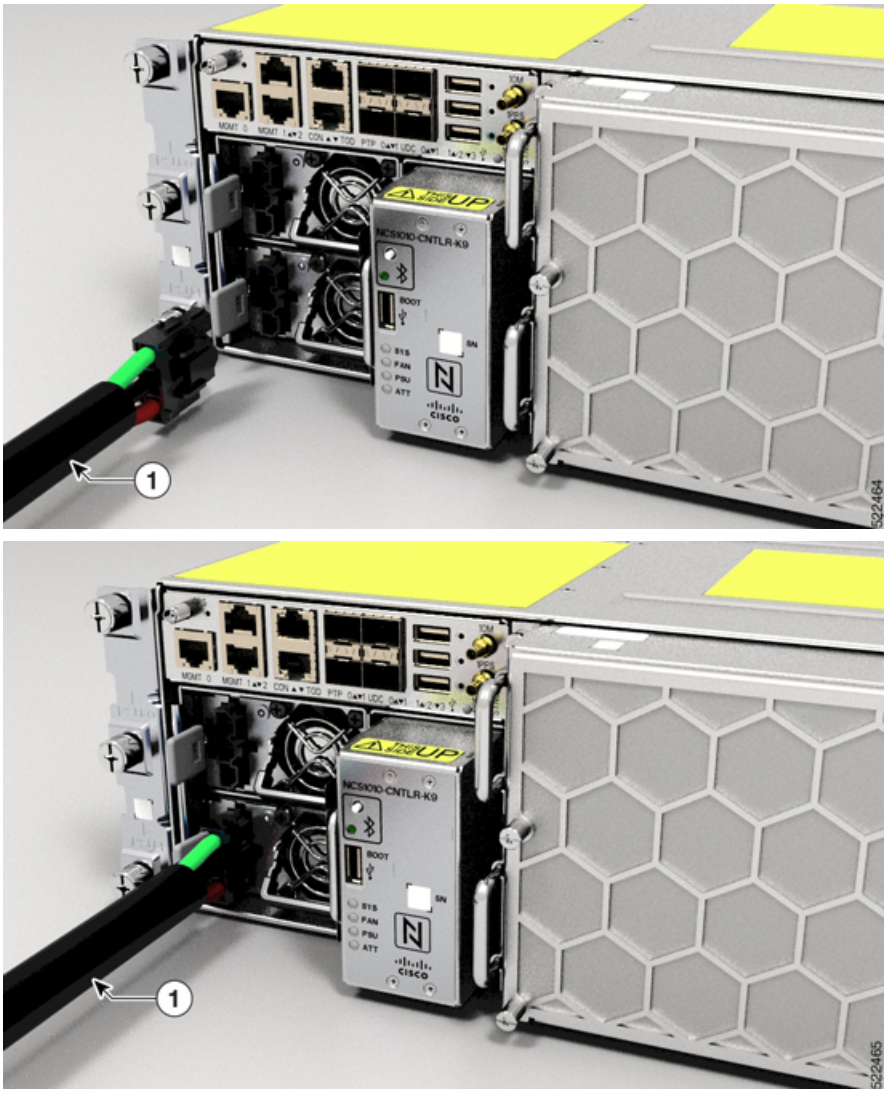
Step 4 Attach the DC power cable to the cable connector in the DC power module.

Use the CAB-48DC-40A-8AWG or NCS1010-DC-CBL-ET= cable. We recommend using NCS1010-DC-CBL-ET= with the ETSI 300-mm cabinet to remain compliant with the 300-mm footprint. See Power Cable Specifications, on page 193.

Note
Ensure to ground the green colored cable.

The green-colored cable is provided as an optional connection to the GND terminal on the fuse panel that has a dedicated GND terminal.

Figure 68: Connecting DC Power



1	DC power cable

Install Controller

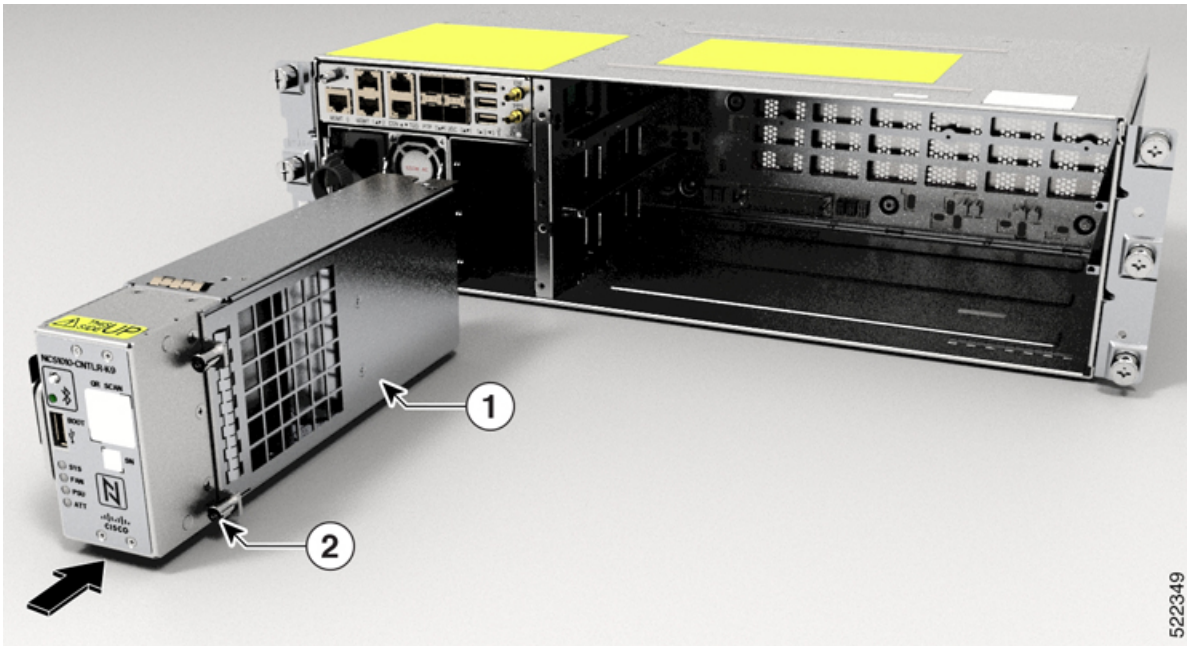
Use this task to install controller into the Cisco NCS 1010 chassis.

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 69: Installing the Controller



1	Controller
2	Captive Screw

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

Install Line Card

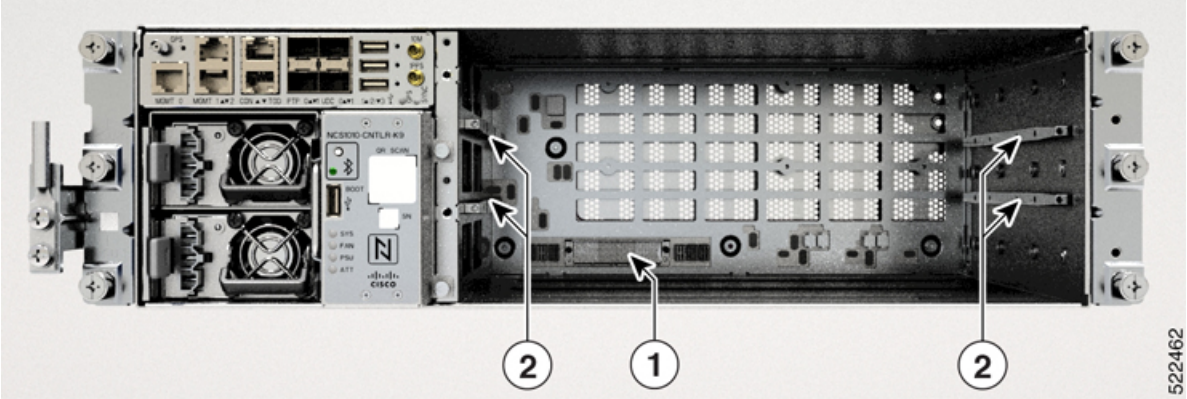
Use this task to install the line card into the Cisco NCS 1010 chassis.

Procedure

Step 1 Orient the line card.

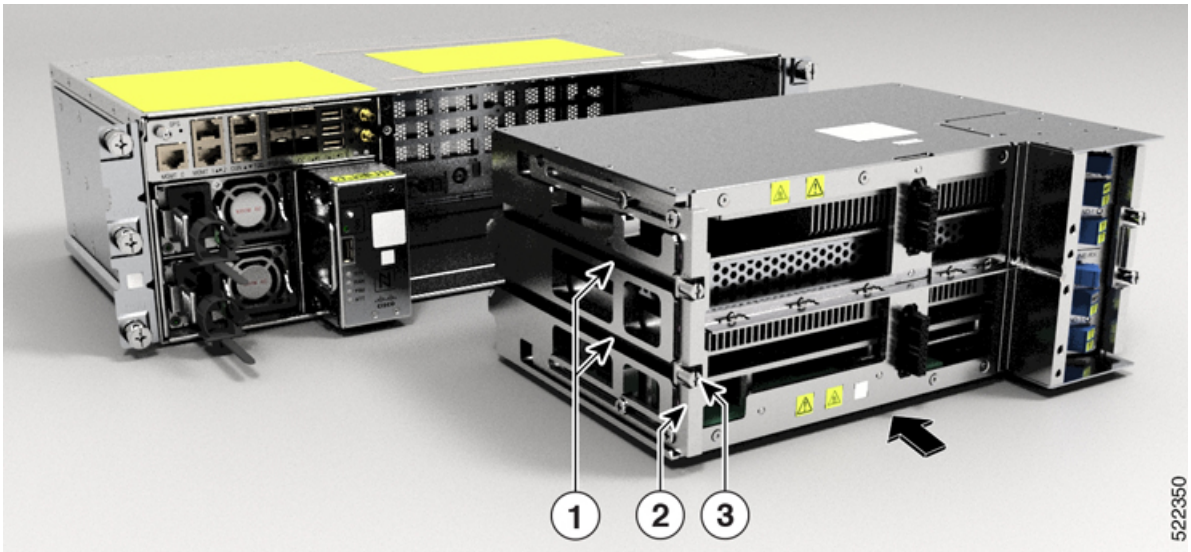
Step 2 Align the grooves in both sides of the line card with the slide guides available inside the chassis.

Figure 70: Cisco NCS 1010 Chassis



1	Backplane connector
2	Slide Guides

Figure 71: Inserting the Line Card



1	Grooves
2	Handle
3	Captive Screws (Two captive screws on each side of the 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 top and 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).

Install Fan Tray

Use this task to install the fan trays into the chassis. The chassis can accommodate two fan trays.

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.

Figure 72: Front View of the Fan Tray

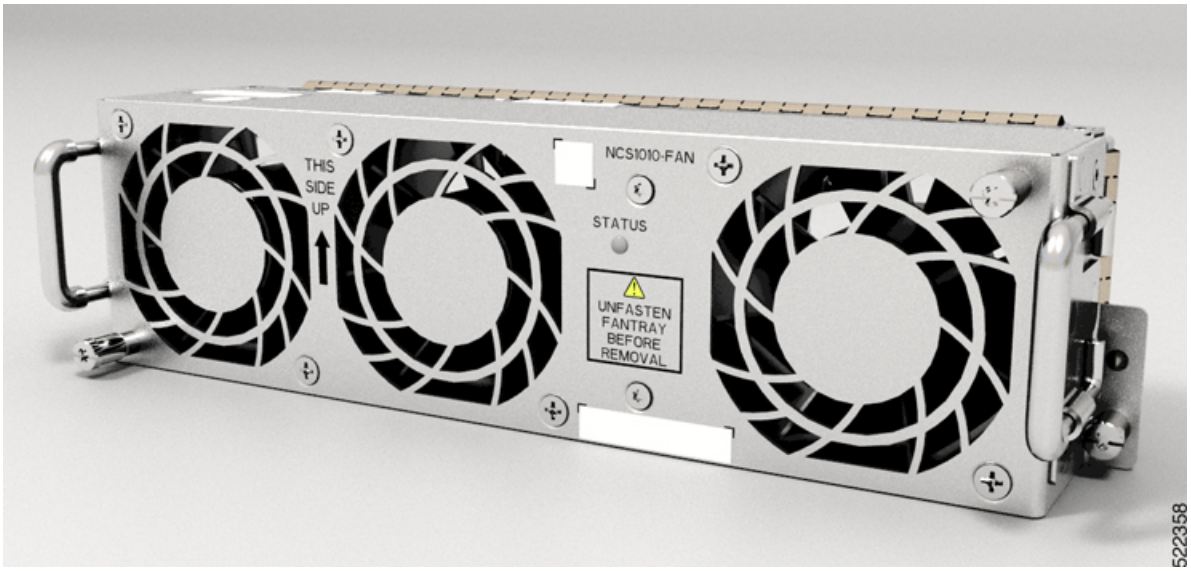
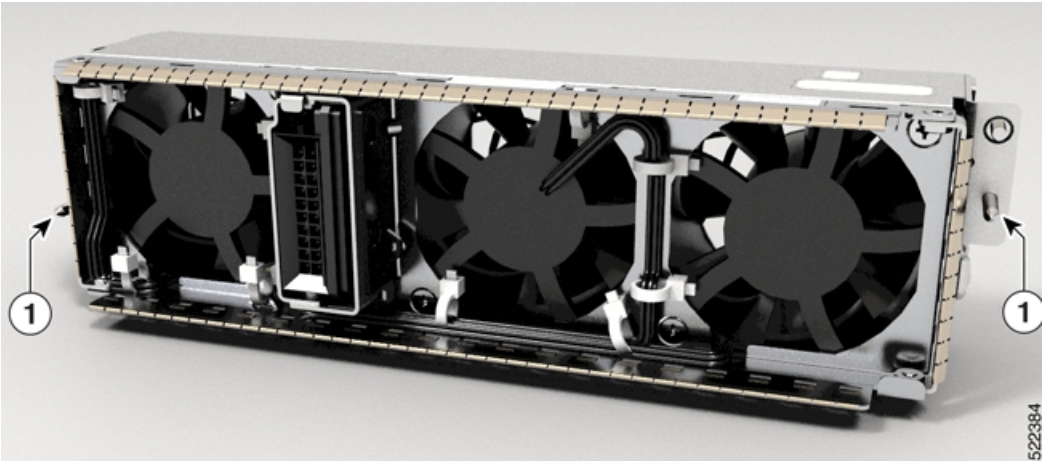


Figure 73: Rear View of the Fan Tray



1	Guide pin

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

Figure 74: Inserting a Fan Tray



1	Fan tray
2	Captive screw

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.

Install Fan Filter

Use this task to assemble the fan filter on the Cisco NCS 1010 chassis.

Procedure

Step 1 Align the four captive screws in the fan filter with the respective standoffs in the fan trays. Check for the *This Side Up* label.

Figure 75: Installing the Fan Filter



1	Fan filter
2	Captive screw

Step 2 Tighten the captive screws using the screwdriver to a torque value of 0.65 N-m`(5.75 lbs-in).

Install the Protection Cover

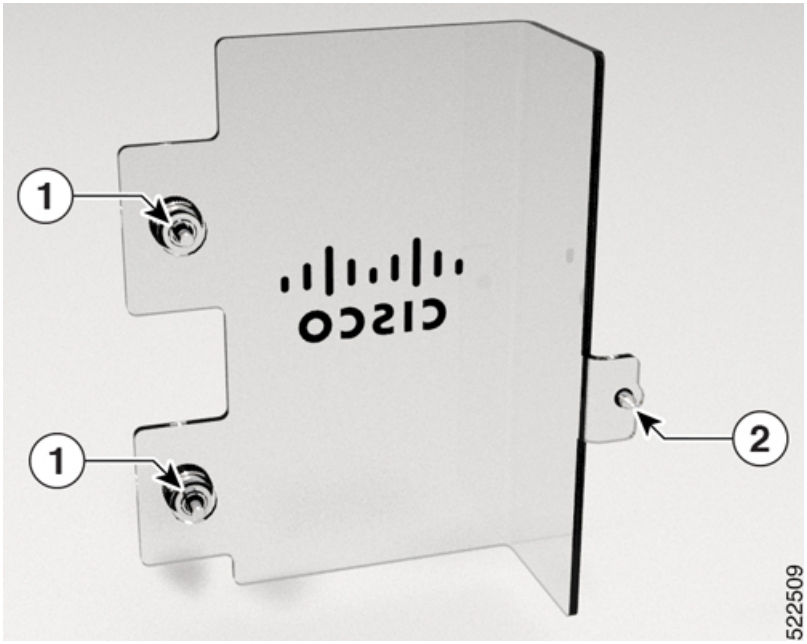
Use this task to install the transparent plastic protection cover to enclose the faceplate of the line card, after the fibers are connected on the faceplate of the line card.

The protection cover is available in the NCS1010-ACC-KIT only. The line cards having a straight orientation front panel cannot use the protection cover as the cover does not leave sufficient space for fiber routing. See Package Contents, on page 59 for the line cards that can use the protection cover.

Procedure

Step 1 Align the guide pin available at the back side of the cover with the hole in the line card.

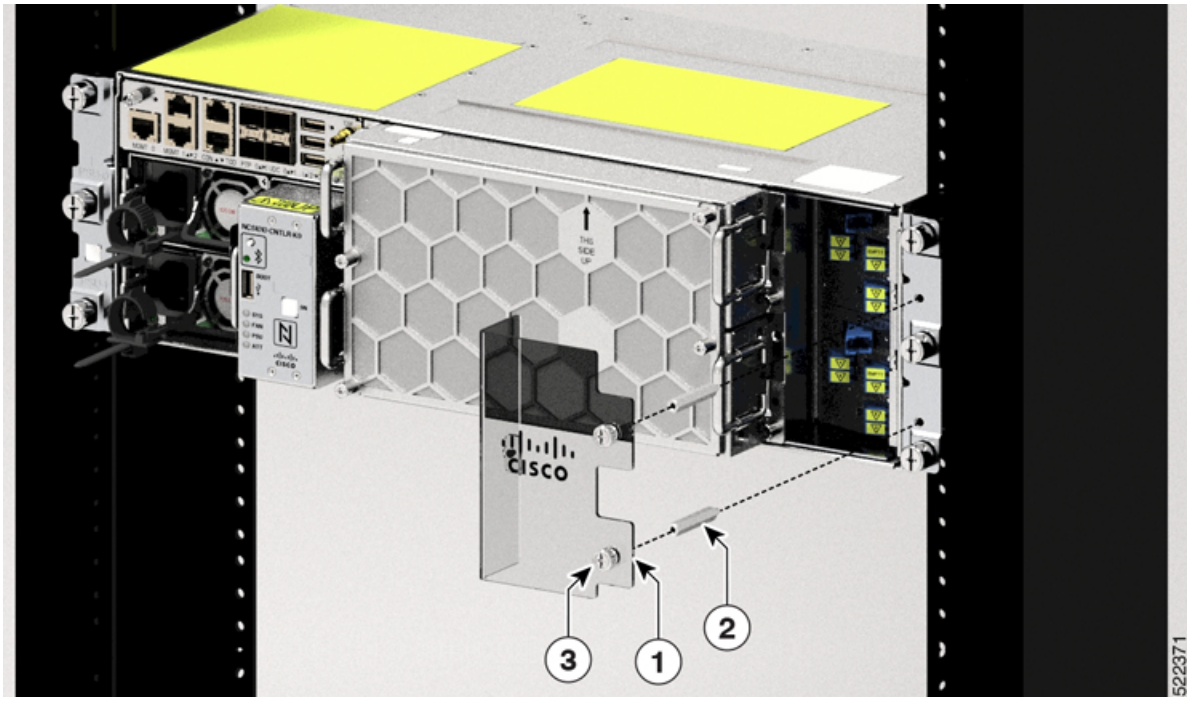
Figure 76: Rear View of the Protection Cover



1	Captive screws
2	Guide pin

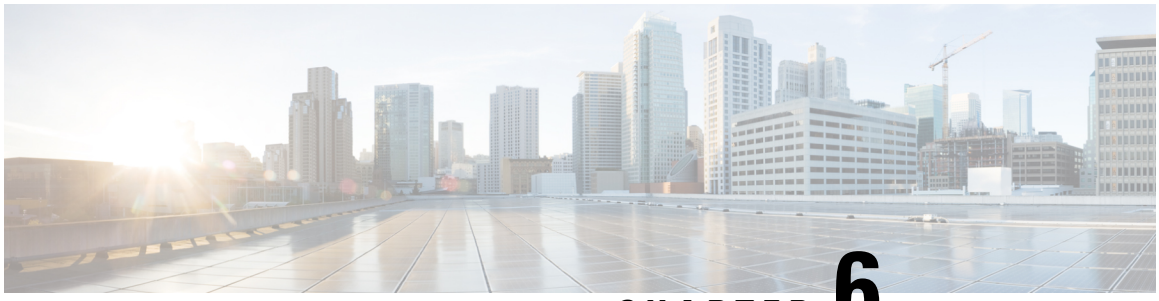
Step 2 Align the standoffs with the holes available in the chassis mounting brackets, and fasten the standoffs into the holes.

Figure 77:



1	Protection cover
2	Standoffs
3	Captive screws

Step 3 Tighten the captive screws available in the protection cover, such that the screws get fixed into the standoffs. Remove the protection cover to access the line card faceplate and reinstall after the fibers are connected.



CHAPTER 6

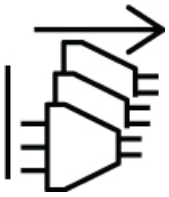
Remove and Replace Cisco NCS 1010 Modules

This chapter describes the tasks to remove and replace Cisco NCS 1010 modules.

Caution Always populate the modular slots in the Cisco NCS 1010 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 Celsius. Complete the OIR of modules within five minutes to prevent overheating of the components.

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.

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.

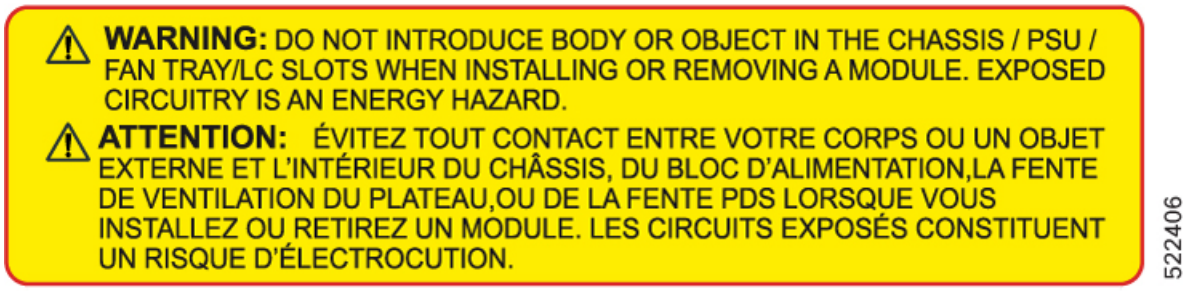
Warning **Statement 1090—**Installation by a Skilled Person

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

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.

Note The maximum operating altitude for OIR is 1800 m.



- Replace a Cisco NCS 1010 chassis, on page 92
- Remove and Replace Controller, on page 95
- Remove and Replace PSU, on page 96
- Remove and Replace Fan Filter, on page 98
- Remove and Replace Fan Tray, on page 99
- Remove and Replace Line Card , on page 100
- Remove and replace the RTC battery in the controller, on page 102
- Wipe Data in Disk Using Secure Erase, on page 104
- Upgrade an NCS 1010 EDFA only Network to a Raman Network, on page 108

Replace a Cisco NCS 1010 chassis

Use this task when you must replace a Cisco NCS 1010 chassis and preserve the information that is required to restore and validate the node.

Complete the pre-checks before the maintenance window. During the maintenance window, replace the chassis, reconnect the cabling, start the system, and compare the post-check data with the pre-check data.

Before you begin

- Ensure that SSH access and session logging are enabled on the node.

- Ensure that console access is available.
- Schedule the activity during a maintenance window.
- Label all fibers, patch cords, Ethernet cables, console cables, power cables, and USB connections. Complete this labeling before starting the replacement.
- Ensure that the solid-state drive (SSD) in the replacement chassis is empty or factory-formatted.

Caution Do not power on the replacement chassis with any route processor (RP) installed prior to the chassis replacement.

Follow these steps to replace a Cisco NCS 1010 chassis.

Procedure

Step 1 Collect and save the pre-check system information.

Run these commands and save the command output for post-check comparison:

Example:

```
show version
show platform
show install active
show install committed
show install fixes active
show install fixes committed
show ip interface brief
show alarms brief system active
show hw-module fpd
show tech ncs1010 detail
```

Step 2 Back up the running configuration.

Copy the backup file to an external location after you verify that the backup file exists.

Example:

```
copy running-config harddisk:
run ls -lrt /harddisk:/ | grep running
```

Step 3 Prepare the hardware records.

a) Record the FPD versions for post-check comparison.
b) Label all cable connections.
c) Label all passive USB connections and record the exact USB port used by each connection.

Step 4 Power down the existing chassis and remove the hardware.

a) Gracefully power down the chassis.
b) Remove the fan trays.
c) Remove the RP cards.
d) Remove the line cards.

e) Disconnect all the fibers, Ethernet cables, console cables, USB cables, and power cables.
f) Remove the chassis from the rack.

Step 5 Install the replacement chassis and modules.

a) Mount the replacement chassis in the rack.
b) Reinstall the fan tray filter.
c) Reinstall the fan trays.
d) Reinstall the power supplies.
e) Reinstall the RP cards and line cards.
f) Firmly tighten the screws on each module. Ensure that all modules are fully seated and secured.

Step 6 Reconnect the cabling and start the replacement chassis.

a) Reconnect the fibers, console cables, and power cables.
b) Reconnect the Ethernet and management cables.
c) Reconnect the passive USB connections to the same USB ports on the EITU panel that were used before removal.
d) Power on the replacement chassis.
e) Monitor the startup process through the console.
f) Allow up to one hour for full system initialization.

Step 7 Verify the post-check system state.

Run these commands and compare the command output with the pre-check output:

Example:

```
show version
show platform
show install active
show install committed
show install fixes active
show install fixes committed
show ip interface brief
show alarms brief system active
show hw-module fpd
```

Step 8 Complete the final validation.

a) Compare the FPD versions with the pre-check data and upgrade FPDs if required.
b) Reestablish the Cisco Smart Software Manager (CSSM) trust for Smart Licensing if the chassis serial number changed.
c) Verify that all interfaces are operational.
d) Verify that only expected alarms are active.
e) Verify that traffic and services have recovered.
f) Confirm that unexpected hardware, software, or environmental alarms do not exist.

The replacement chassis runs with the intended software and configuration, restored cabling, recovered traffic and services, and no unexpected alarms.

What to do next

If the system starts with the wrong software version or configuration, take these steps to recover:

1. Treat this condition as a Disaster Recovery boot caused by a chassis SSD that is not empty,
2. Reinstall the intended software release and fixes.
3. Restore the saved configuration backup.
4. Reboot and revalidate the node.

If issues are observed, collect these logs:

- **show tech ncs1010 detail**
- **show hw-module fpd**
- **show platform**
- **show alarms brief system active**
- **show install active**
- **show install fixes active**

Remove and Replace Controller

Use this task to remove and replace the controller in the Cisco NCS 1010 chassis.

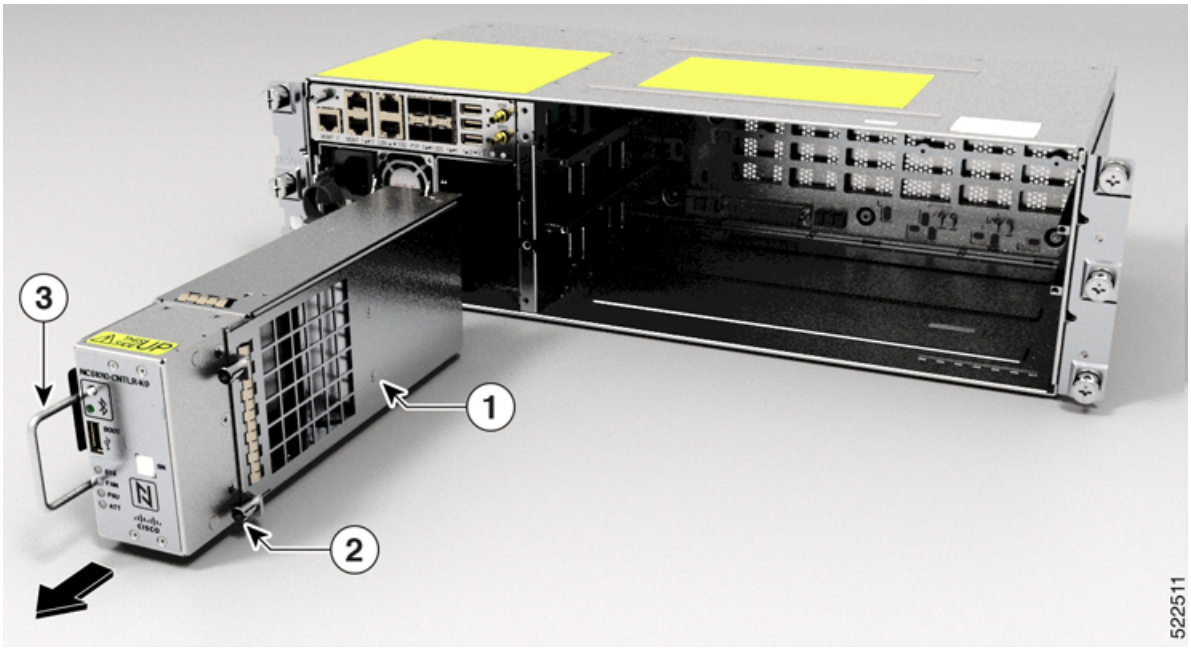
Procedure

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

Step 2 Pull out the handle from the controller

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

Figure 78: Removing the Controller



1	Controller
2	Captive screws
3	Handle

What to do next

To replace the controller, see Install Controller, on page 82.

Remove and Replace PSU

Use this task to remove and replace a PSU in the Cisco NCS 1010 chassis.

Before you begin

Remove the connections to the PSU:

- Disconnect power from the breaker before disconnecting power from the PSU.
- Remove the cable from the retainer and the PSU, in case of an AC PSU installation.
- Disengage the latch available in the DC Cable connector from the DC PSU to remove the cable.

Procedure

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

Figure 79: Locking Latch of AC Power Supply

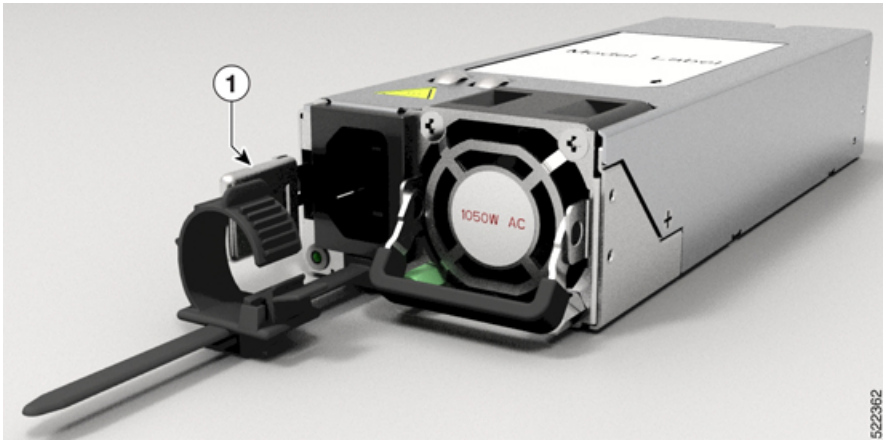
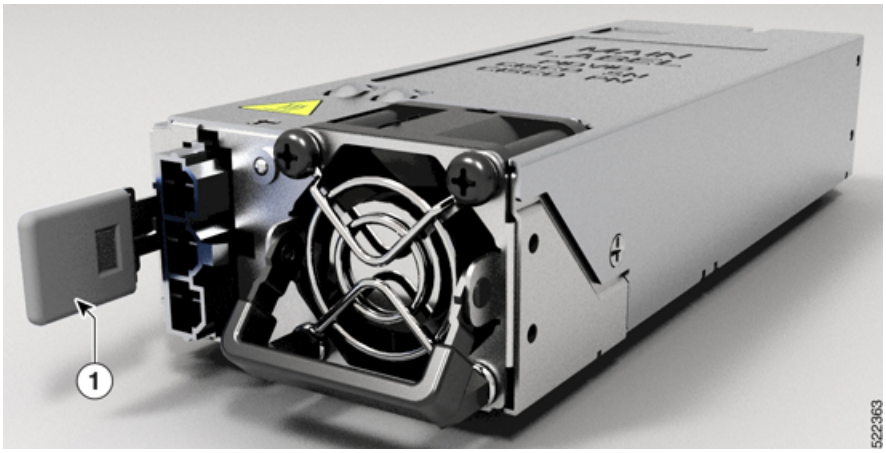
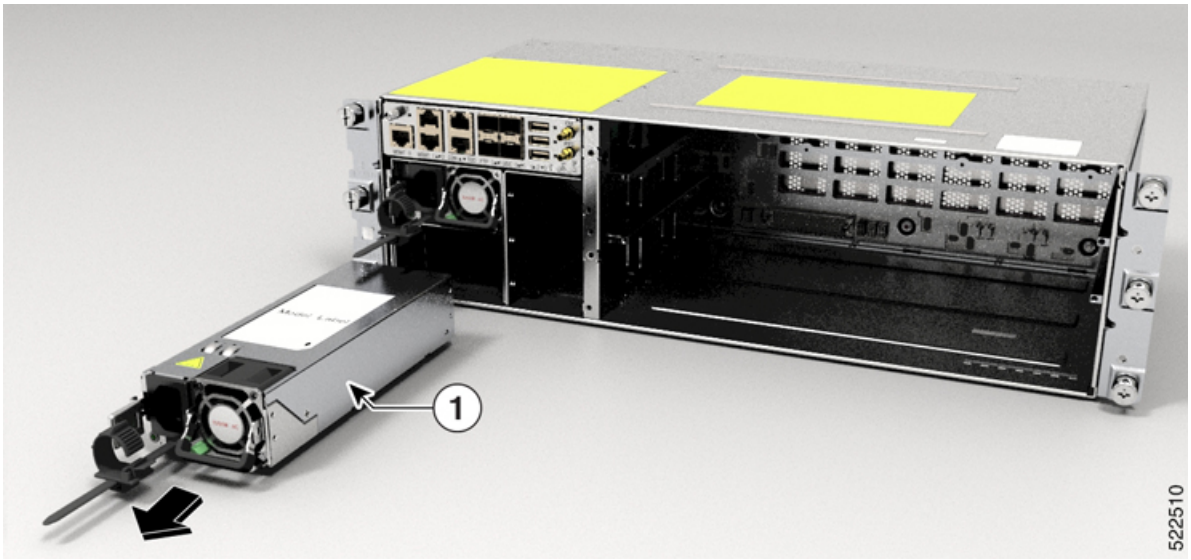


Figure 80: Locking Latch of DC Power Supply



1	Latch

Figure 81: Removing the PSU



Step 2 Supporting the PSU with the one hand, gently pull out the PSU from the slot.

What to do next

To replace the PSU, see Install PSU, on page 77.

Remove and Replace Fan Filter

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

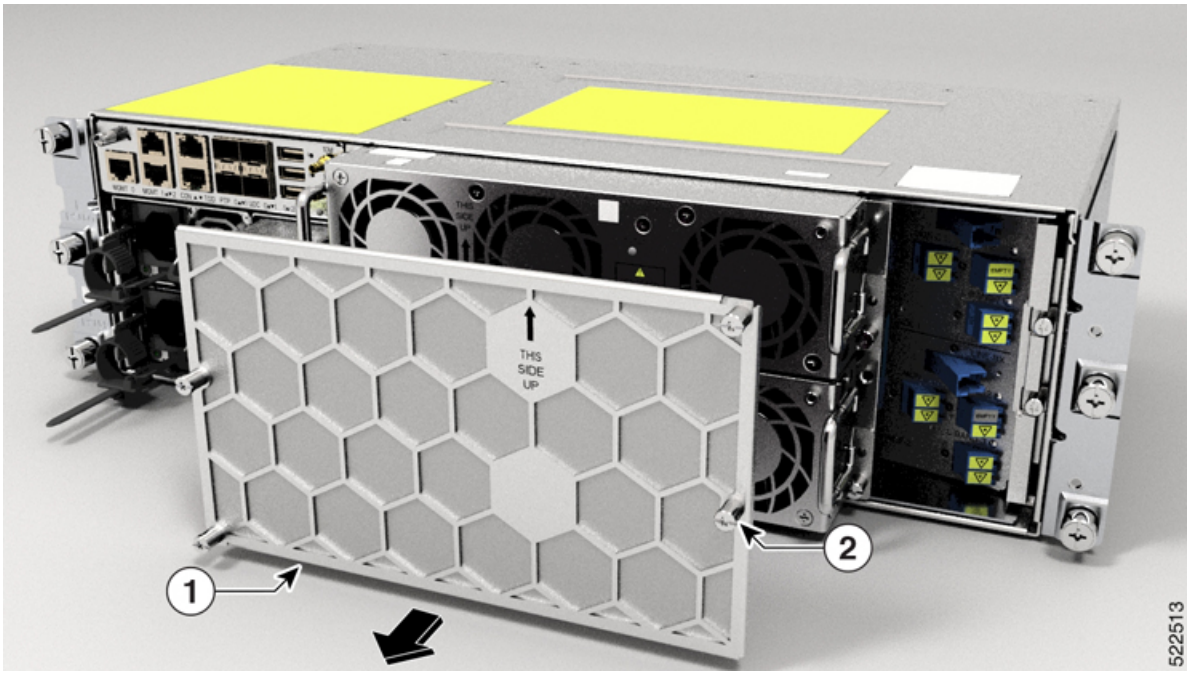
Use this task to remove and replace the fan filter.

Note Inspect the fan filters every three months and replace them as needed. Fan 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.

Procedure

Step 1 Loosen the four captive screws in the fan filter from the standoffs in the fan trays.

Figure 82: Removing the Fan Filter



1	Fan filter
2	Captive Screw

Step 2 Gently remove the fan filter from the fan tray.

What to do next

To replace the fan filter, see Install Fan Filter, on page 87.

Remove and Replace Fan Tray

Use this task to remove and replace a fan tray in the Cisco NCS 1010 chassis.

Caution Online Insertion and Removal (OIR) duration for the fan tray unit at 30 degree Celsius 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.

Before you begin

Remove the fan filter.

Procedure

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

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

Figure 83: Removing the Fan Tray



1	Fan
2	Captive Screw

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

What to do next

To replace the fan tray, see Install Fan Tray, on page 85.

Remove and Replace Line Card

Use this task to remove and replace the line card in the Cisco NCS 1010 chassis.

Before you begin

- Remove the fan filter.

- Remove the fan trays.
- Remove the protection cover by loosening the captive screws fastened into the standoffs, and remove the standoffs.

Caution

- **Perform the removal and replacement procedure for the line card only when the ambient temperature is below 30 degree Celsius and complete it within five minutes to prevent overheating of the chassis components.**
- **Ensure that you perform the removal and replacement of the fan filter, fan trays, protection cover, 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.**

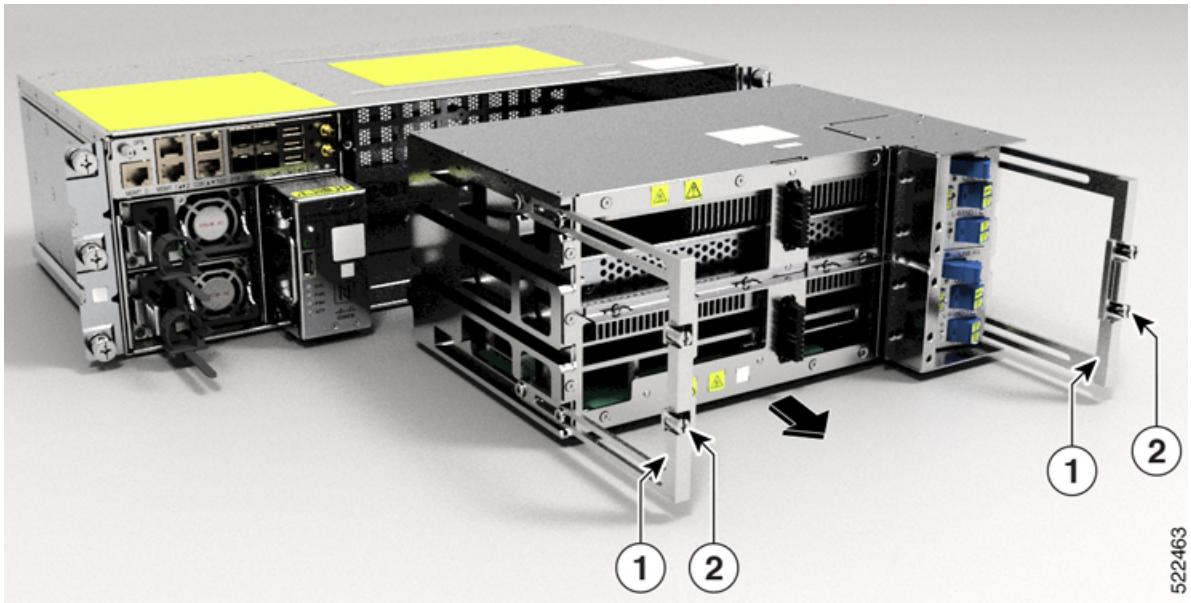
Procedure

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

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

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

Figure 84: Removing the Line Card



1	Handle

2	Captive Screws

What to do next

To replace the line card, see Install Line Card, on page 83.

Remove and replace the RTC battery in the controller

Use this procedure to remove and replace the controller RTC battery.

Before you begin

Ensure you have these tools and equipment.

- Screw drivers:
  - T-8 Torx screwdriver for NCS1010-CTR2-B-K9 and NCS1010-CTR2-K9
  - Number-1 Phillips screwdriver for NCS1010-CTLR-B-K9 and NCS1010-CNTLR-K9
- Plastic spudger/pry tool
- Plastic or ceramic tweezers
- Electrostatic discharge (ESD) strap or other grounding equipment such as a grounded mat
- Replacement battery – Choose any one from the options:
  - 06032 101 501 — Varta Microbattery Inc.
  - 100272 — Renata

Caution Handle all components only by the carrier edges. Always use an ESD wrist-strap or grounding device to avoid damaging static-sensitive components.

Warning Ensure the system is shut down and power is removed before you begin.

There is danger of explosion if the RTC battery is replaced incorrectly. Replace the RTC battery only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.

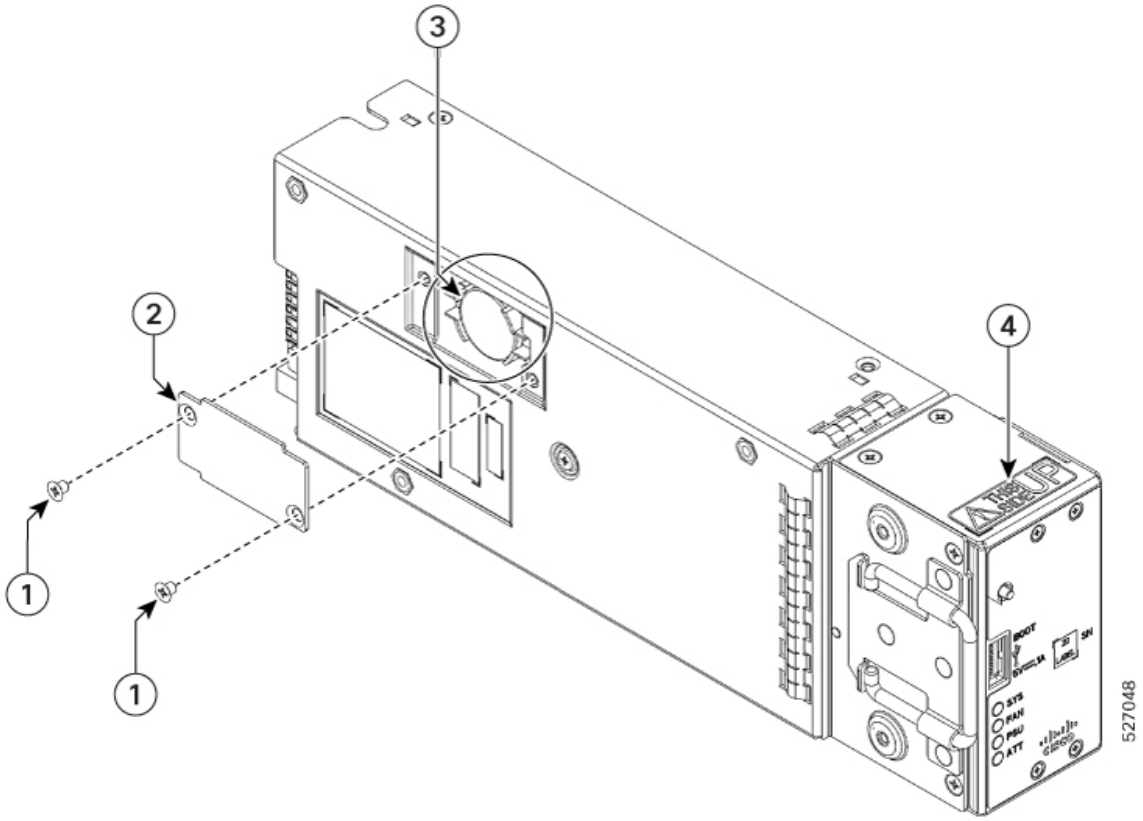
Follow these steps to remove and replace the RTC battery in the controller.

Procedure

Step 1 Remove the battery cover on the left side of the controller.

Before removing the battery cover, use the *This Side Up* label to help yourself orient the controller correctly.

Figure 85: Removing the battery cover on the left side cover



1	• T-8 Torx screws for NCS1010-CTR2-B-K9 and NCS1010-CTR2-K9 • Number-1 Phillips screws for NCS1010-CTLR-B-K9 and NCS1010-CNTLR-K9
2	Side cover
3	Horizontal RTC battery socket
4	*This Side Up* label

a) Loosen the two screws securing the battery cover using the appropriate screwdriver for your controller model.

For the controllers	Use
NCS1010-CTR2-B-K9 and NCS1010-CTR2-K9	T8 Torx screwdriver to loosen the two Torx screws.

For the controllers	Use
NCS1010-CTLR-B-K9 and NCS1010-CNTLR-K9	number-1 Phillips screwdriver to loosen the two Phillips flat-head screws.

b) Gently pull out the battery cover.

Step 2 Locate the horizontal RTC battery socket just below the battery cover.

Step 3 Remove the old RTC battery.

a) Use the plastic spudger/pry tool to gently push the battery toward the spring clip.
b) Slide the battery sideways toward the spring clip.

Once compressed, the other side of the battery pops up slightly.

c) Carefully remove the battery from the holder using the plastic or ceramic tweezers.

Step 4 Install the new RTC battery.

a) Identify the battery polarity.

The positive side has the "CR2032" text and a plus sign (+). The negative side is flat.

b) Insert the battery at a slight angle around 30-degrees to the holder's opening, with the flat negative side facing the internal lower spring contact.
c) Gently slide the battery into the horizontal opening, pressing slightly against the spring contact.

Continue pushing until the battery is fully seated and securely clicks under the plastic retaining tab.

Note
Ensure the battery is seated snugly and correctly.

The positive side of the battery should face outward when installed in the horizontal holder.

Step 5 Reattach the battery cover.

a) Use the two screws to secure the battery cover back into position.
b) Using the appropriate screwdriver, tighten the two screws to a torque value of 5.5 ±0.5 in-lbs.

The new RTC battery is correctly installed and seated. The controller is ready for reassembly and power-up.

What to do next

- Power on the controller and verify that it recognizes the new RTC battery and no battery errors are reported.
- Safely dispose the old battery according to local practices.

Wipe Data in Disk Using Secure Erase

If NCS 1010 develops a fault, contact TAC to request a Return Material Authorization (RMA). Before submitting an RMA request, securely erase data on NCS 1010 disks using the Secure Erase feature.

Warning Use this procedure only when performing an RMA.

Before you begin

- Remove the NCS 1010 unit scheduled for RMA from the data center and the network. Access NCS 1010 only through the console port.
- Perform an RP cold reload to successfully wipe the CPU disk.
- Perform the chassis cold reload for the successful Chassis disk wipe.

Procedure

Step 1 When NCS 1010 boots during RP cold reload or chassis cold reload, the following message appears.

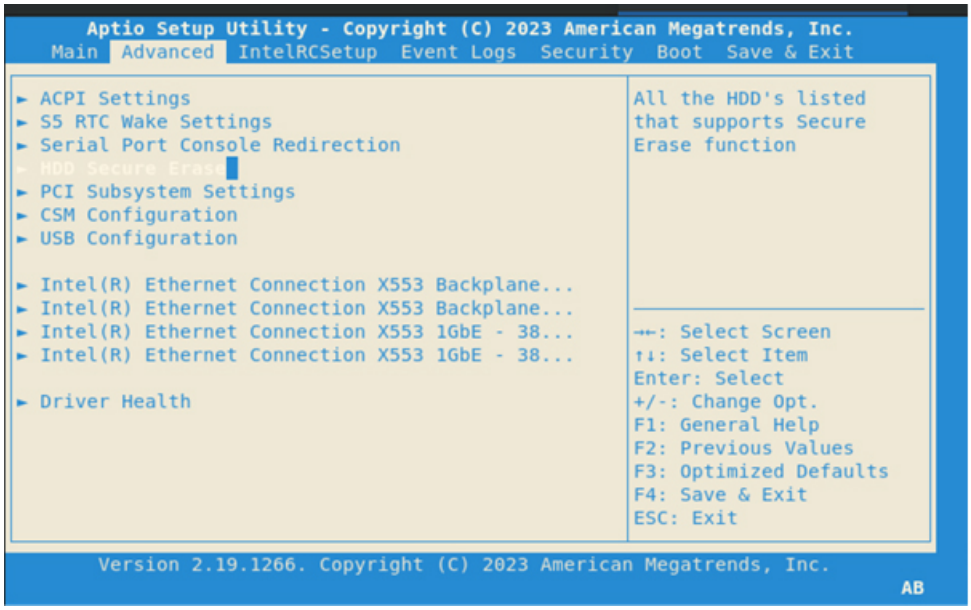
```
Version 2.19.1266. Copyright (C) 2022 American Megatrends, Inc.
BIOS Date: 06/22/2022 08:29:52 Ver: 0ACHI0420
Press <DEL> or <ESC> to enter setup.
Press DEL or ESC key to enter BIOS.
```

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.

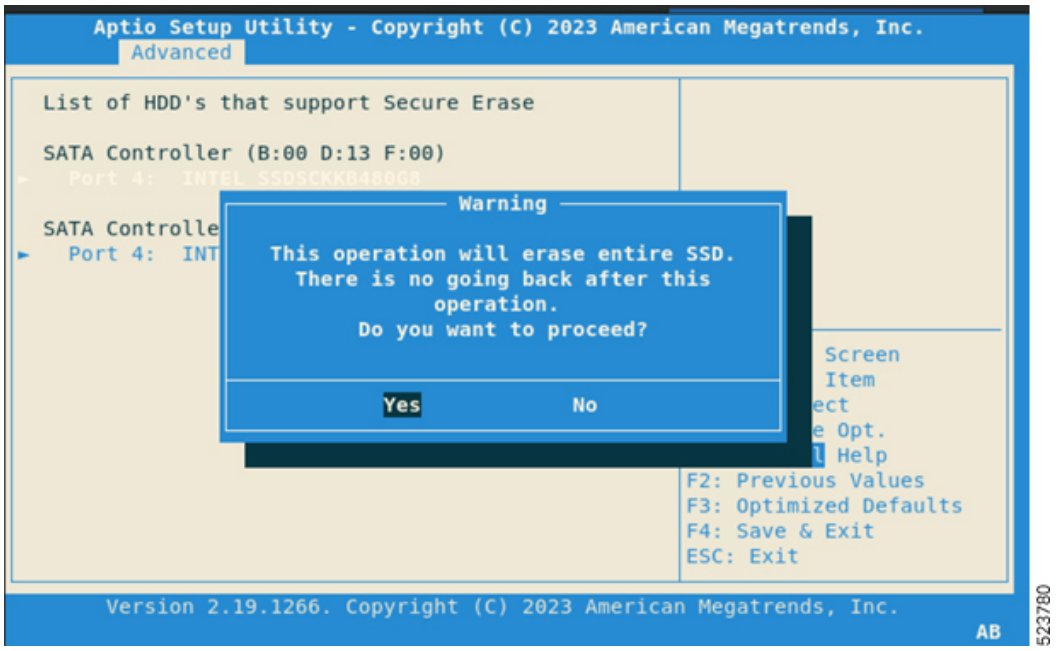
a) Select the SSD under D:13 for RP SSD secure erase.



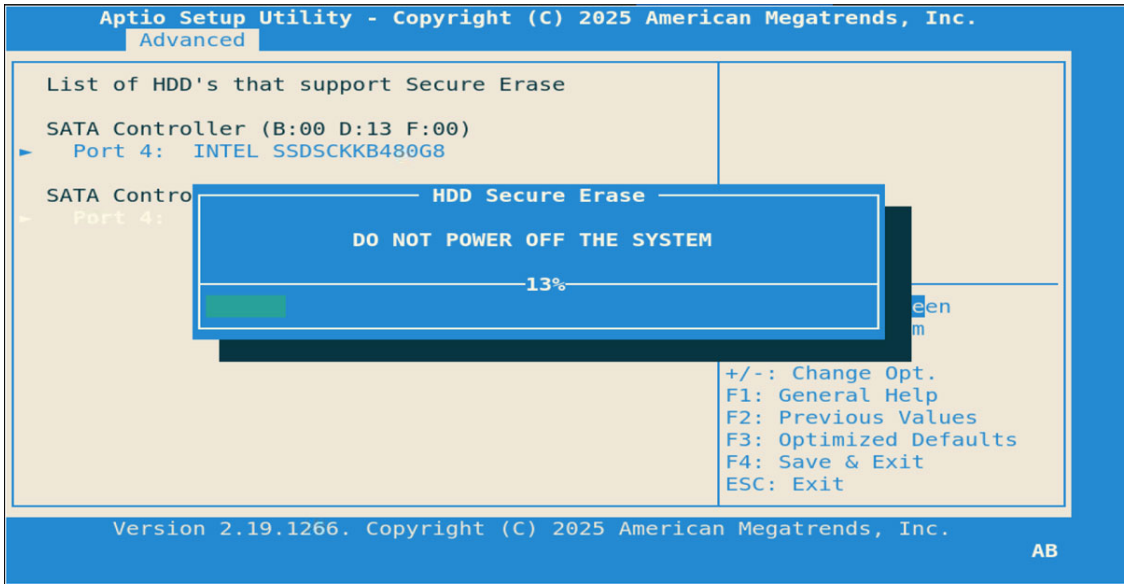
b) Select the SSD under D:14 for chassis SSD secure erase.



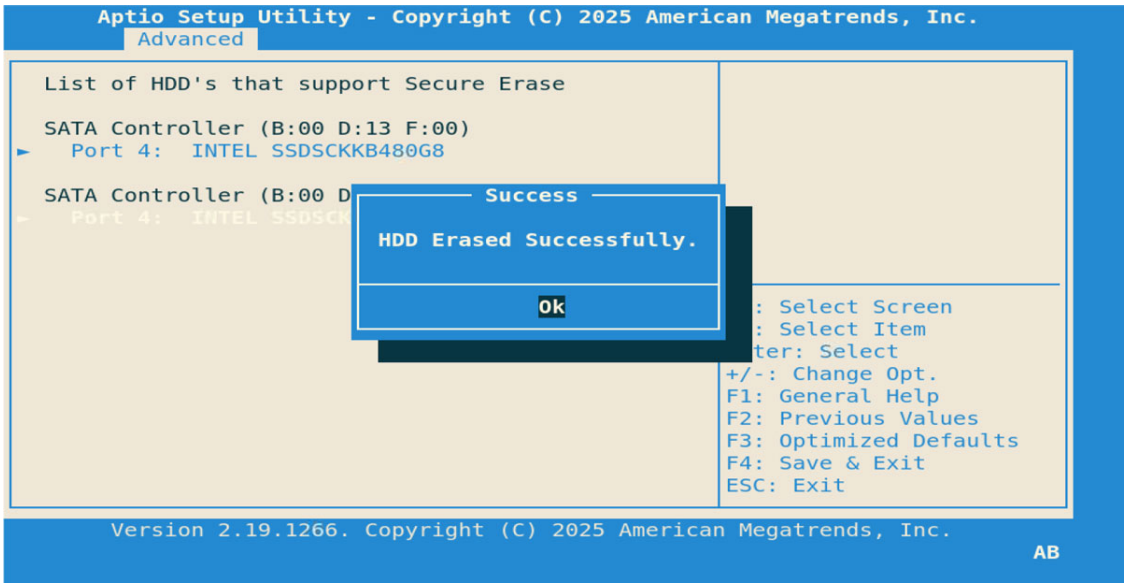
Step 5 Click **Yes** on the **Warning** message box to erase the selected SSD data.



A progress bar appears during the erase operation.



A success message appears when the Secure Erase operation completes.



What to do next

Remove the RP and power down the chassis. This step is important to prevent XR from booting and synchronizing data from the RP back to the chassis SSD.

Upgrade an NCS 1010 EDFA only Network to a Raman Network

The following topics describe how to upgrade an NCS 1010 EDFA only network to a Raman network.

Prerequisites

- Maintain the same physical connections as the EDFA only NCS 1010 nodes.
- You need E2000-LC patch cords for the NCS 1010 Raman ports on the NCS 1010 MPO faceplate. Make sure you have E2000-LC patch cords for each MPO faceplate Raman port. For LC faceplate OLTs, use LC-LC patch cords.
- Raman amplification is sensitive to reflection and loss. Make sure you have the necessary cleaners and fiber scope for any troubleshooting.

Copy Configuration

On each existing EDFA device on the network, perform the following steps:

1. Use the **show running-config** command to get the controller configuration.
2. Copy the configuration to a file on your local system and save the file.

Note This configurations include all the cross-connect configuration on OLTs. Copying these configurations to the Raman module ensures that you do not need to recreate the cross-connect configuration on the Raman node.

Replace the Hardware

You have the following two options to replace the hardware.

- Replace the whole chassis with a Raman OLT or ILA chassis.
- Replace the OLT or ILA line card with a corresponding Raman line card.

Replace all OLT and ILA nodes with corresponding Raman nodes.

1: Replace the Entire NCS 1010 Chassis

For instructions to assemble the NCS 1010 chassis, see Install Cisco NCS 1010 Modules.

1. Remove the existing fiber connections from the NCS 1010 chassis.
2. Loosen the screws of the NCS 1010 chassis in the rack or adapter brackets.
3. Support the top and bottom of the NCS 1010 chassis with your hand to extract the chassis.
4. Install the Raman ILA or OLT module by following the instructions at Install Cisco NCS 1010.
5. Make the fiber connections maintaining the previous connections.

2: Replace the Line Card Only

Prerequisites:

- Remove the fan filter by following the instructions at Remove and Replace Fan Filter.
- Remove the fan tray by following the instructions at Remove and Replace Fan Tray.
- Remove the protection cover by loosening the captive screws fastened into the standoffs, and remove the standoffs.

1. Remove the existing fiber connections from the NCS 1010 chassis.
2. Remove the OLT or ILA line card by following the instructions at Remove and Replace Line Card , on page 100.
3. Install the Raman line card. For steps to install the line card, see Install Line Card, on page 83.
4. Make the fiber connections maintaining the previous connections.

Apply Configuration to Raman Nodes

Boot up the new nodes. For instructions to boot, see Boot NCS 1010.

Apply the configurations copied in Copy Configuration, on page 108 to the newly installed Raman nodes.

Initial Setup of Raman Nodes

Initiate Raman tuning and gain estimation so that Automatic Power Control gets the necessary setpoints. Link tuner runs automatically when it detects changes in the network and during network bring-up.

For more information on Raman Tuning, Gain Estimation, Link Tuner, and APC, see the following links:

- Raman Tuning
- Gain Estimation
- Link Tuner
- Automatic Power Control

Use the following commands to initiate these operations.

- **olc start-raman-tuning controller ots** *Rack/Slot/Instance/Port*
- **olc start-gain-estimation controller ots** *Rack/Slot/Instance/Port*

Note Raman tuning blocks gain estimation from executing while tuning is in progress. Wait until Raman tuning status changes to **Tuned** before initiating gain estimation.

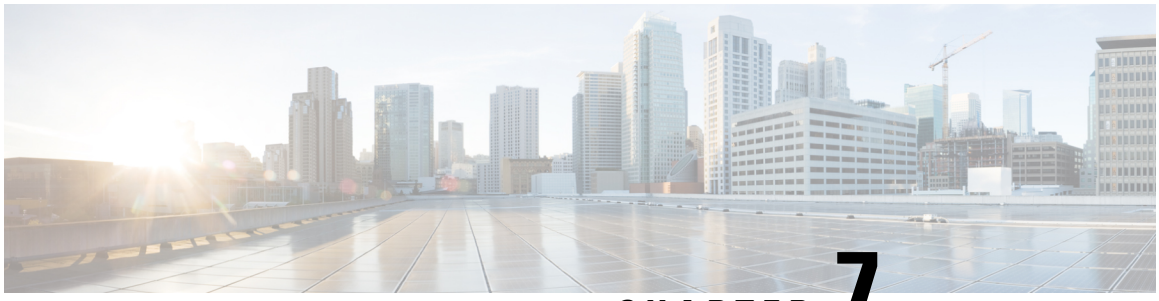
The circuits on the new Raman nodes should be up if the configurations were copied and port connections were mapped accurately between the EDFA implementation and Raman implementation.



PART II

Cisco NCS 1000 Breakout Patch Panel Hardware Installation

- Cisco NCS 1000 Breakout Patch Panel and Modules Overview , on page 113
- Safety Guidelines for Breakout Patch Panel and Modules, on page 121
- Prepare to Install Cisco NCS 1000 Breakout Patch Panel and Modules, on page 125
- Install Cisco NCS 1000 Breakout Patch Panel and Modules, on page 129
- Remove and Replace Cisco NCS 1000 Breakout Patch Panel and Modules, on page 155



CHAPTER 7

Cisco NCS 1000 Breakout Patch Panel and Modules Overview

This chapter provides an overview for Cisco NCS 1000 Breakout Patch Panel and Cisco NCS 1000 Breakout Modules.

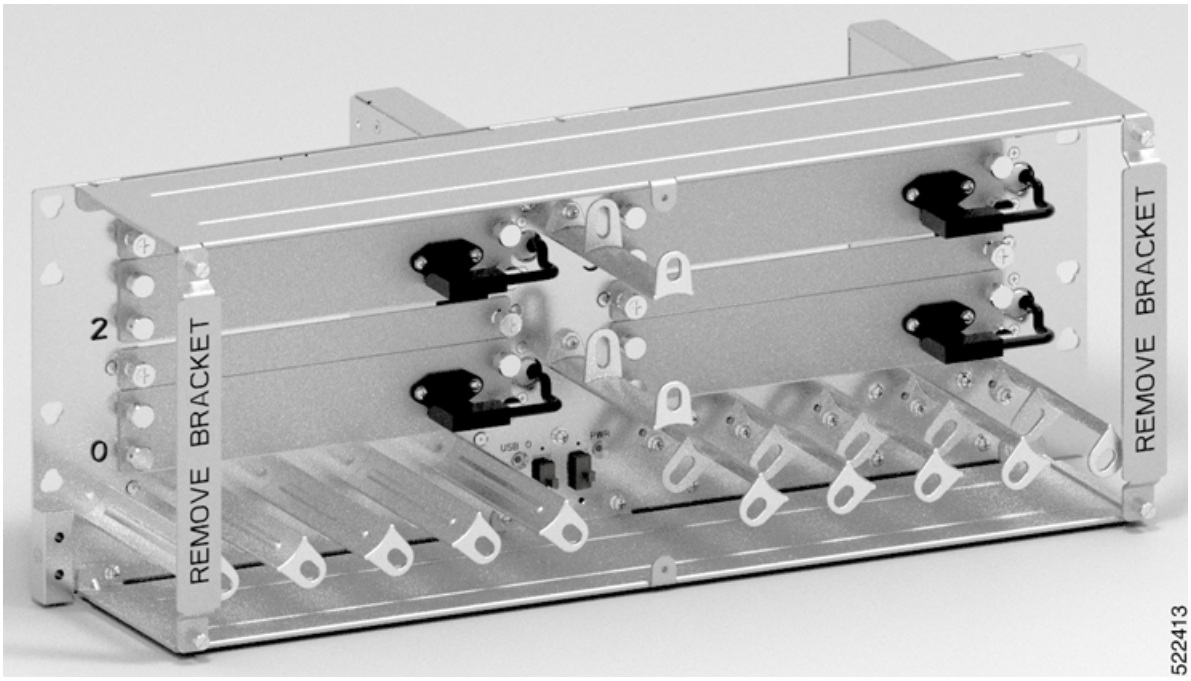
Note In this chapter, "breakout panel" refers to the "Cisco NCS 1000 Breakout Patch Panel". "breakout modules" refer to the "Cisco NCS 1000 Breakout Modules".

- Cisco NCS 1000 Breakout Patch Panel, on page 113
- Cisco NCS 1000 Breakout Modules, on page 114

Cisco NCS 1000 Breakout Patch Panel

Cisco NCS 1000 Breakout Patch Panel is colorless breakout-modular patch panel. It is powered by the NCS 1010 chassis using a single USB 2.0 cable from the NCS 1010 EITU. The breakout panel contains four USB 2.0 connections that power the breakout modules. It allows connections between the OLT-C and OLT-R-C line cards that are installed in the NCS 1010 chassis and the four breakout modules using MPO cables. The breakout panel supports up to 72 colorless mux/demux channels and 8-directional interconnections. The breakout panel is 4 RU high and has adjustable fiber guides for fiber routing. The empty slots are covered with dummy covers. The panel is shipped with USB 2.0 connectors that are connected to the corresponding dummy covers. The plastic transparent cover can be installed in front of the panel for fiber protection. The panel is designed to fit a 19-inch rack. The panel can also be installed on ETSI and 23-inch rack using adapter brackets.

Figure 86: NCS1K-BRK-SA



Cisco NCS 1000 Breakout Modules

The breakout modules are a set of three optical breakout units. The modules can be connected to the A/D 4–11, A/D 12–19, A/D 20–27 and A/D 28–33 MPO connector ports of the OLT-C and OLT-R-C line cards to provide ROADM node internal connections and for local channels add/drop.

A USB 2.0 connection from the NCS 1010 chassis powers up the breakout panels. The modules monitor signals, check connection verification, and retrieve the inventory data.

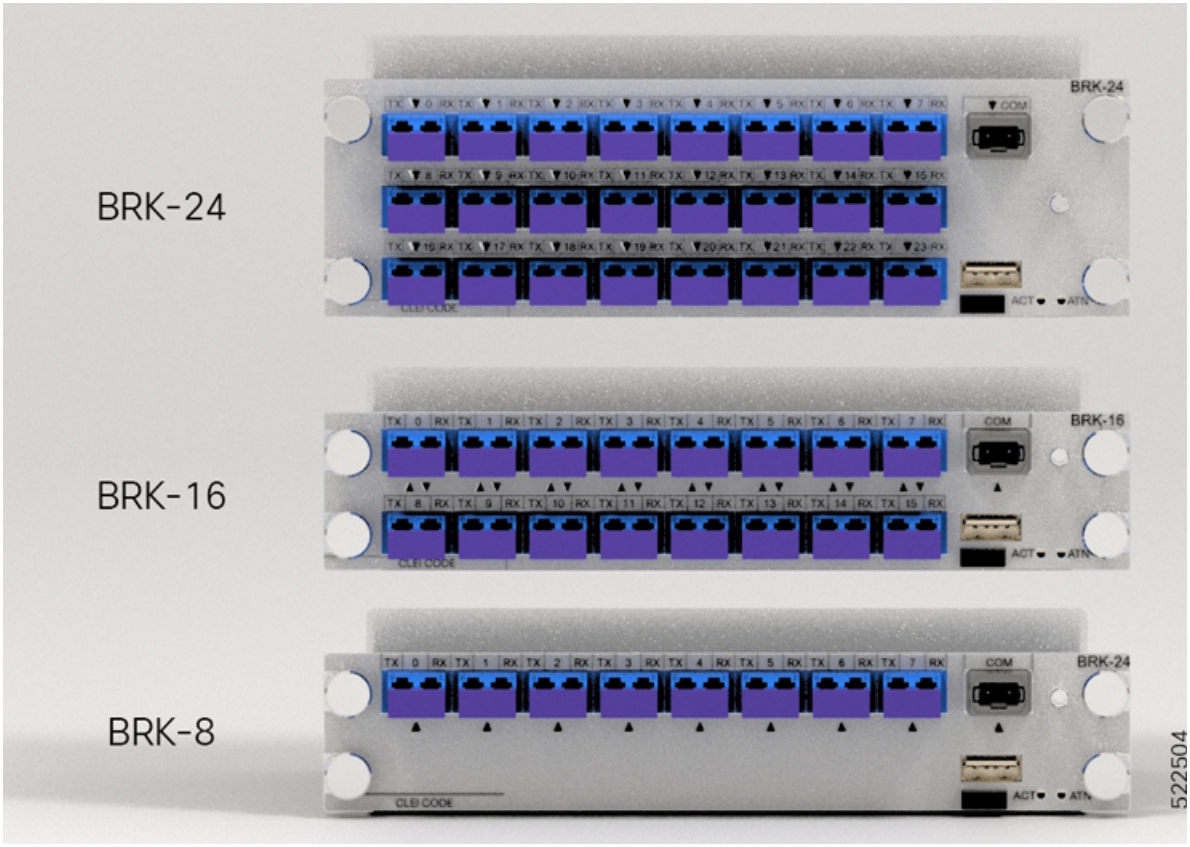
The modules have two operational modes:

- Low-power mode—Retrieves only inventory data.
- High-power mode—Full monitoring and checks features are available.

The three breakout modules can be used in C-band.

Breakout Modules Faceplate

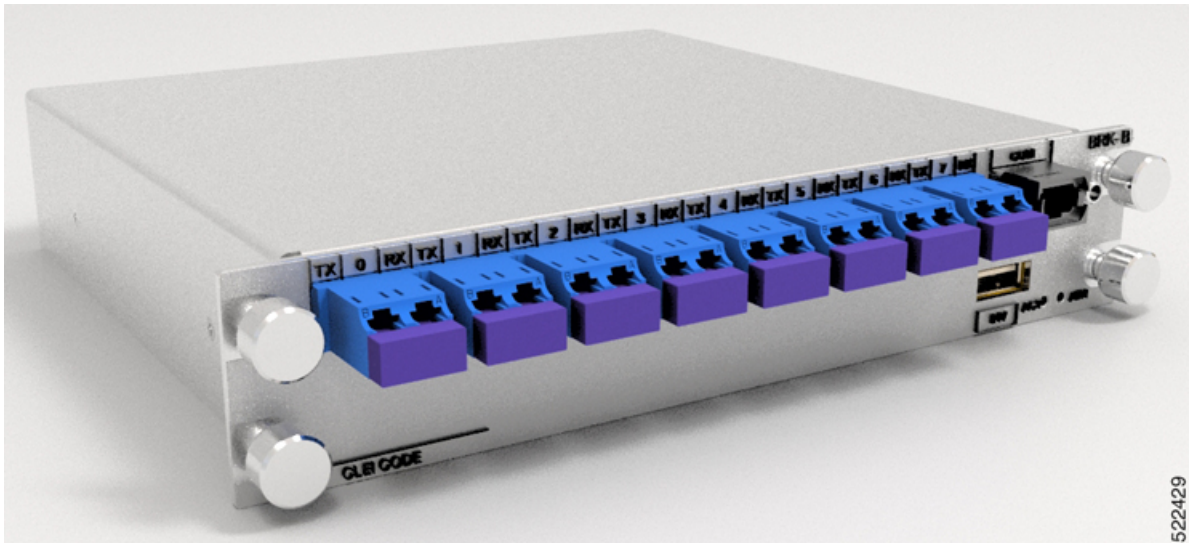
Figure 87: Breakout Modules Faceplate



The breakout panel supports the following breakout modules:

- **NCS1K-BRK-8**

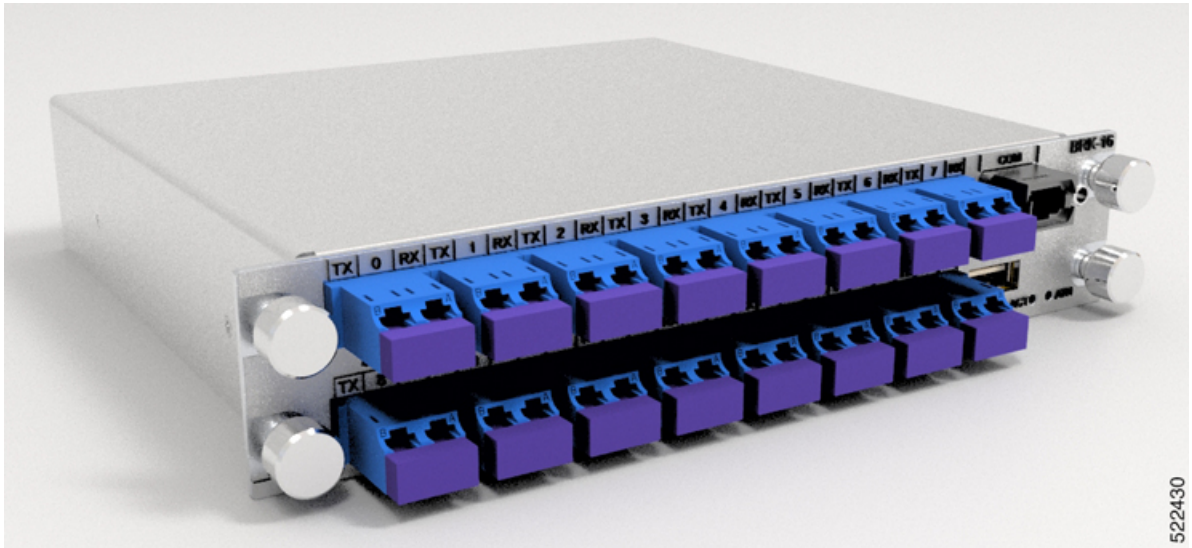
Figure 88: 8-port Breakout Module



The NCS1K-BRK-8 module provides the breakout of 16 fibers from an MPO-24 connector to 8 duplex line card connectors. It essentially performs an optical connection adaptation of MPO-to-LC connectors for the ADD/DROP signals of the MPO ports of OLT line cards. For each port (MPO and LC), power monitors with tone detection capability are available. A filtered optical loopback (191.175 THz) from one MPO input port (fiber-1) to all MPO output ports is available for connection verification.

- **NCS1K-BRK-16**

Figure 89: 16-port Breakout Module



The NCS1K-BRK-16 module provides the breakout of 16 fibers from an MPO-24 connector to 16 duplex LC connectors. The signals on each fiber from the MPO input ports are split over two LC output ports by a 1x2 optical splitter. The signals from the two adjacent input LC ports are combined into a single MPO output port through a 1x2 optical coupler. For each port (MPO and LC), power monitors with tone

detection capability are available. A filtered optical loopback (191.175 THz) from one MPO input port (fiber-1) to all MPO output ports is available for connection verification.

- **NCS1K-BRK-24**

Figure 90: 24-port Breakout Module



The NCS1K-BRK-24 module provides the breakout of 16 fibers from an MPO-24 connector to 24 duplex LC connectors. The signals on each fiber from the MPO input ports are split over three LC output ports by a 1x3 optical splitter. The signals from the three adjacent input LC ports are combined into a single MPO fiber output port through a 1x3 optical coupler. For each port (MPO and LC), power monitors with tone detection capability are available. A filtered optical loopback (191.175 THz) from one MPO input port (fiber-1) to all MPO output ports is available for connection verification.

For more information on the port details of the breakout modules, see Cisco NCS 1010 datasheet.

Breakout Modules Port Label Descriptions

NCS1K-BRK-8 Port Label Description

NCS1K-BRK-8 is equipped with 1x MPO-24 connector (with only 16 fibers connected) and with 8x LC-duplex connectors.

Table 13: NCS1K-BRK-8 Port Label Description

Port	Connector Type	Connector Label	Operating Frequency Range [THz, (nm)]	Note
COM-TX/RXi, (i=1–8)	MPO/MPT	**COM**	197.2–185.9 (1520–1612)	—

Port	Connector Type	Connector Label	Operating Frequency Range [THz, (nm)]	Note
DIR-i-TX/RX (i=1–8)	LC	**TX-i-RX**	197.2–191.275 (1520–1567.34) 191.0-185.9 (1569.6–1612)	Signals from 191.275 to 191 THz are filtered out from/to the DIR-i-TX/RX ports.

NCS1K-BRK-16 Port Label Description

NCS1K-BRK-16 is equipped with 1x MPO-24 connector (with only 16 fibers connected) and with 16x LC-duplex connectors.

Table 14: NCS1K-BRK-16 Port Label Description

Port	Connector Type	Connector Label	Operating Frequency Range [THz, (nm)]	Note
COM-TX/RXi, (i=1–8)	MPO/MPT	**COM**	197.2–185.9 (1520–1612)	—
CH-i-TX/RX (i=1–16)	LC	**TX-i-RX**	197.2–191.275 (1520–1567.34) 191.0–185.9 (1569.6–1612)	Signals from 191.275 to 191 THz are filtered out from/to the CH-i-TX/RX ports.

NCS1K-BRK-24 Port Label Description

NCS1K-BRK-24 is equipped with 1x MPO-24 connector (with only 16 fibers connected) and with 24x LC-duplex connectors.

Table 15: NCS1K-BRK-24 Port Label Description

Port	Connector Type	Connector Label	Operating Frequency Range [THz, (nm)]	Note
COM-TX/RXi, (i=1–8)	MPO/MPT	**COM**	197.2–185.9 (1520–1612)	—
CH-i-TX/RX (i=1–24)	LC	**TX-i-RX**	197.2–191.275 (1520–1567.34) 191.0–185.9 (1569.6–1612)	Signals from 191.275 to 191 THz are filtered out from/to the CH-i-TX/RX ports.

Breakout Module LEDs

Table 16: Feature History

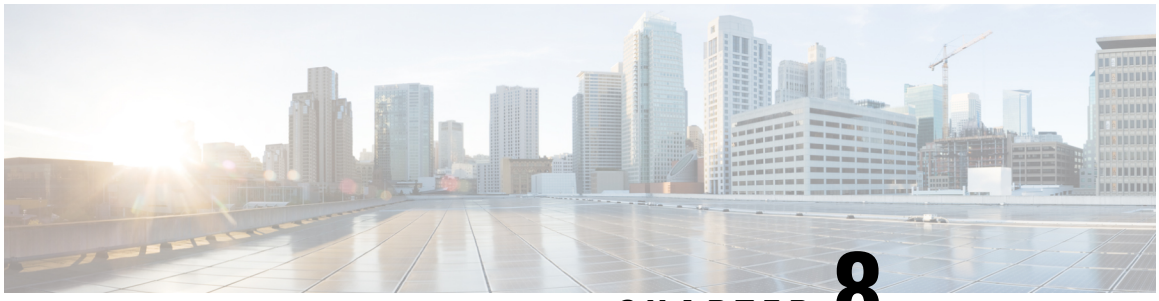
Feature Name	Release Information	Feature Description
Port Status for Breakout Modules	Cisco IOS XR Release 7.9.1	The LEDs for optical ports (COM, TX-i-RX) in the breakout modules will now indicate port status in these colors: • Red—Presence of major and critical alarms that could be traffic-impacting • Amber—Presence of minor alarm when tone generation or tone detection is initiated. Tone detection uses a specific probe signal to verify the connection between OLT line cards and the breakout modules. • Green—Normal operations with no system alarms.

The breakout module LEDs indicate the system status and the status of the optical ports.

Three color LEDs (green, amber, and red) are present near each optical port (COM, DIR-i, and CH-i) to indicate the port status. The optical ports vary depending on the breakout module.

Table 17: Status of the Optical Port LEDs

Port LED	Color	Status
COM, DIR-i, or CH-i	Red	Indicates major and critical alarms such as RX-LOS-P, which could be traffic-impacting. These alarms are raised when there is a loss of signal (LOS) or when the OTS power reading is below the Fail-Low threshold.
	Amber	Indicates minor alarms that are raised when initiating tone generation and tone detection for connection verification.
	Green	Indicates that the patch panel is operational and has no alarm.
ACT	Green	Indicates the active status for the USB connection.
ATN	Green	Indicates the attention condition for the USB connection.



CHAPTER 8

Safety Guidelines for Breakout Patch Panel and Modules

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 - Cisco Network Convergence System 1010*.

- Standard Warning Statements, on page 121
- Safety Information, on page 123
- Laser Radiation Emission Restrictions, on page 124
- Laser Safety During Operation, on page 124
- Electrical Safety, on page 124

Standard Warning Statements



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 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.

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.



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.



Note For more information on all the applicable statements and their translations, see *Regulatory Compliance and Safety Information - Cisco Network Convergence System 1010*.

Safety Information

Before you install, operate, or service, you must read the *Regulatory Compliance and Safety Information - Cisco Network Convergence System 1010* document for important safety information and warning translations.

The units are compliant with the GR 1089, UL60950 /CSA 22.2 No. 60950-00, and IEC 60950 standards.

Laser Radiation Emission Restrictions

The Class 1M Laser safety and warning label affixed to the passive optical modules indicate that the product should never be used or installed in an optical network with emissions higher than Class 1M.

Laser Safety During Operation

Cisco NCS 1010 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 91: Class 1M Laser Product Label



Figure 92: Class 1M Laser Product Label

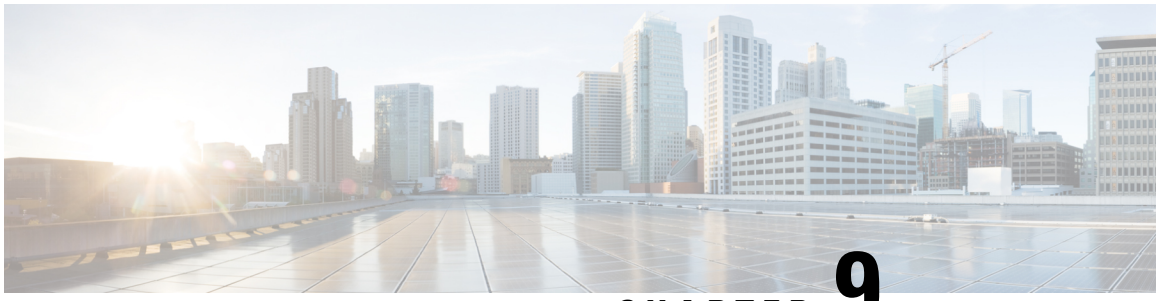


Warning **Statement 1051—**Laser Radiation

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

Electrical Safety

The passive optical modules are optically and electrically passive and require no electrical connections. No electrostatic discharge (ESD) or other electrical safety considerations apply.



CHAPTER 9

Prepare to Install Cisco NCS 1000 Breakout Patch Panel and Modules

This chapter explains how to prepare for Cisco NCS 1000 Breakout Patch Panel and Cisco NCS 1000 Breakout Modules installation.

Note In this chapter, "breakout panel" refers to the "Cisco NCS 1000 Breakout Patch Panel". "breakout modules" refer to the "Cisco NCS 1000 Breakout Modules".

- Package Contents, on page 125
- Unpack and Verify Cisco NCS 1000 Breakout Patch Panel and Breakout Modules, on page 126

Package Contents

You can order the breakout panel and breakout modules separately. The breakout panel package contains the 19-inch rack accessory kit as part of the default kit. If necessary, you can order the ETSI and ANSI 23" accessory kits separately. The breakout panel and breakout modules are shipped separately. See PIDs, on page 189 for all PIDs of the breakout panel and breakout modules components.

The shipped breakout panel package contains the following:

- Cisco NCS 1000 Breakout Patch Panel.
- Accessory kit (NCS1K-BRK-KIT)—Includes all the hardware necessary for the breakout patch panel installation on the ANSI 19" Rack. You can order the accessory kits for ETSI (NCS1K-ETSI-KIT) and ANSI 23" (NCS1K-23-KIT) racks as required. The following table describes the contents of the accessory kits.

Table 18: Accessory Kit Contents

Accessory Kit	Contents
NCS1K-BRK-KIT	This kit has the following items for patch panel installation on a 19" rack: • Plastic faceplate (1) • 12–24 x 0.50-inch length Pan head screws (8) • Double hole ground lug (1) • Lock washers for M5 screws (2) • M5 x 10mm length Pan head screws (2) • 6-inch Velcro strips for fiber management (15)
NCS1K-ETSI-KIT	This kit has the following items for patch panel installation on an ETSI 21" rack: • M6 x 20mm length Pan head screws (12) • Z-shaped adapter brackets (2)
NCS1K-23-KIT	This kit has the following items for patch panel installation on an ANSI 23" rack: • 12–24 x 0.5-inch length Pan head screws (12) • Right adapter bracket (1) • Left adapter bracket (1)

The breakout module package includes the following:

- Breakout modules
- Production test report form. The form has the part number and serial number of the manufacturer, Cisco product part number, date, and device description.

Unpack and Verify Cisco NCS 1000 Breakout Patch Panel and Breakout Modules

The breakout panel and the breakout modules are shipped in separate packages. This task describes the steps for unpacking and verifying both the components.

Procedure

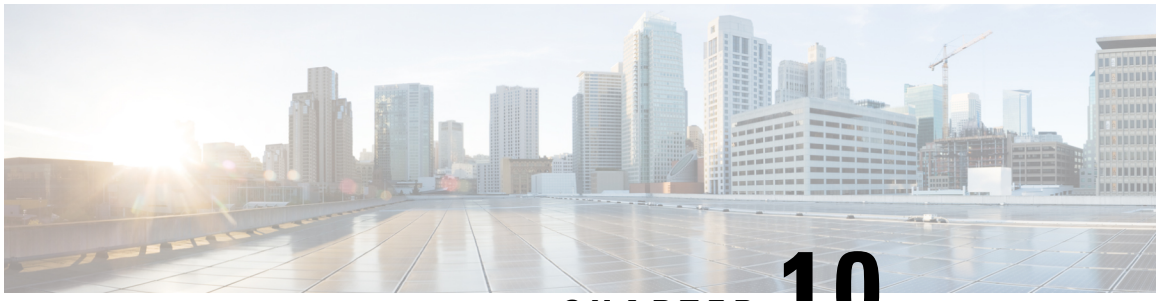
Step 1 When you receive the breakout panel and breakout modules at the installation site, open the top of the box.

Step 2 Unpack and inspect the breakout panel and breakout modules.

For more information on the package contents, see Package Contents, on page 125.

Step 3 To remove the breakout panel or breakout modules, grasp the side of the breakout panel or module and lift the panel or module out of the box.

Step 4 If there is any damage, call your Cisco sales engineer for a replacement.



CHAPTER 10

Install Cisco NCS 1000 Breakout Patch Panel and Modules

This chapter contains tasks to install Cisco NCS 1000 Breakout Patch Panel and Cisco NCS 1000 Breakout Modules.

Note In this chapter, "breakout panel" refers to the "Cisco NCS 1000 Breakout Patch Panel". "breakout modules" refer to the "Cisco NCS 1000 Breakout Modules".

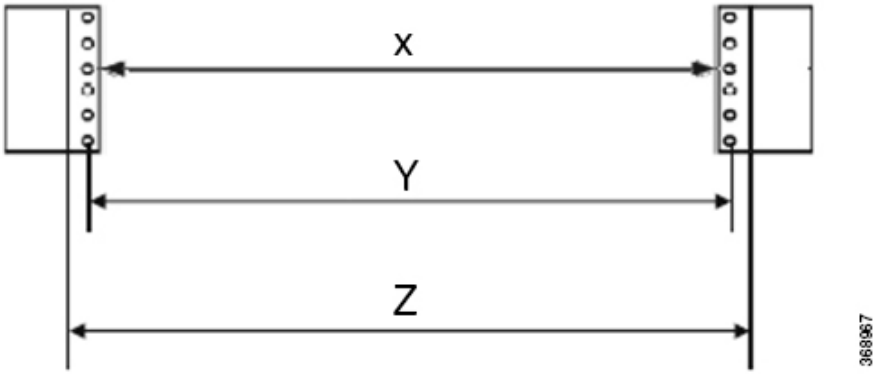
- Rack Compatibility, on page 129
- Ground Description, on page 130
- Rack Mount Warnings, on page 132
- Install Breakout Panel Adapter Brackets, on page 133
- Install the NCS 1000 Breakout Patch Panel, on page 135
- Install the NCS 1000 Breakout Modules, on page 137
- Breakout Panel Cable Management, on page 145
- Install Breakout Panel Plastic Cover, on page 152
- Fiber-Optic Connector Cleaning and Maintenance, on page 152

Rack Compatibility

The Cisco NCS 1000 Breakout Patch Panel can be installed in a standard ANSI/EIA (19"), ANSI (23"), or ETSI (21") 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 93: Rack Specification



Rack Type	Rack Front Opening X	Rack Mounting Hole Center-Center Y	Mounting Flange Dimension Z
ANSI 19" racks	450.8mm (17.75")	465mm (18.312")	482.6mm (19")
ANSI 23" racks	552.45mm (21.75")	566.7mm (22.312")	584.2mm (23")
ETSI 21" racks	500.0mm(19.68")	515.0mm(20.276")	533.4mm(21")

Ground Description

The unpainted surface between the adapter bracket, optical modules, and patch panels, ensure proper grounding of the breakout patch panels. The adapter bracket, the straight adapter brackets, and the Z-shaped adapter brackets are unpainted and treated with conductive finishing.

Ground Connection Warnings

Take note of the following ground connection warnings:

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.

Ground the Breakout Panel

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

This task describes the steps to ground the breakout panel.

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 breakout panel ground and bay frame ground point. Clean the mating surfaces and apply appropriate antioxidant compound to the bare conductors.

Step 3 Identify the ground stamp on the breakout panel to attach the ground lug.

Step 4 Crimp a #6 AWG ground cable to the dual-hole ground lug.

Step 5 Align the dual-hole ground lug to the breakout panel.

The ground points are present on the front and rear side of the breakout panel, as shown in the following figure.

Figure 94: Front Side Grounding Option

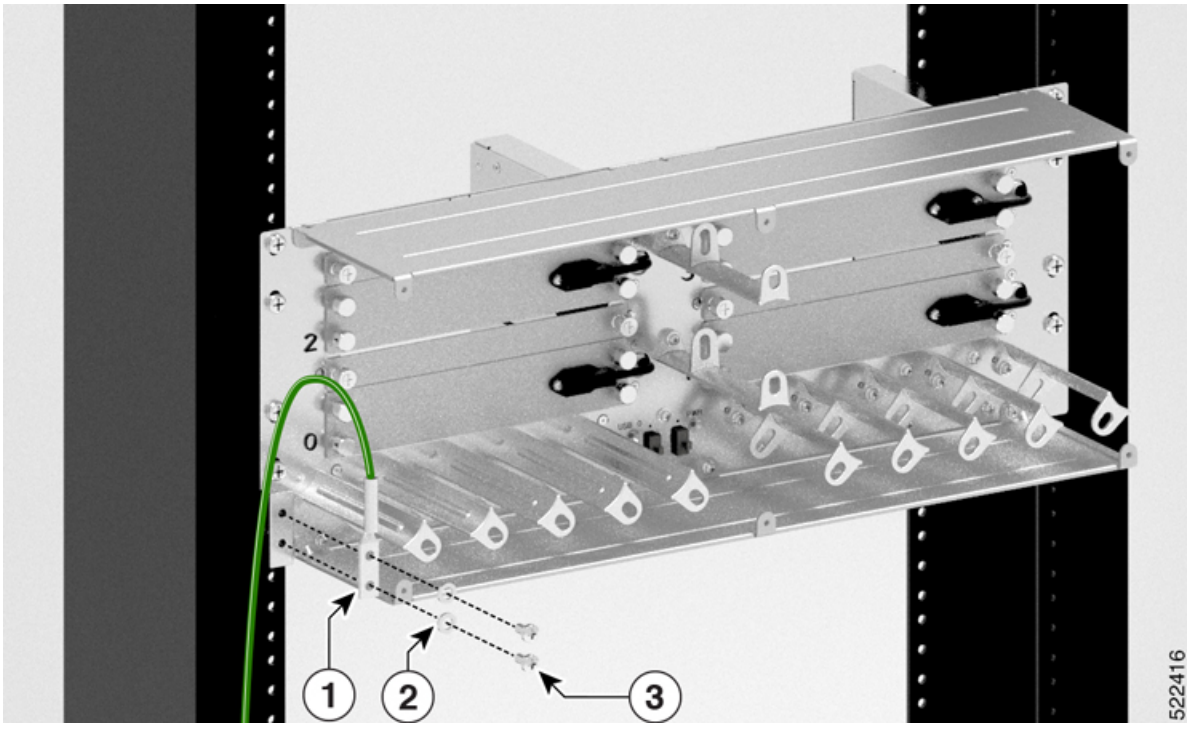
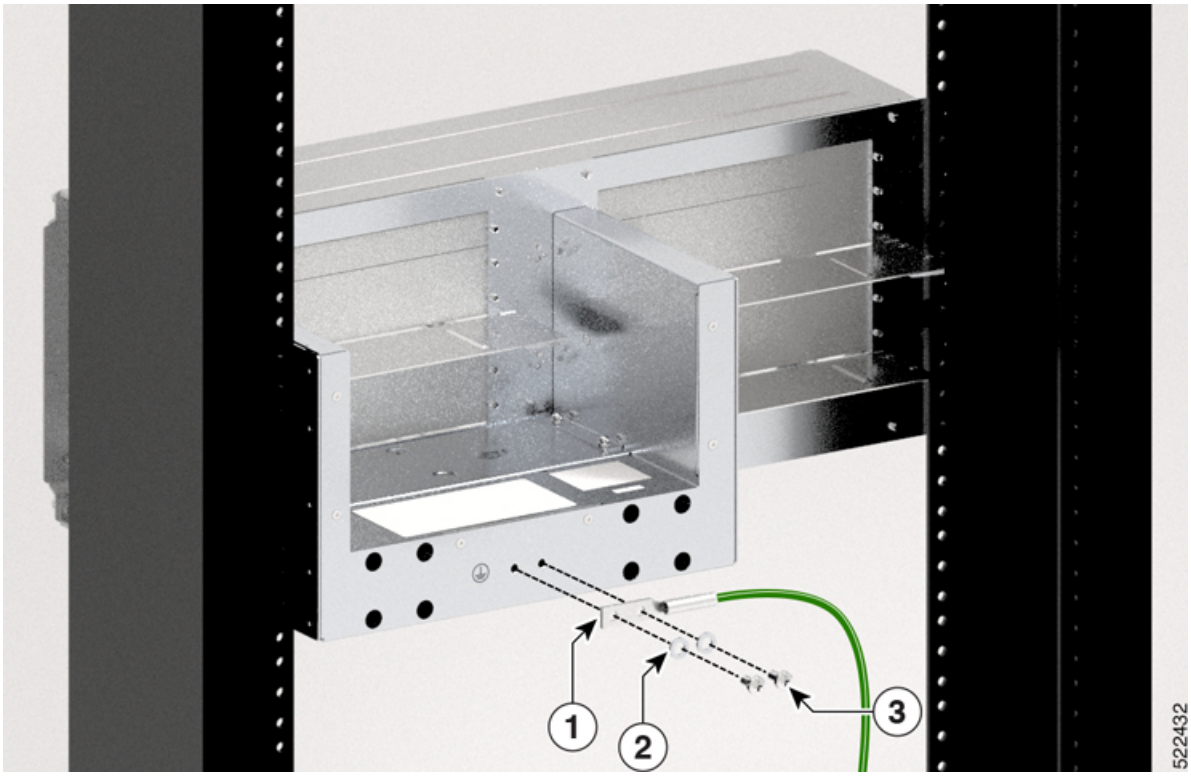


Figure 95: Rear Side Grounding Option



1	Double-hole Ground Lug
2	Lock Washers
3	M5 Pan Head Phillips Screws

Step 6 Tighten the M5 pan head screw to torque value of 3.1 N-m (27.4 lbs-in).

Step 7 Terminate the other end of the ground cable either at the office ground point or the rack ground point.

Rack Mount Warnings

Take note of the following rack-mount safety warnings.

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

Two 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 Breakout Panel Adapter Brackets

This task explains how to install the adapter brackets to the ANSI or ETSI standard equipment rack.

Note The breakout panel does not need adapter brackets to fit into an ANSI 19-inch rack.

Before you begin

Ensure you completed the following tasks:

- Unpack and Verify Cisco NCS 1000 Breakout Patch Panel and Breakout Modules, on page 126.
- Rack Compatibility

Procedure

Step 1 To mount the adapter brackets to the standard equipment rack, perform one of the following actions:

- For a 23 inch (584.2 mm) ANSI configuration, perform the following steps.

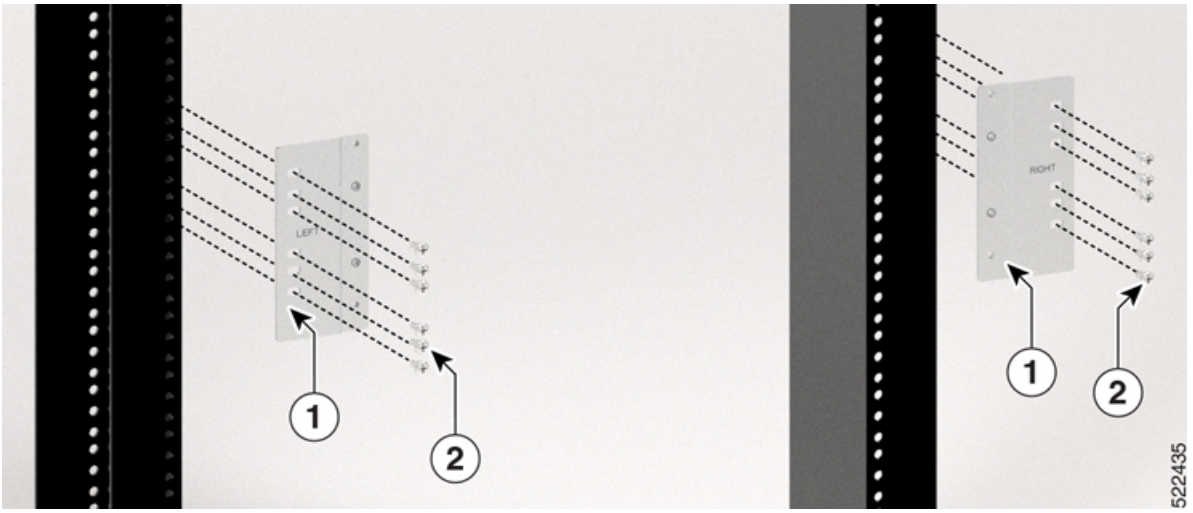
  Note
  Use the "NCS1K-23-KIT" accessory kit for installing the breakout panel on the 23-inch rack. For more information, see Package Contents, on page 125.

  a. Align the screw holes of the left bracket against the screw holes of the left rack.

  b. Place the screws to hold the left bracket on the left rack.

  c. Align the screw holes of the right bracket against the screw holes of the right rack.

  Figure 96: Installing the Adapter Brackets on the 23-inch Rack

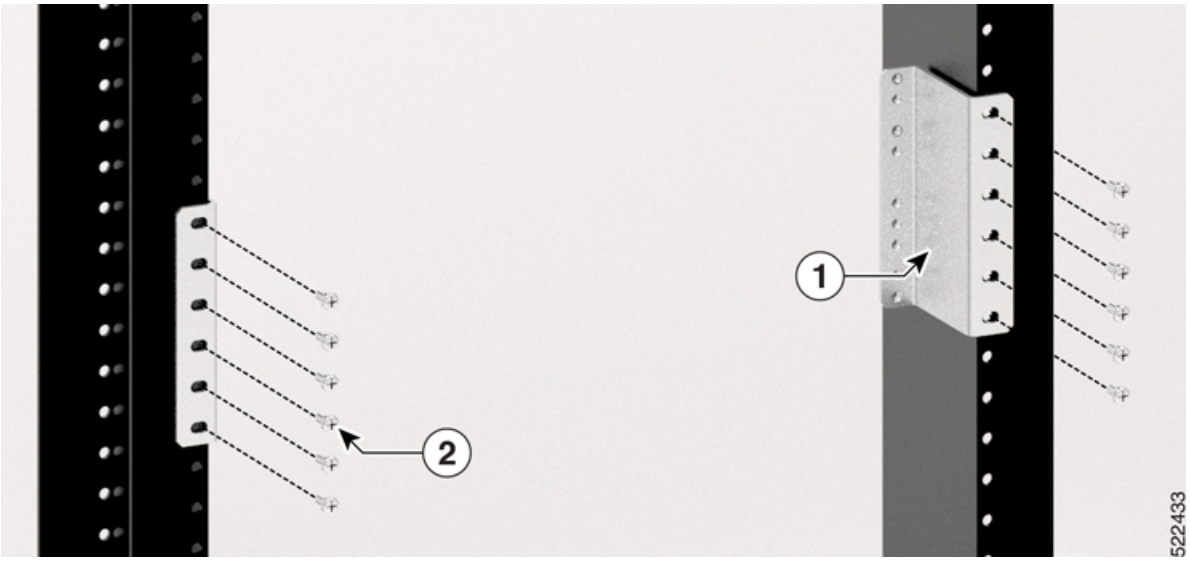
1	Left and Right Adapter Brackets
2	12-24 Pan Head Screws

  d. Place the screws to hold the right bracket on the right rack.

- For an ETSI configuration, align the screw holes of the Z-shaped adapter brackets against the rack screw holes.

  Note
  Use the "NCS1K-ETSI-KIT" accessory kit for installing the breakout panel on the ETSI rack. For more information, see Package Contents, on page 125.

Figure 97: Installing the Adapter Brackets on an ETSI Rack



1	Adapter Bracket
2	M6 x 20mm Length Screws

Step 2 Using a screwdriver, tighten the screws to a torque value of 4.65 N-m (41 lbs-in).

What to do next

- Install the NCS 1000 Breakout Patch Panel, on page 135

Install the NCS 1000 Breakout Patch Panel

This task explains how to install the breakout panel into the ETSI and 23-rack adapter brackets.

Before you begin

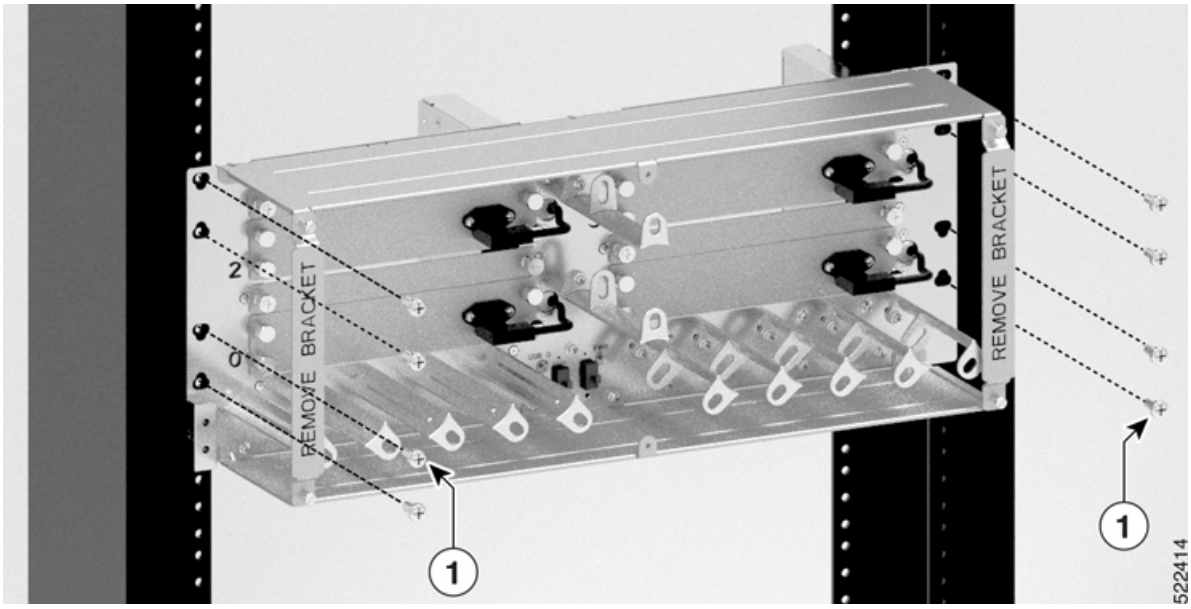
- Install Breakout Panel Adapter Brackets, on page 133

Procedure

Step 1 Hold the bottom side of the breakout panel and align the breakout panel to the rack.

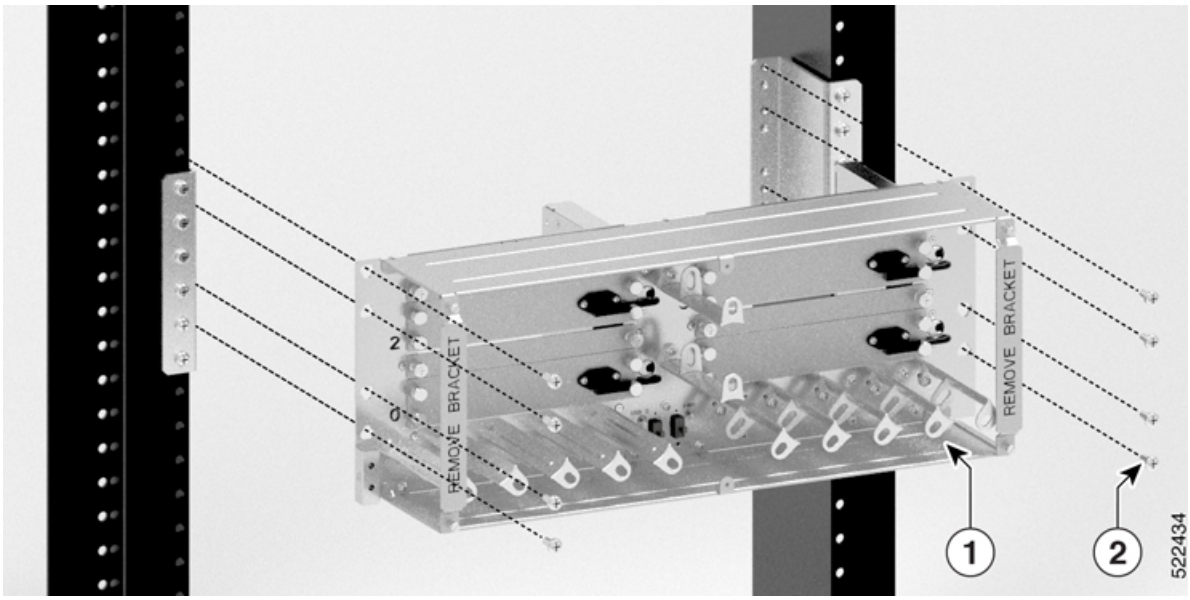
Warning
Using the top or bottom covers to lift the breakout panel may damage the equipment.

Figure 98: Installing the Breakout Panel on a 19-inch Rack



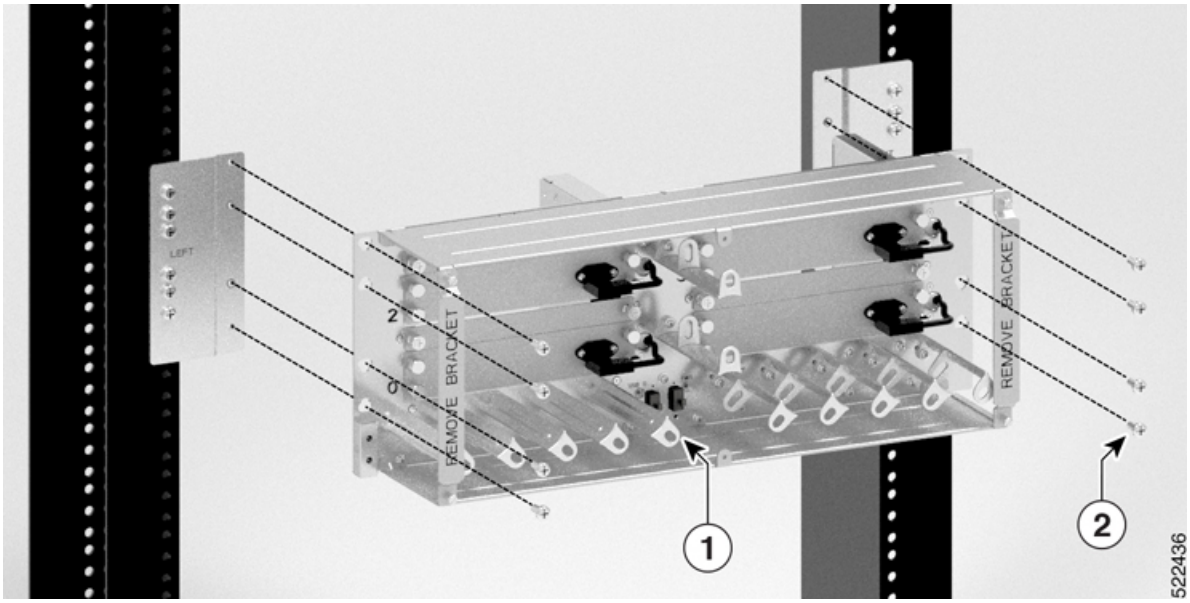
1	12–24 x 0.5" Length Pan Head Screws

Figure 99: Installing Breakout Panel on an ETSI Rack



1	NCS1K-BRK-SA
2	12–24 x 0.5" Length Pan Head Screws

Figure 100: Installing Breakout Panel on a 23-inch Rack



1	NCS1K-BRK-SA
2	12–24 x 0.5" Length Pan Head Screws

Step 2 Tighten the 12–24 pan-head screws to a torque value of 4.65 N-m (41 lbs-in).

What to do next

- Install the NCS 1000 Breakout Modules, on page 137

Install the NCS 1000 Breakout Modules

This task explains how to install the following breakout modules into the breakout panel.

- NCS1K-BRK-8
- NCS1K-BRK-16
- NCS1K-BRK-24

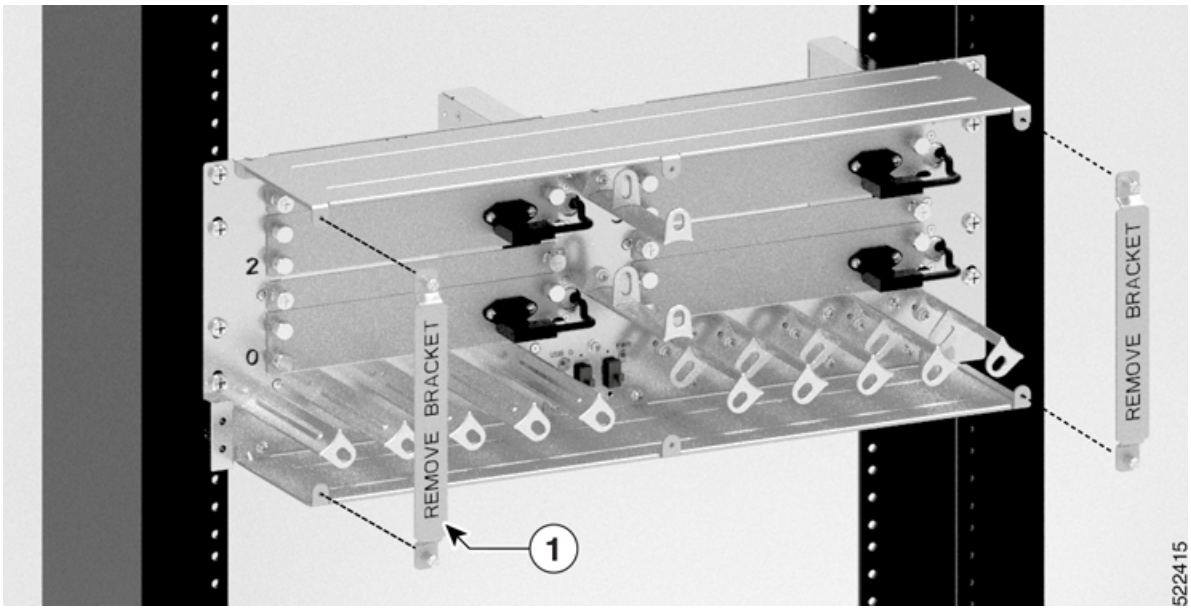
Before you begin

- Install the NCS 1000 Breakout Patch Panel

Procedure

Step 1 Loosen the captive screws to remove the front brackets in the breakout panel.

Figure 101: Removing Front Brackets from Breakout Panel

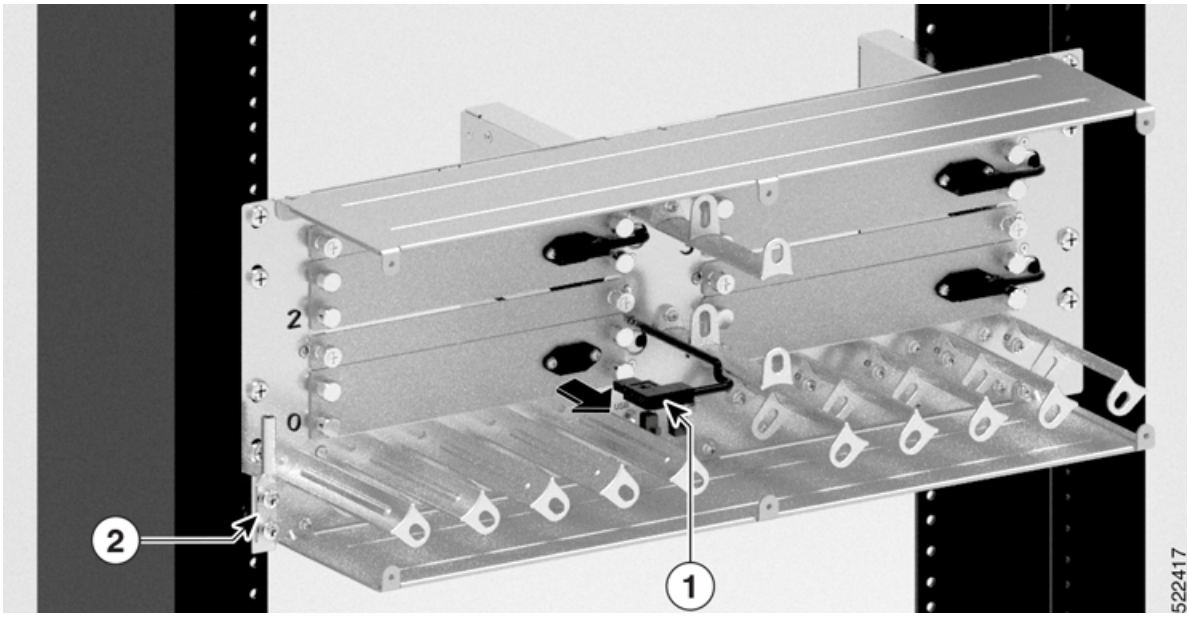


1	Front Brackets

Step 2 Establish grounding for the breakout panel. For more information, see Ground the Breakout Panel, on page 131.

Step 3 Remove the USB 2.0 connection from the USB dummy cover.

Figure 102: Removing USB 2.0 Connection

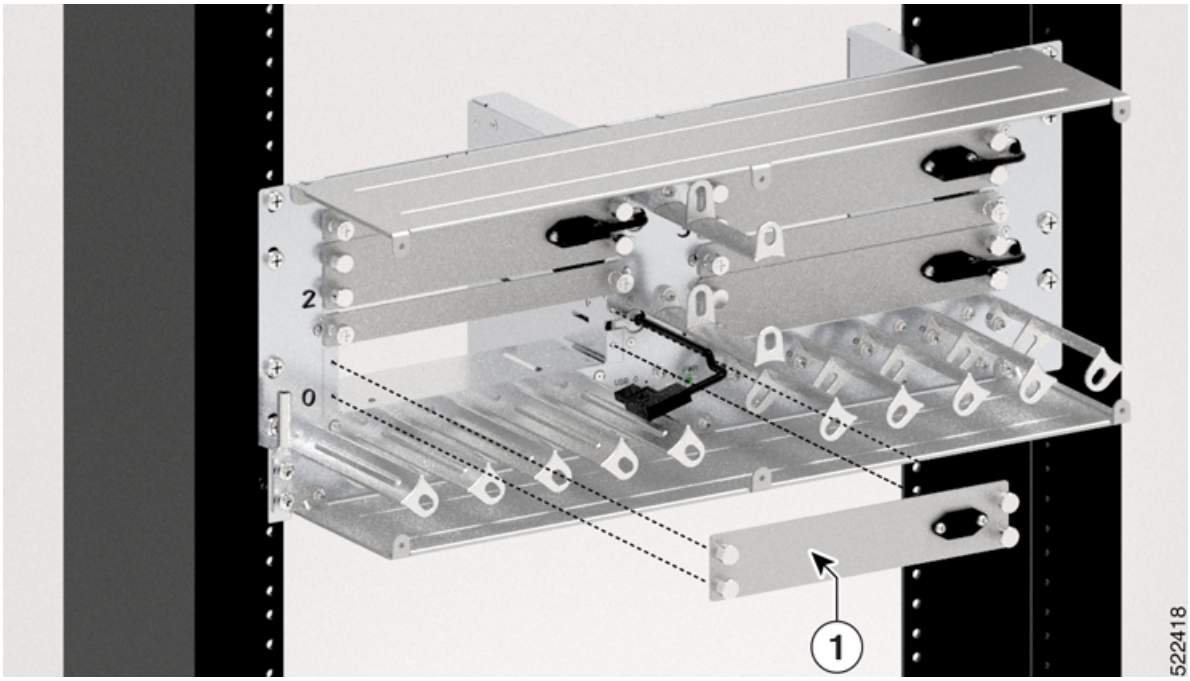


1	USB 2.0 Cable
2	Ground Lug

Step 4 Loosen the captive screws to remove the dummy cover from the breakout panel. For installing the 24-port breakout module, you need to also remove the smaller dummy cover above the USB dummy cover. See Figure 104: Removing Dummy Cover for 24-Port Module, on page 140.

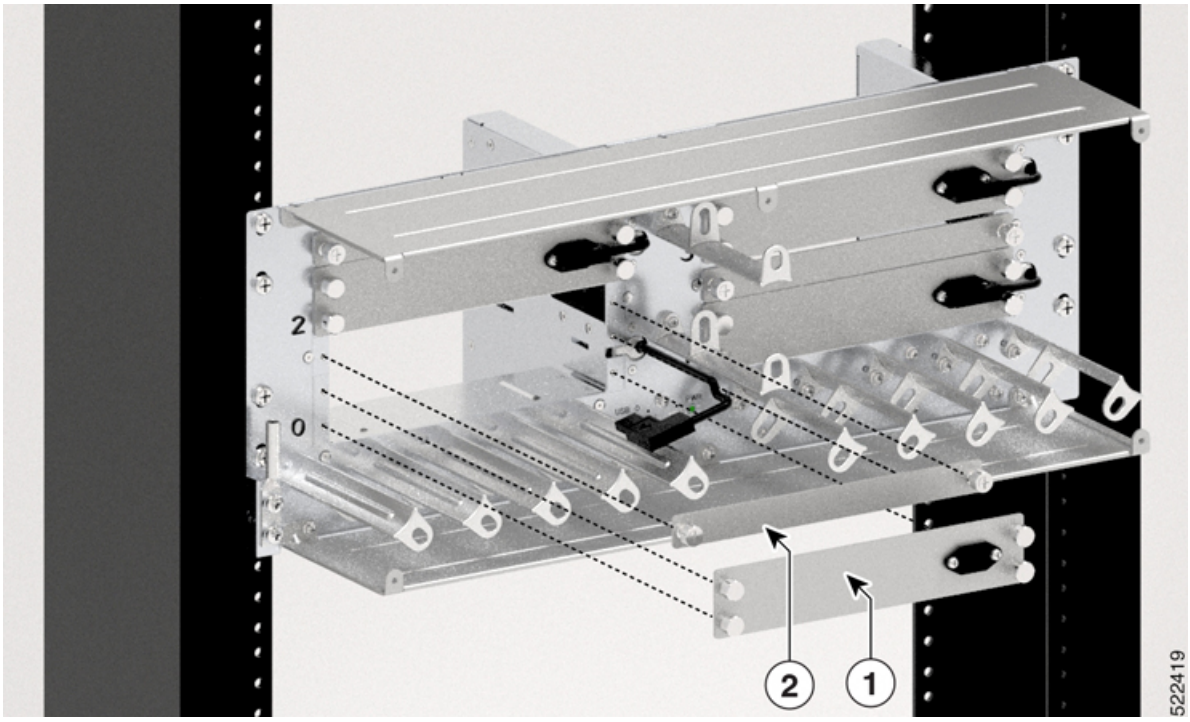
Note
A line marking is provided on the faceplate of the breakout panel where 8/16-port breakout modules can be installed.

Figure 103: Removing USB Dummy Cover for 8/16-Port Module



1	USB Dummy Cover

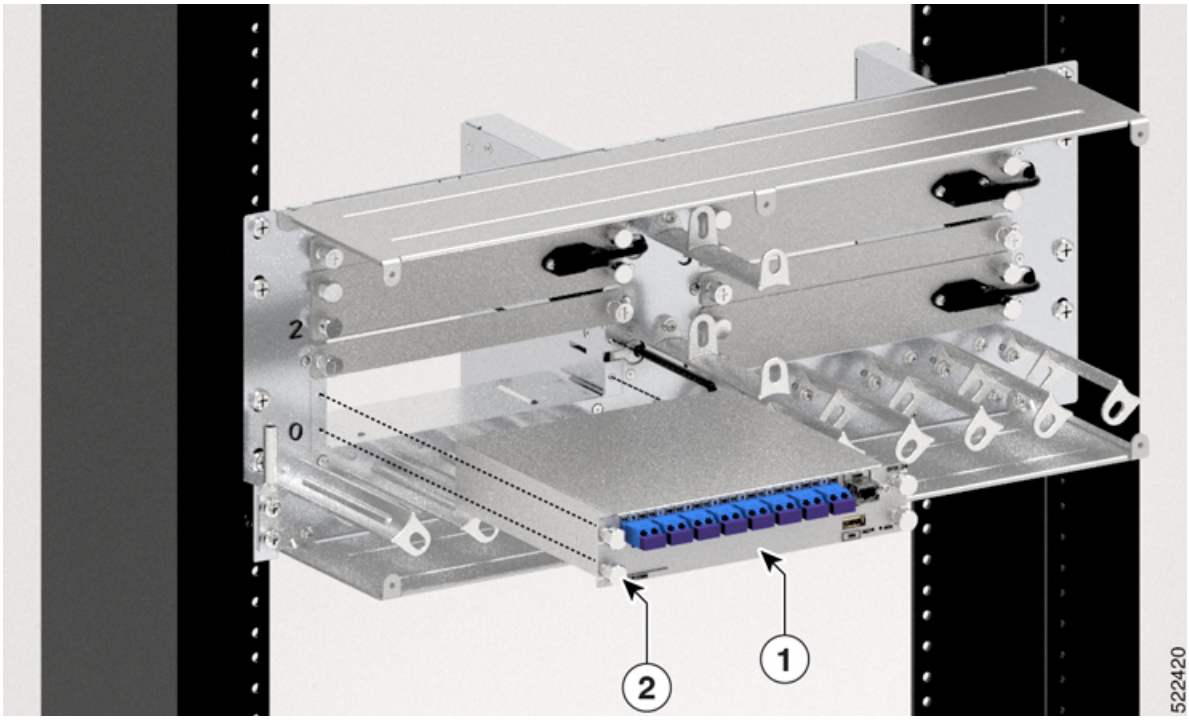
Figure 104: Removing Dummy Cover for 24-Port Module



1	USB Dummy Cover
2	Dummy Cover

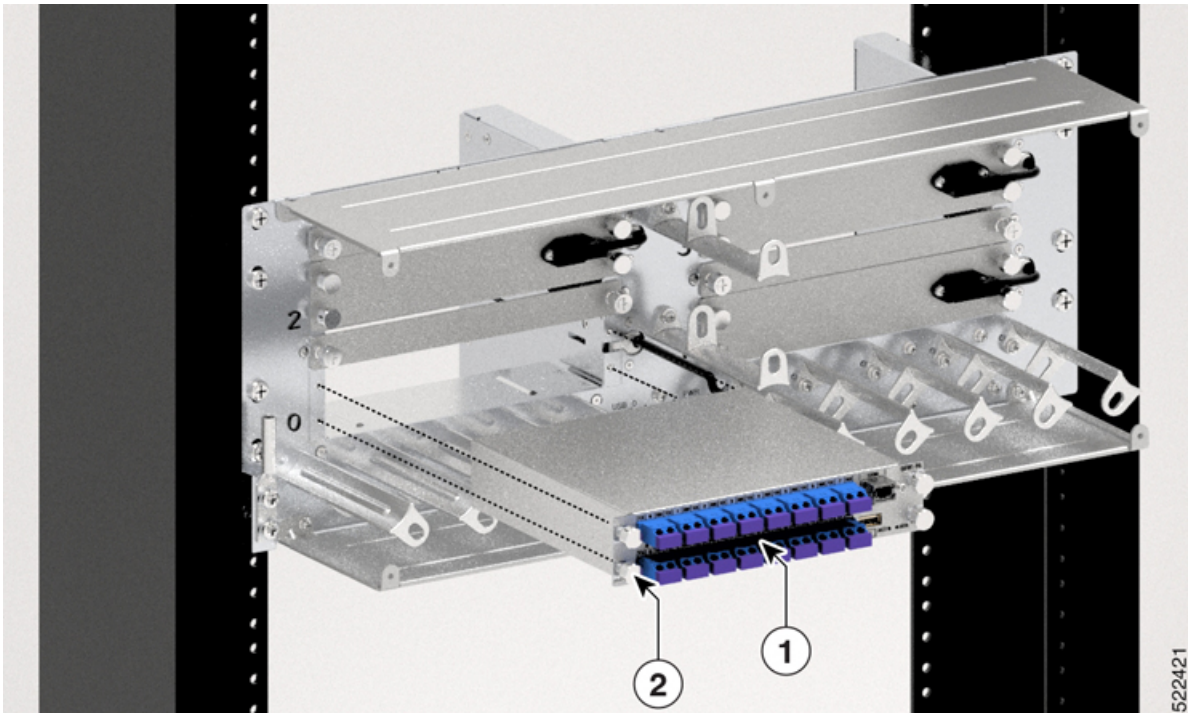
Step 5 Insert the breakout module into the empty slot.

Figure 105: Inserting 8-Port Breakout Module into the Breakout Panel



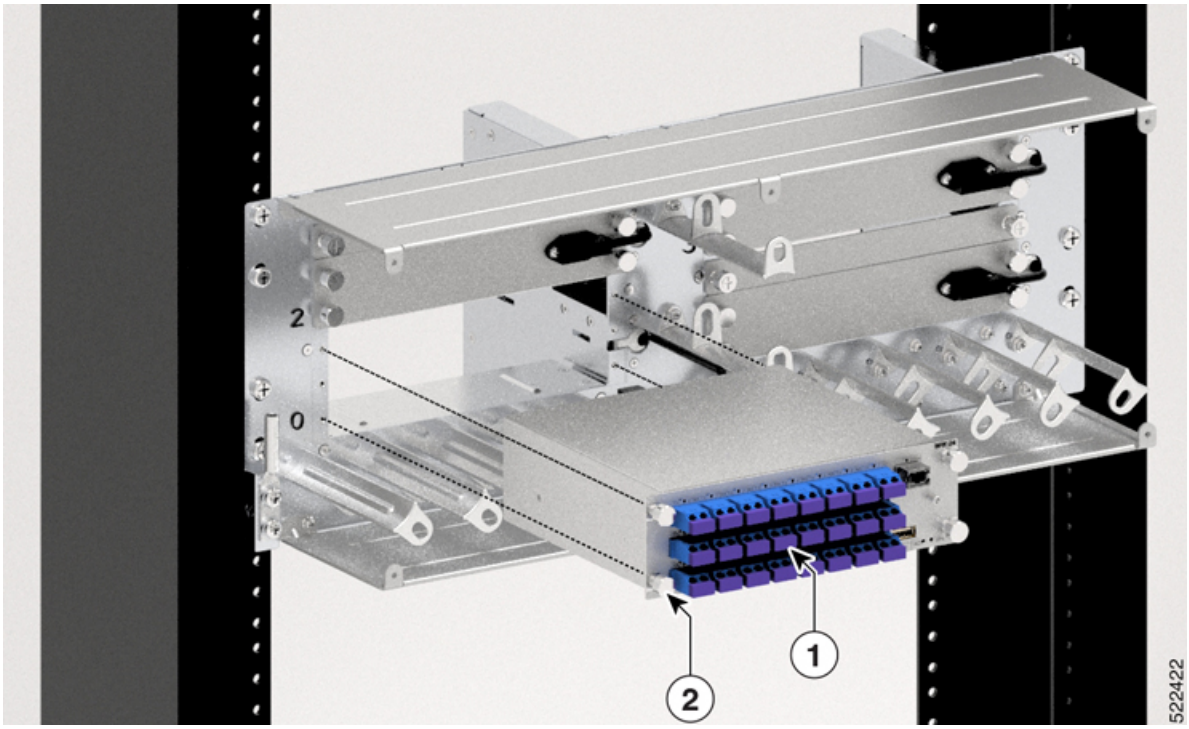
1	8-Port Breakout Module (NCS1K-BRK-8)
2	Captive Screws

Figure 106: Inserting 16-Port Breakout Module into the Breakout Panel



1	16-Port Breakout Module (NCS1K-BRK-16)
1	Captive screws

Figure 107: Inserting 24-Port Breakout Module into the Breakout Panel

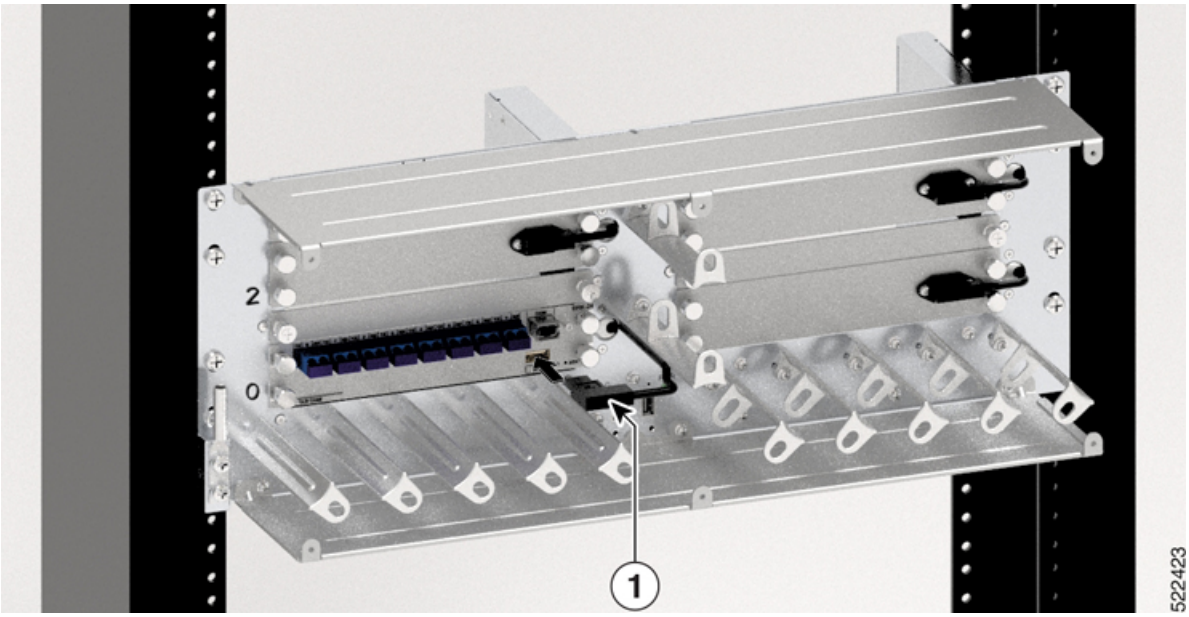


1	24-Port Breakout Module (NCS1K-BRK-24)
1	Captive Screws

Step 6 Tighten the captive screws of the breakout module to a torque value of 0.65 N-m (5.75 lbs-in).

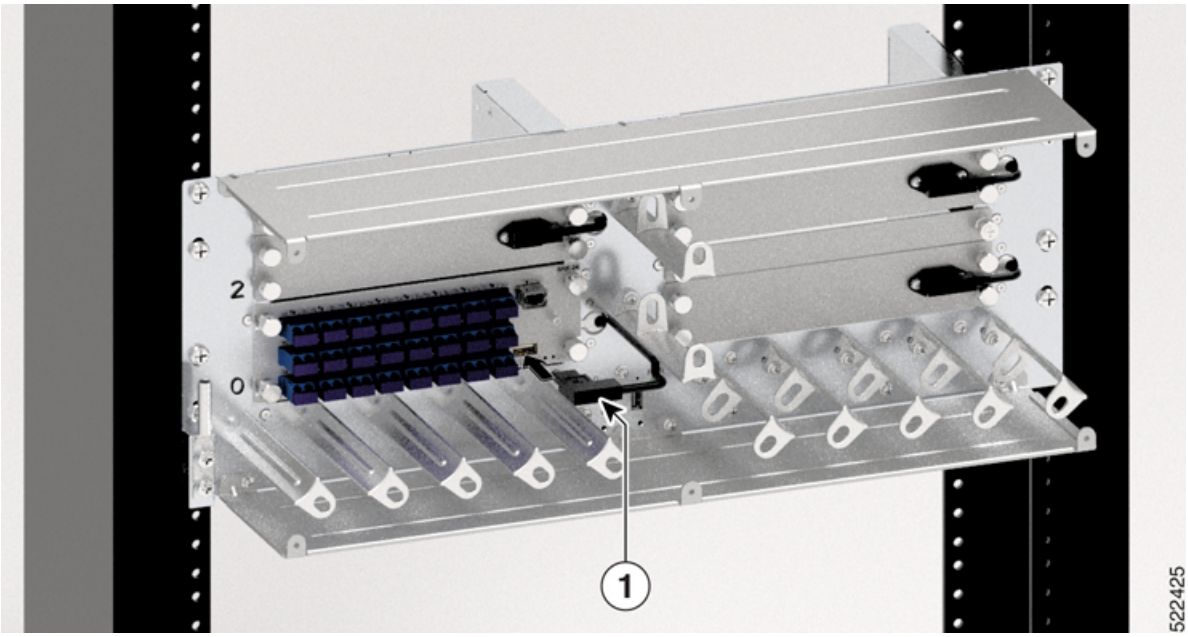
Step 7 Connect the associated USB 2.0 connecter to the breakout module.

Figure 108: Connecting USB 2.0 Connector for 8-Port Breakout Module



1	USB 2.0 Connector

Figure 109: Connecting USB 2.0 Connector for 24-Port Breakout Module

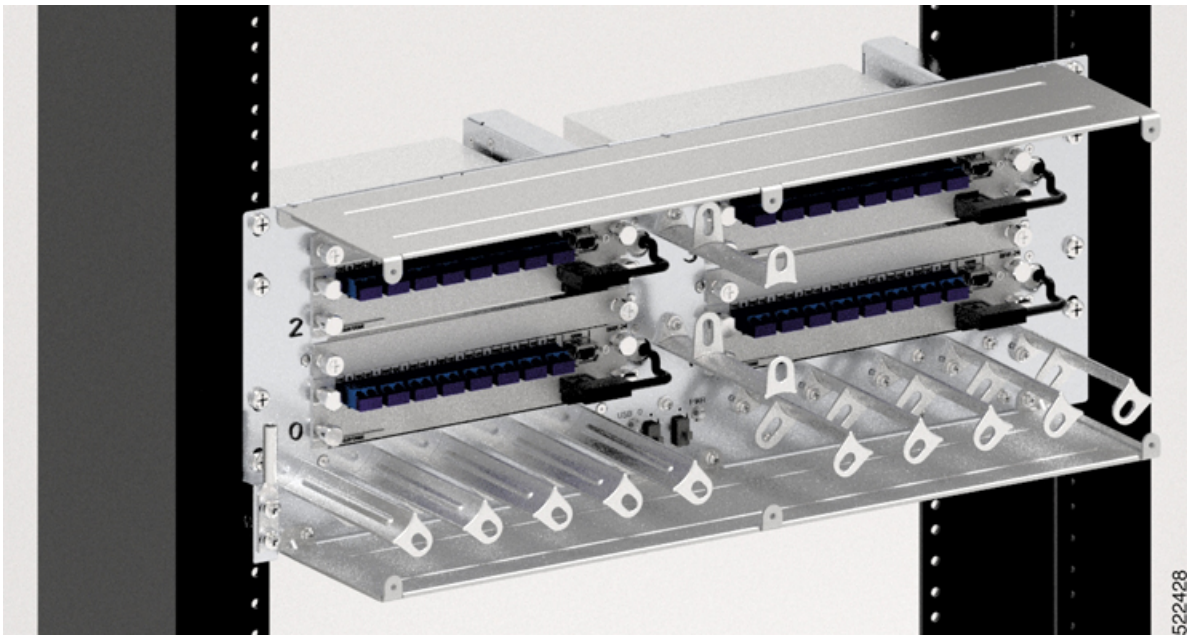


1	USB 2.0 Connector

Step 8 Repeat steps Step 3, on page 138 through Step 7, on page 143 to install the rest of the breakout modules.

The following image displays the complete installation of the breakout modules into the breakout panels.

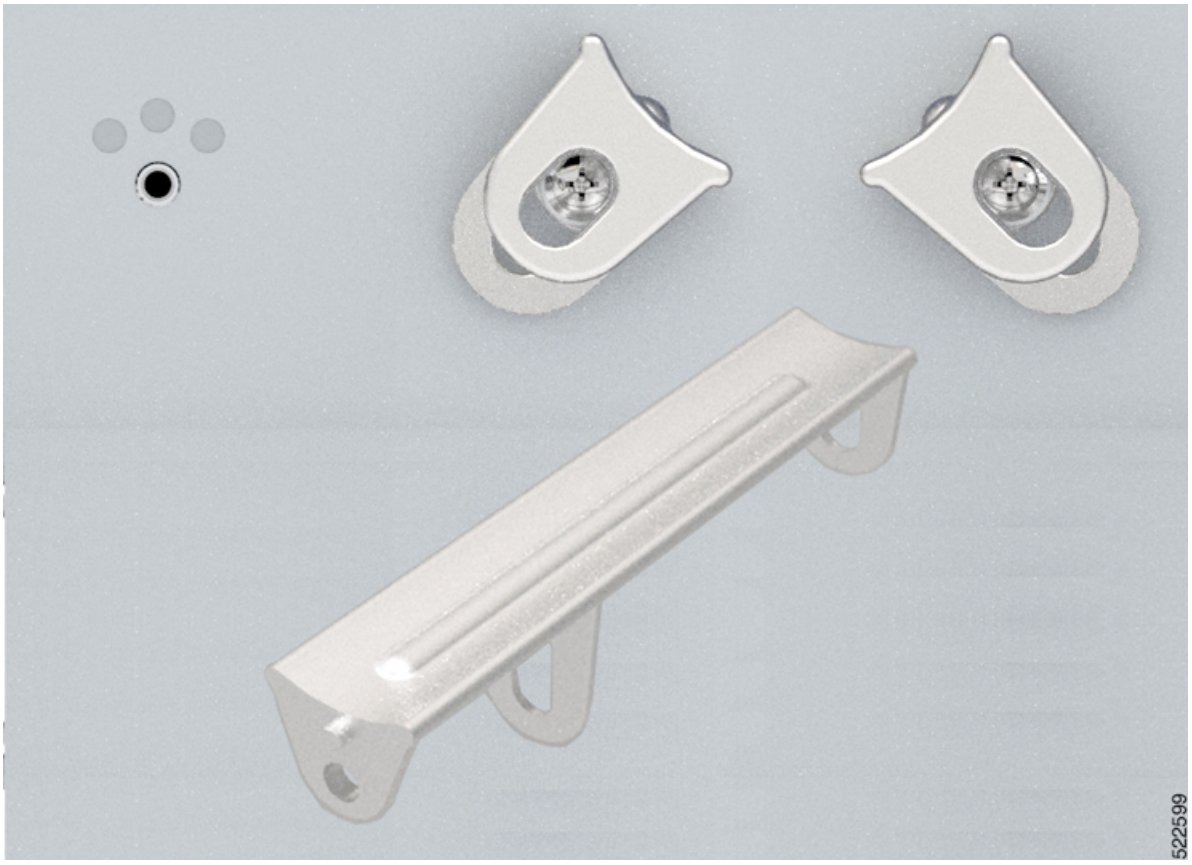
Figure 110: Breakout Panel with Breakout Modules Installed



Breakout Panel Cable Management

The breakout panel accommodates high-density cable connections from the breakout modules. The LC, MPO, and USB cables exit the breakout panel through the right-, left-, or both sides. The USB 2.0 cable connection must exit from the lower left side of the breakout panel and connect to the USB 0 port of the NCS 1010 EITU. The MPO cables must exit on the right side of the breakout panel to the MPO ports of the NCS 1010 OLT-C and OLT-R-C line cards. The LC cables can exit through the left-, right-, or both sides of the breakout panel. The following image shows the different orientations of the fibre guides:

Figure 111: Fiber Guides



To exit the cables on both sides of the breakout panel, perform the following steps:

- Tilt the bottom fiber guides inwards toward the USB 0 port on the faceplate.
- Fix the protrusions of the fiber guides on the faceplate guide holes.
- Tighten the captive screws.
- Route the cables on both sides out of the breakout panel.

To exit the cables on the right side of the breakout panel, perform the following steps:

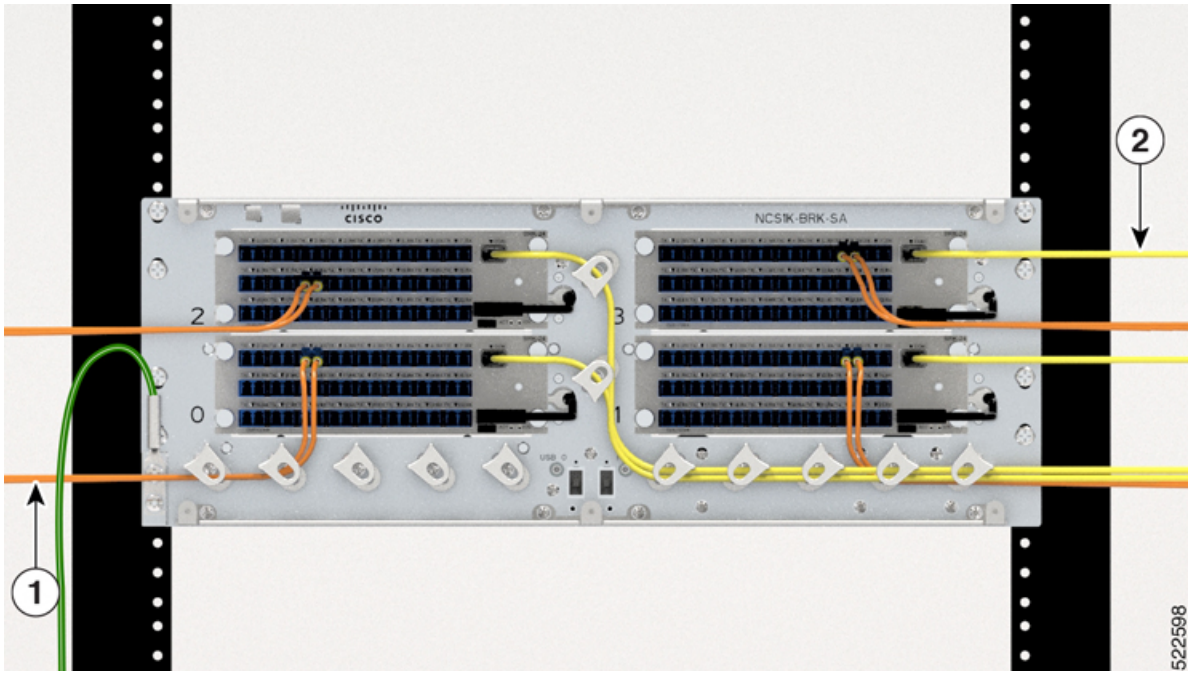
- Tilt the bottom fiber guides to the left side facing downwards.
- Tilt the top fiber guide to the right side facing upwards and tilt the middle fiber guide in the opposite direction.
- Fix the protrusions of the fiber guides on the faceplate guide holes.
- Tighten the captive screws.
- Route the cables to the right side of the breakout panel.

To exit the cables on the left side of the breakout panel, perform the following steps:

- Tilt the bottom fiber guides to the right side facing downwards.

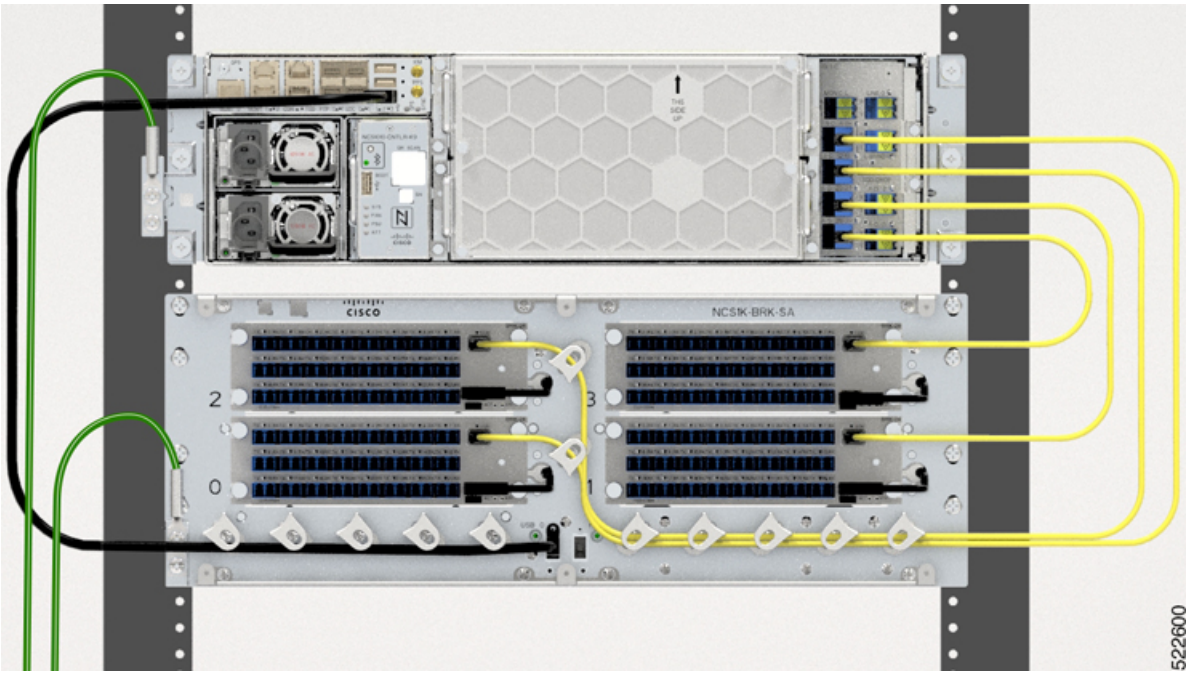
- Tilt the top fiber guide to the left side facing upwards and tilt the middle fiber guide to the opposite direction.
- Fix the protrusions of the fiber guides on the faceplate guide holes.
- Tighten the captive screws.
- Route the cables to the right side of the breakout panel.

Figure 112: Routing of MPO and LC Cables



1	LC Cable
2	MPO Cable

Figure 113: Routing of MPO and USB 3.0 Cables



Install and Route Fiber-Optic Cables

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.

Note Always clean all fiber connectors thoroughly before making the connection with the mating adapter. Very small particles can permanently damage the end of the mating fiber inside the breakout module, which makes regular cleaning imperative. For cleaning instructions, see Fiber-Optic Connector Cleaning and Maintenance.

Note The breakout modules feature LC/MPO bulkhead adapters. Always use fiber-optic cables equipped with the corresponding (LC/MPO) connector type. Using any other type of connector results in damage to the connector or adapter, or both.

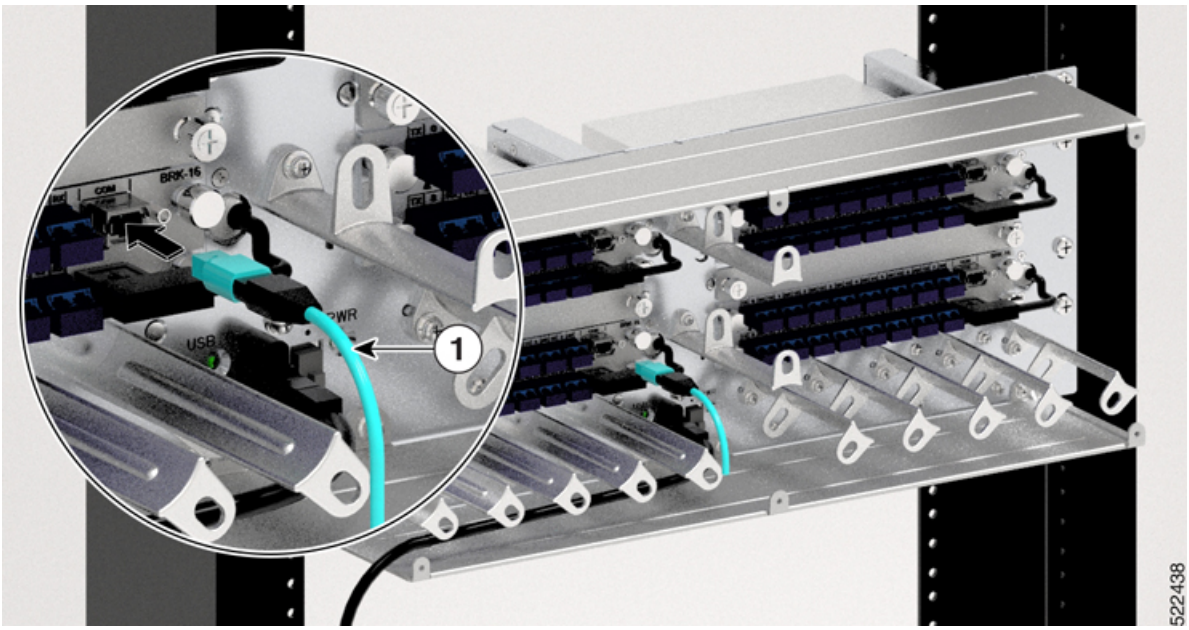
This procedure explains how to install and route fiber-optic cables from the OLT-C or OLT-R-C line card to the breakout module.

Procedure

Step 1 For an MPO cable installation, do the following:

a) Remove the dust cap from the MPO adapter on the breakout module.
b) Place the MPO cable connector in front of the corresponding COM port of the breakout modules.
c) Align the keyed ridge of the MPO cable connector with the slot in the receiving adapter.

Figure 114: Aligning MPO Fiber Cable Connector



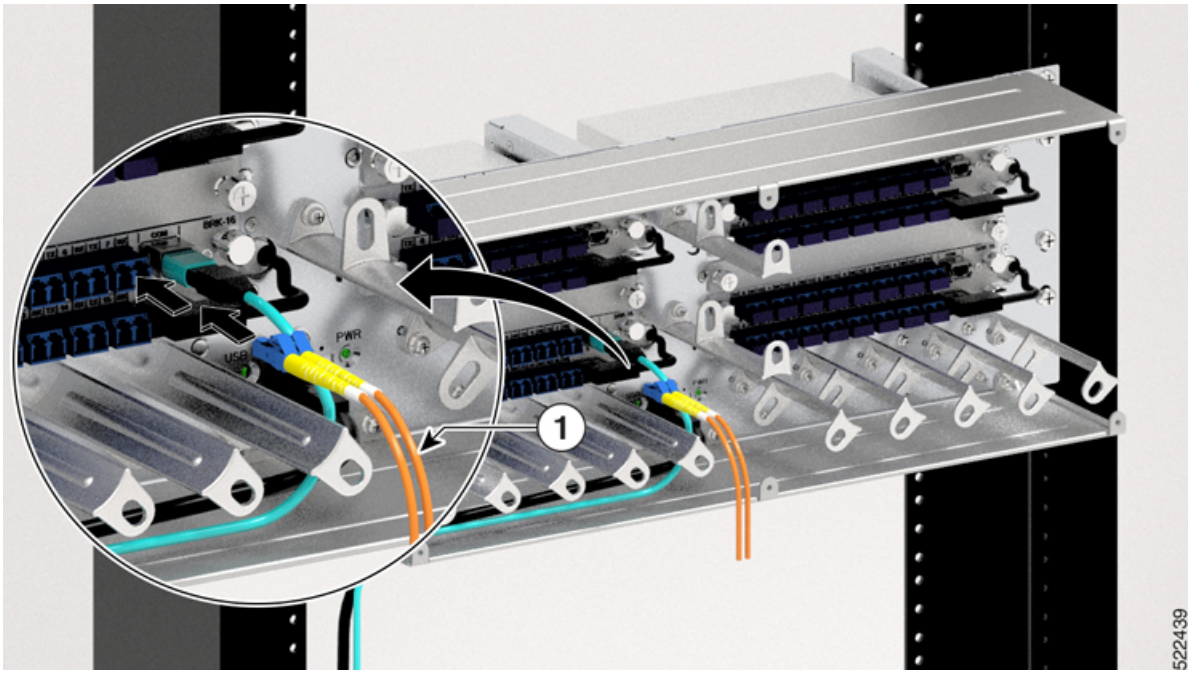
1	MPO Fiber Cable • 15454-24MPO-MPO-2 • 15454-24MPO-MPO-4 • 15454-24MPO-MPO-6 • 15454-24MPO-MPO-8

d) Gently push the cable connector into the adapter until you hear a click, which indicates that the latching system is engaged.
e) Route the cables through the right side to the MPO ports A/D 4–11, A/D 12–19, A/D 20–27 and A/D 28–33 in the OLT-C or OLT-R-C line cards in the NCS 1010 shelf. See Breakout Panel Cable Management, on page 145.
f) Place the other end of the MPO cable connector in front of the corresponding ADD/DROP port of the line cards.
g) Align the keyed ridge of the MPO cable connector with the slot in the receiving adapter.
h) Gently push the cable connector into the adapter until you hear a click, which indicates that the latching system is engaged.

Step 2 For an LC cable installation, do the following:

a) Remove the dust cap from the LC adapter on the breakout modules.
b) Place the LC cable connector in front of the corresponding LC bulkhead adapter of the breakout modules.
c) Align the keyed ridge of the cable connector with the slot in the receiving adapter.

Figure 115: Aligning LC Cable Connector



1	LC Cable

d) Gently push the cable connector into the adapter until you hear a click, which indicates that the latching system is engaged.
e) Route the cables through the left or right side of the breakout panel. See Breakout Panel Cable Management, on page 145.
f) Place the other end of the LC cable connector in front of the corresponding unit.
g) Align the keyed ridge of the LC cable connector with the slot in the receiving adapter.
h) Gently push the cable connector into the adapter until you hear a click, which indicates that the latching system is engaged.

Install and Route the USB Cable

This task explains how to install and route the USB 3.0 cable into the NCS 1010 chassis.

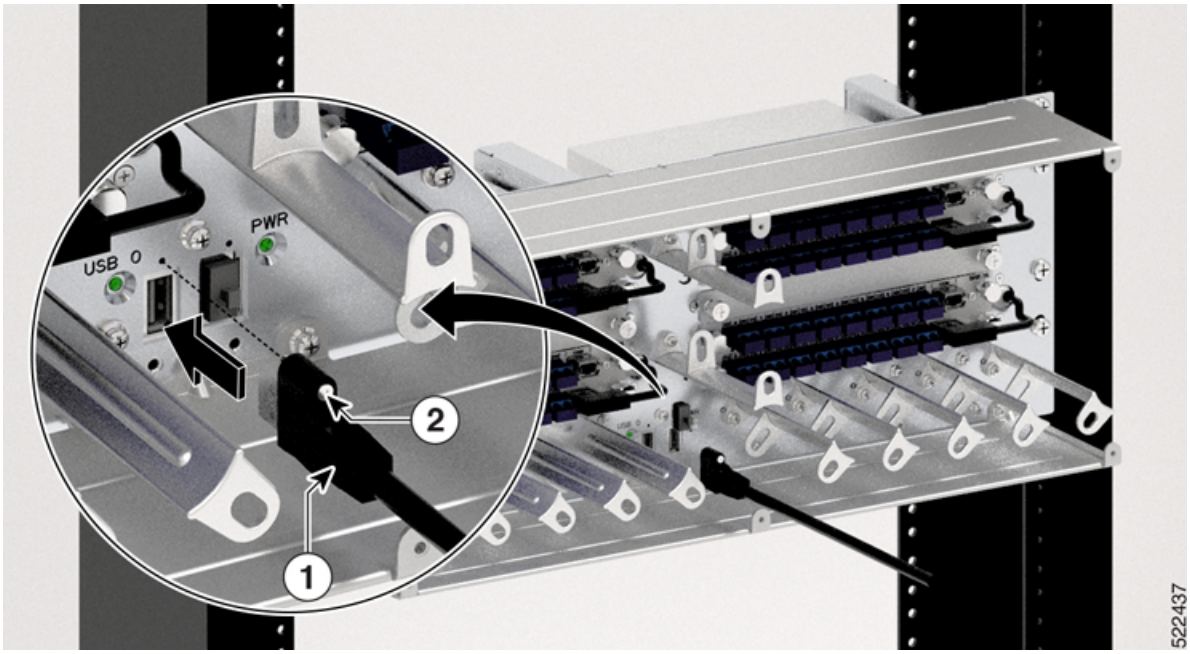
Procedure

Step 1 Remove the dust cap from USB 0 port in the breakout panel.

Caution
Do not remove the dust cap from the PWR port. The PWR port will be supported in a future release. Avoid connecting the USB cable to the PWR port.

Step 2 Align the USB 3.0 cable connector to the inventory USB Type A receptacle (USB 0 port) present on the breakout panel.

Figure 116: USB 3.0 Cable Connection



1	USB 3.0 • NCS1010-USB-3M= • NCS1010-USB-1M=
2	USB 3.0 Cable Screw

Step 3 Gently push the USB 3.0 cable connector in the USB Type A receptacle (USB 0 port) on the breakout panel.

Step 4 Tighten the captive screw to a torque value of 0.15 N-m (1.32 lbs-in) to secure the USB 3.0 cable in the receptacle.

Step 5 Route the other side of the USB 3.0 cable through the left side of the breakout panel.

Step 6 Connect the other side of the USB 3.0 cable to the USB 0 port on the NCS 1010 EITU.

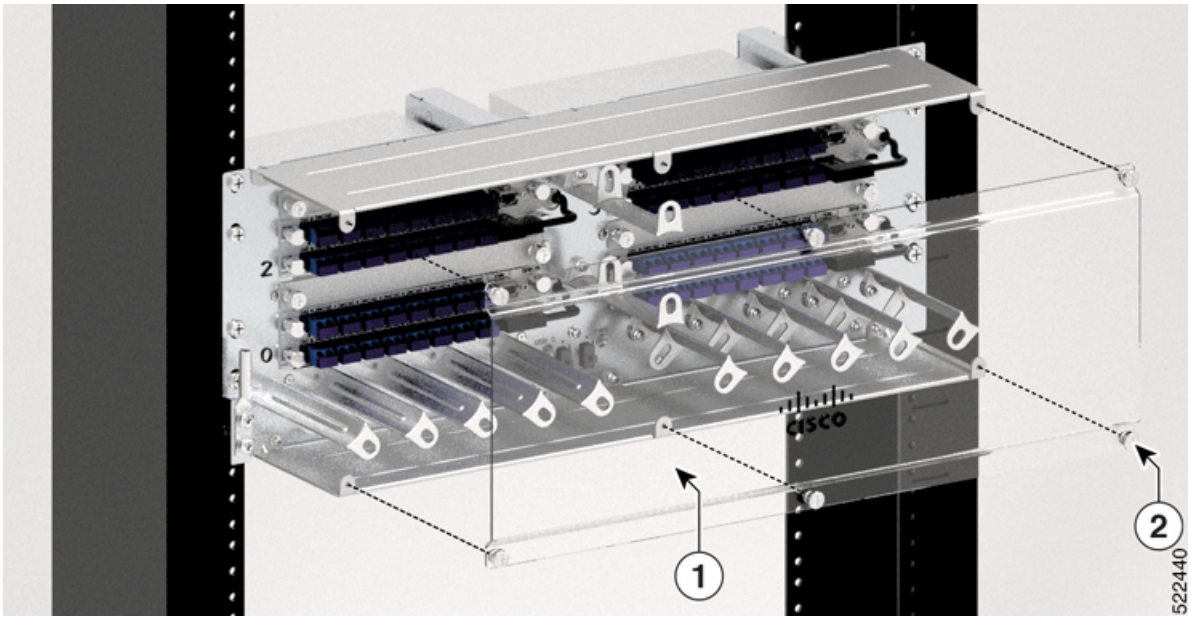
Install Breakout Panel Plastic Cover

This task describes the steps to install the transparent plastic cover on the breakout panel.

Procedure

Step 1 Install the plastic cover to the breakout panel using six captive screws.

Figure 117: Installing the Plastic Cover on Breakout Panel



1	Plastic Cover
2	Captive Screws

Step 2 Using a screwdriver, tighten the captive screws to a torque value of 0.65 N-m (5.6 lbs-in).

Fiber-Optic Connector Cleaning and Maintenance

Connector cleaning is required to maintain the performance of fiber-optic circuits. It is important that both the LC/UPC connector at the end of the fiber-optic cable and the mating bulkhead adapter on the front panel of the patch panel and the optical modules are clean before the connection is made.

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.

The following warning applies to disposal of chemicals and other materials used to clean connectors and adapters:

Warning **Statement 9001—**Product Disposal

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

Before installing the fiber-optic cable, always perform the cleaning procedure for cable connectors described in the following section. Whenever possible, inspect each connector before connecting it to the mating bulkhead adapter on the front panel.

The LC/MPO bulkhead adapters on the optical modules are less likely to get dirty if they are capped when not in use. Because the procedure for a thorough cleaning of these adapters is complicated, we recommend that you use a commercially available cleaning kit and closely follow the instructions included with the kit.

Customer Supplied Cleaning Materials

The Type A fiber optic connector cleaners, for example, CLETOP reel are recommended to clean the cable connectors, but are not supplied with the patch panel/optical modules.

When cleaning a paired cable connector (bulkhead mating adapter), always clean the mating adapter first.

If properly maintained (only used with clean, defect-free fiber connectors and capped when not in use), the mating adapter would not require cleaning. However, if you suspect the adapter is dirty, clean it by using the CLETOP stick swab.

Note For multi-fiber cable assemblies, use specific cleaning tools or materials designed for the assembly type.

Clean the Bulkhead Mating Adapters

This task describes the steps to clean the bulkhead mating adapters.

Procedure

Step 1 Read the manufacturer (cleaning cartridge) instructions to insert the cartridge cleaning tip into the mating adapter.

Step 2 Slide the lever on the cartridge to swipe the mating surface.

Note

Always keep unused adapter ports and fiber connectors capped with a clean dust cap.

Clean Fiber-Optic Cable Connectors

This task describes the steps to clean the fiber-optic cables connectors.

The tools required to clean fiber connectors are:

- Inspection microscope
- Type A fiber-optic connector cleaner (CLETOP reel)
- Optical swab
- Optical receiver cleaning stick

Procedure

Step 1 Using an inspection microscope, inspect each fiber connector for dirt, cracks, or scratches.

Step 2 Replace any damaged fiber connectors.

Note
Replace all dust caps whenever the equipment is unused for 30 minutes or more.

Note
Do not reuse optical swabs. Keep unused swabs away from work surfaces.

Step 3 Clean the fiber connectors with CLETOP reel:

a. Remove the dust cap from the fiber connector.

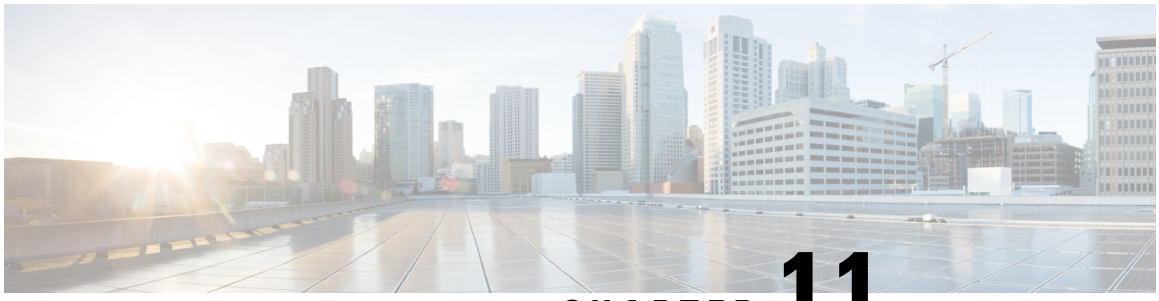
b. Press the lever down to open the shutter door. Each time you press the lever, you expose a clean wiping surface.

c. Insert the connector into the CLETOP cleaning cassette slot, rotate one-quarter turn, and gently swipe downwards.

d. Use an inspection microscope to inspect each fiber connector for dirt, cracks, or scratches. If the connector is not clean, repeat the above substeps.

e. Insert the fiber connector into the applicable adapter or attach a dust cap to the fiber connector.

Note
If you must replace a dust cap on a connector, first verify that the dust cap is clean. To clean the dust cap, wipe the outside of the cap using a dry lint-free wipe and the inside it using a CLETOP stick swab (14100400).



CHAPTER 11

Remove and Replace Cisco NCS 1000 Breakout Patch Panel and Modules

This chapter describes the tasks to replace Cisco NCS 1000 Breakout Patch Panel and Cisco NCS 1000 Breakout Modules.

Note In this chapter, "breakout panel" refers to the "Cisco NCS 1000 Breakout Patch Panel". "breakout modules" refer to the "Cisco NCS 1000 Breakout Modules".

Caution Always populate the modular slots in the Cisco NCS 1010 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 Celsius. Complete the OIR of modules within five minutes to prevent overheating of the components.

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.

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.

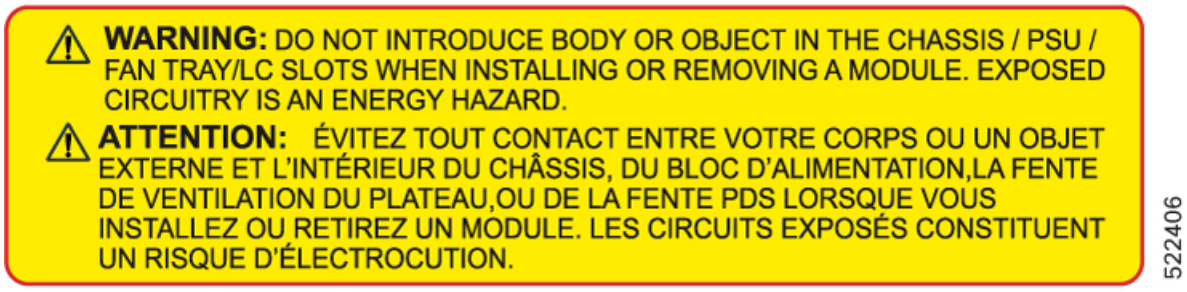
Warning **Statement 1090—**Installation by a Skilled Person

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

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.

Note The maximum operating altitude for OIR is 1800 m.



- Remove and Replace Breakout Panel Plastic Cover, on page 156
- Remove and Replace NCS 1000 Breakout Module, on page 157
- Remove and Replace Cisco NCS 1000 Breakout Patch Panel, on page 157

Remove and Replace Breakout Panel Plastic Cover

This task describes the steps for removing the plastic cover from the breakout panel.

Procedure

Step 1 Loosen the six captive screws in the plastic cover.

Step 2 Pull the plastic cover away from the breakout panel to remove the plastic cover.

What to do next

- Install Breakout Panel Plastic Cover, on page 152

Remove and Replace NCS 1000 Breakout Module

This task describes the steps for removing a breakout module in the rack.

Before you begin

Uninstall the Plastic Cover. See Remove and Replace Breakout Panel Plastic Cover, on page 156.

Procedure

Step 1 Remove the LC cables from the LC adapter ports in the breakout module.

Note
Keep the LC cables in a safe place to protect the cables from damage and dust.

Step 2 Remove the MPO cables from the MPO adapter port (COM).

Note
Keep the MPO cables in a safe place to protect the cables from damage and dust.

Step 3 Disconnect the inventory USB 2.0 cable in the USB receptacle (INV) for the breakout module to replace.

Step 4 Loosen the captive screws of the breakout module.

Step 5 Extract the breakout module from the breakout panel.

What to do next

- Install the NCS 1000 Breakout Modules, on page 137

Remove and Replace Cisco NCS 1000 Breakout Patch Panel

This task describes the steps for removing the breakout panel in the rack.

Before you begin

- Remove the USB 3.0 cable connector plug.
- Uninstall Breakout Modules. See Remove and Replace NCS 1000 Breakout Module, on page 157.

Procedure

Step 1 Loosen the screws of the breakout panel in the ETSI and 23-inch adapter brackets.

Note
For the 19-inch rack, you can loosen the breakout panel screws from the ANSI 19-inch rack.

Step 2 Support the top and bottom of the breakout panel with your hand to extract the breakout panel.

What to do next

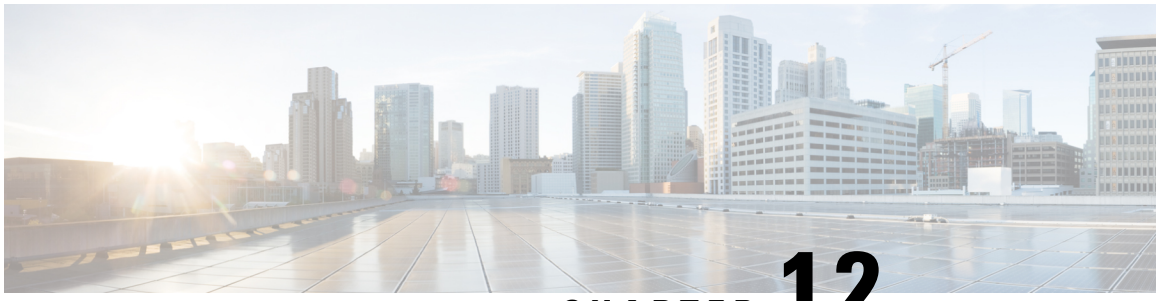
- Install the NCS 1000 Breakout Patch Panel, on page 135



PART III

Cisco NCS 1000 32-Channel Mux/Demux Patch Panel Hardware Installation

- Cisco NCS 1000 32-Channel Mux/Demux Patch Panel Overview, on page 161
- Safety Guidelines for Mux/Demux Patch Panel, on page 165
- Prepare to Install Cisco NCS 1000 32-Channel Mux/Demux Patch Panel, on page 169
- Install Cisco NCS 1000 32-Channel Mux/Demux Patch Panel, on page 171
- Remove and Replace NCS 1000 32-Channel Mux/Demux Patch Panel, on page 185



CHAPTER 12

Cisco NCS 1000 32-Channel Mux/Demux Patch Panel Overview

This chapter provides an overview for Cisco NCS 1000 32-Channel Mux/Demux Patch Panel.

Note In this chapter, "mux/demux panel" refers to the "Cisco NCS 1000 32-Channel Mux/Demux Patch Panel".

- Cisco NCS 1000 32-Channel Mux/Demux Patch Panels Overview, on page 161
- Port Label Descriptions, on page 162
- Channel Wavelength Allocation, on page 163

Cisco NCS 1000 32-Channel Mux/Demux Patch Panels Overview

The Cisco NCS 1000 32-Channel Mux/Demux patch panels are a pair of passive Athermal Arrayed Waveguide Grating (AAWG) based modules (PIDs NCS1K-MD-32O-C and NCS1K-MD-32E-C). Each mux/demux panel has 32 channels and works as an add/drop unit for the OLT-C and OLT-R-C line cards. Each mux/demux panel allows the multiplexing and demultiplexing of 32 channels with 150-GHz spacing. 75-GHz frequency shift exists between the ODD and EVEN panels. When both panels are used on the same OLT (OLT-C and OLT-R-C) line cards, the combined capacity becomes 64 channels with 75-GHz spacing. Each mux/demux panel provides a wide optical pass-band support. When used as a standalone, each panel acts as an add/drop unit for 32 channels at 140 GBd.

The NCS1K-MD-32O/E-C panel operates in C-band.

The Cisco NCS 1000 Mux/Demux patch panels are fully passive. The units are powered with a USB 2.0 connection in the NCS 1010 chassis. The panels are capable of monitoring channel power, verifying connection, detecting tone, and reporting the inventory data.

Mux/Demux Patch Panel LEDs

Table 19: Feature History

Feature Name	Release Information	Feature Description
Port Status for Mux/Demux Patch Panel	Cisco IOS XR Release 7.9.1	In the mux/demux panel, the optical ports (COM, CH-0…CH-31) LEDs will now indicate port status in the following three colors: • Red—Presence of traffic-impacting major and critical alarms. • Amber—Presence of minor alarm when performing tone generation or tone detection for connection verification. Tone detection verifies the connection between OLT line cards and the mux/demux panels using a specific probe signal. • Green—Patch panel is operating fine and no alarm is raised.

The Mux/Demux Patch Panel unit has 34 LEDs to indicate the system status and the status of the optical ports.

Three color LEDs (green, amber, and red) are present near each optical port (COM and CH-i) to indicate the port status.

Table 20: Status of the Optical Port LEDs

Port LED	Color	Status
COM, CH-0…CH-31	Red	Indicates major and critical alarms such as RX-LOS-P, which could be traffic-impacting. These alarms are raised when there is a loss of signal (LOS) or when the OTS power reading is below the Fail-Low threshold.
	Amber	Indicates minor alarms that are raised when initiating tone generation and tone detection for connection verification.
	Green	Indicates that the patch panel is operational and has no alarm.
INV	Green	Indicates the active status and attention state of the inventory USB that is connected to the OLT line card.

Port Label Descriptions

Each mux/demux patch panel is equipped with 34-port LC-duplex connectors.

Table 21: Mux/Demux Patch Panels Port Labels

Port Labels	Connector Type	Connector Label	Operating Frequency Range [THz (nm)]	Note
COM-RX COM-TX	LC	**COM** **TX RX**	196.175–191.15 (1528.2–1568.4)	—
MON-RX MON-TX	LC	**MON** **TX RX**	196.175–191.15 (1528.2–1568.4)	Both are output ports. Replica of COM-RX/TX signals ~20dB attenuated.
CH-i TX/RX [i=0–31]	LC	*<ch_number>* *<frequency>* **TX RX**	For more information on ODD and EVEN channels, see Channel Wavelength Allocation, on page 163	—
INV	USB Type A receptacle connector	**INV**	—	USB inventory port

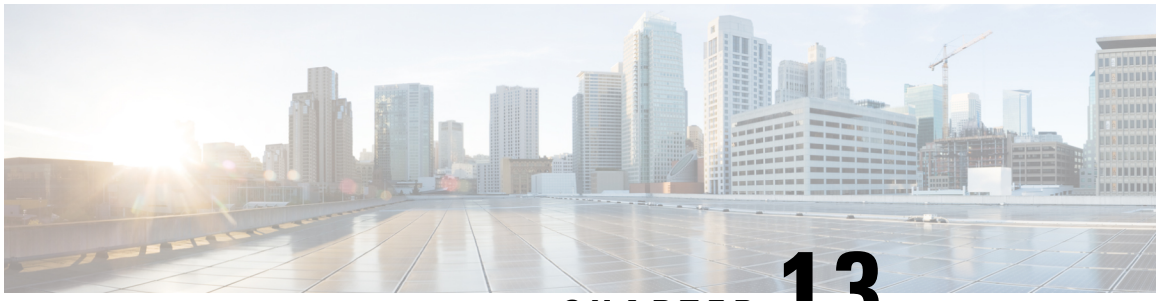
Channel Wavelength Allocation

The following table describes the C-band channel wavelength plan for the odd and even patch panels.

Table 22: C-Band Channel Wavelength Plan

Channel Label	NCS1K-MD-32O-C		NCS1K-MD-32E-C	
	Frequency (THz)	Wavelength (nm)	Frequency (THz)	Wavelength (nm)
0	196.100	1528.77	196.025	1529.36
1	195.950	1529.94	195.875	1530.53
2	195.800	1531.12	195.725	1531.70
3	195.650	1532.29	195.575	1532.88
4	195.500	1533.47	195.425	1534.05
5	195.350	1534.64	195.275	1535.23
6	195.200	1535.82	195.125	1536.41
7	195.050	1537.00	194.975	1537.59

Channel Label	NCS1K-MD-32O-C		NCS1K-MD-32E-C	
	Frequency (THz)	Wavelength (nm)	Frequency (THz)	Wavelength (nm)
8	194.900	1538.19	194.825	1538.78
9	194.750	1539.37	194.675	1539.96
10	194.600	1540.56	194.525	1541.15
11	194.450	1541.75	194.375	1542.34
12	194.300	1542.94	194.225	1543.53
13	194.150	1544.13	194.075	1544.72
14	194.000	1545.32	193.925	1545.92
15	193.850	1546.52	193.775	1547.12
16	193.700	1547.72	193.625	1548.31
17	193.550	1548.91	193.475	1549.52
18	193.400	1550.12	193.325	1550.72
19	193.250	1551.32	193.175	1551.92
20	193.100	1552.52	193.025	1553.13
21	192.950	1553.73	192.875	1554.34
22	192.800	1554.94	192.725	1555.55
23	192.650	1556.15	192.575	1556.76
24	192.500	1557.36	192.425	1557.97
25	192.350	1558.58	192.275	1559.19
26	192.200	1559.79	192.125	1560.40
27	192.050	1561.01	191.975	1561.62
28	191.900	1562.23	191.825	1562.84
29	191.750	1563.45	191.675	1564.07
30	191.600	1564.68	191.525	1565.29
31	191.450	1565.90	191.375	1566.52



CHAPTER 13

Safety Guidelines for Mux/Demux Patch Panel

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 - Cisco Network Convergence System 1010*.

- Standard Warning Statements, on page 165
- Safety Information, on page 167
- Laser Radiation Emission Restrictions, on page 168
- Laser Safety During Operation, on page 168
- Electrical Safety, on page 168

Standard Warning Statements



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 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.

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 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.



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 9001—**Product Disposal

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



Note For more information on all the applicable statements and their translations, see *Regulatory Compliance and Safety Information - Cisco Network Convergence System 1010*.

Safety Information

Before you install, operate, or service, you must read the *Regulatory Compliance and Safety Information - Cisco Network Convergence System 1010* document for important safety information and warning translations.

The units are compliant with the GR 1089, UL60950 /CSA 22.2 No. 60950-00, and IEC 60950 standards.

Laser Radiation Emission Restrictions

The Class 1M Laser safety and warning label affixed to the passive optical modules indicate that the product should never be used or installed in an optical network with emissions higher than Class 1M.

Laser Safety During Operation

Cisco NCS 1010 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 118: Class 1M Laser Product Label



Figure 119: Class 1M Laser Product Label

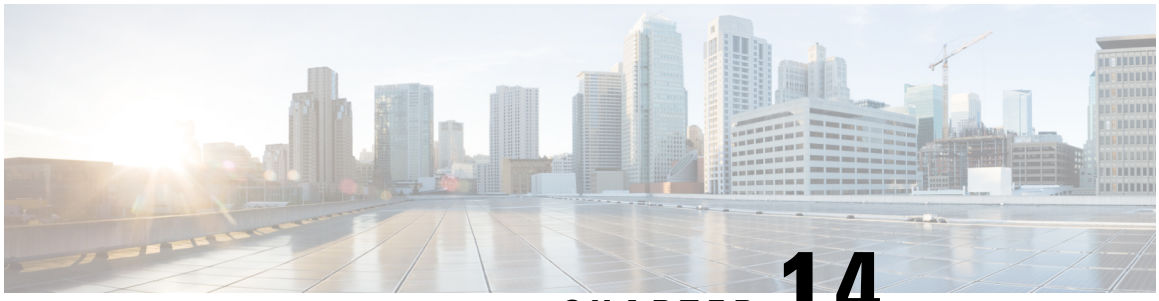


Warning **Statement 1051—**Laser Radiation

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

Electrical Safety

The passive optical modules are optically and electrically passive and require no electrical connections. No electrostatic discharge (ESD) or other electrical safety considerations apply.



CHAPTER 14

Prepare to Install Cisco NCS 1000 32-Channel Mux/Demux Patch Panel

This chapter explains how to prepare for the installation of the Cisco NCS 1000 32-Channel Mux/Demux Patch Panel.

Note The tasks in this chapter also apply to the **N1K-MD-32E-C=** patch panel in the Cisco NCS 1000 Series Mux/Demux Patch Panels, unless otherwise specified.

Note In this chapter, "patch panel" refers to the "Cisco NCS 1000 32-Channel Mux/Demux Patch Panel".

- Package Contents, on page 169
- Unpack and Verify NCS 1000 32-Channel Mux/Demux Patch Panel, on page 170

Package Contents

You can order Cisco NCS 1000 32-Channel Mux/Demux Patch Panels along with the components.

The package contains the following:

- Cisco NCS 1000 32-Channel Mux/Demux Patch Panel. The patch panel comes preinstalled with the ground lug and toothed lock washer.
- Accessory kit—Includes all the hardware necessary for the patch panel installation on the 19", 23" and ETSI rack. The following list provides the contents of the accessory kits.
  - Double hole ground lug (1)
  - Tie wrap with UL94V-0 flammability rate (3)
  - 16 x 160mm (W x L) Velcro strips (4)
  - Optical fiber network saddle (5)
  - M6 x 12mm long Philips pan head screws (ETSI Rack compatible) (4)

- ETSI brackets (2)
- 23-inch mounting brackets (2)

Unpack and Verify NCS 1000 32-Channel Mux/Demux Patch Panel

This procedure describes the steps for unpacking and verifying both the components.

Procedure

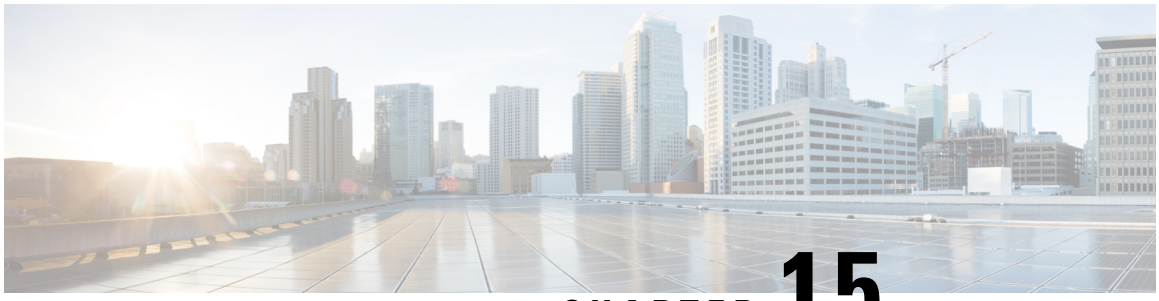
Step 1 When you receive Cisco NCS 1000 32-Channel Mux/Demux Patch Panel at the installation site, open the top of the box. The Cisco Systems logo is on the side of the box.

Step 2 Unpack and inspect the module. The package includes these components:

For more information on the package contents, see Package Contents, on page 169.

Step 3 To remove the patch panel, grasp the side of the patch panel and lift the panel out of the box.

Step 4 If there is any damage, call your Cisco sales engineer for a replacement.



CHAPTER 15

Install Cisco NCS 1000 32-Channel Mux/Demux Patch Panel

This chapter contains tasks to install Cisco NCS 1000 32-Channel Mux/Demux Patch Panel.

Note The tasks in this chapter also apply to the **N1K-MD-32E-C=** patch panel in the Cisco NCS 1000 Series Mux/Demux Patch Panels, unless otherwise specified.

Note In this chapter, "patch panel" refers to the "Cisco NCS 1000 32-Channel Mux/Demux Patch Panel".

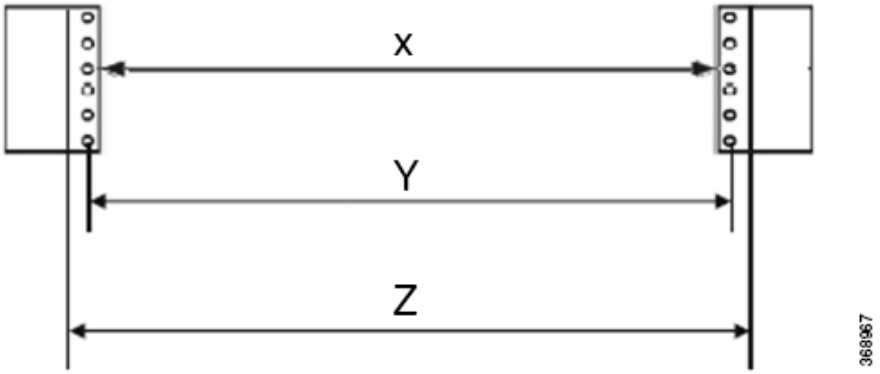
- Rack Compatibility, on page 171
- Ground Description, on page 172
- Rack Mount Warnings, on page 174
- Attach the Mounting Brackets, on page 175
- Install NCS 1000 32-Channel Mux/Demux Patch Panels, on page 177
- Install and Route Fiber-Optic and USB Cables, on page 180
- Cleaning and Maintaining Fiber-Optic Connectors, on page 182

Rack Compatibility

The mux/demux panels can be installed in a standard ANSI/EIA (19"), ANSI (23"), or ETSI (21") 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 120: Rack Specification



Rack Type	Rack Front Opening X	Rack Mounting Hole Center-Center Y	Mounting Flange Dimension Z
ANSI 19" racks	450.8mm (17.75")	465mm (18.312")	482.6mm (19")
ANSI 23" racks	552.45mm (21.75")	566.7mm (22.312")	584.2mm (23")
ETSI 21" racks	500.0mm(19.68")	515.0mm(20.276")	533.4mm(21")

Ground Description

The NCS 1000 32-channel mux/demux patch panels have two grounding options on the left and right rear side. You can choose from the two grounding options to ground the patch panels. The rear side of the patch panels, adapter brackets, the straight adapter brackets, and the Z-shaped adapter brackets are unpainted and treated with conductive finishing.

Note Use the grounding lug and wire size according to your local regulations.

Ground Connection Warnings

Take note of the following ground connection warnings:

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.

Ground NCS 1000 32-Channel Mux/Demux Patch Panels

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

This task describes the steps to ground the patch panel.

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 patch panel ground and bay frame ground point. Clean the mating surfaces and apply appropriate antioxidant compound to the bare conductors.

Step 3 Identify the ground stamp on the patch panel to attach the ground lug.

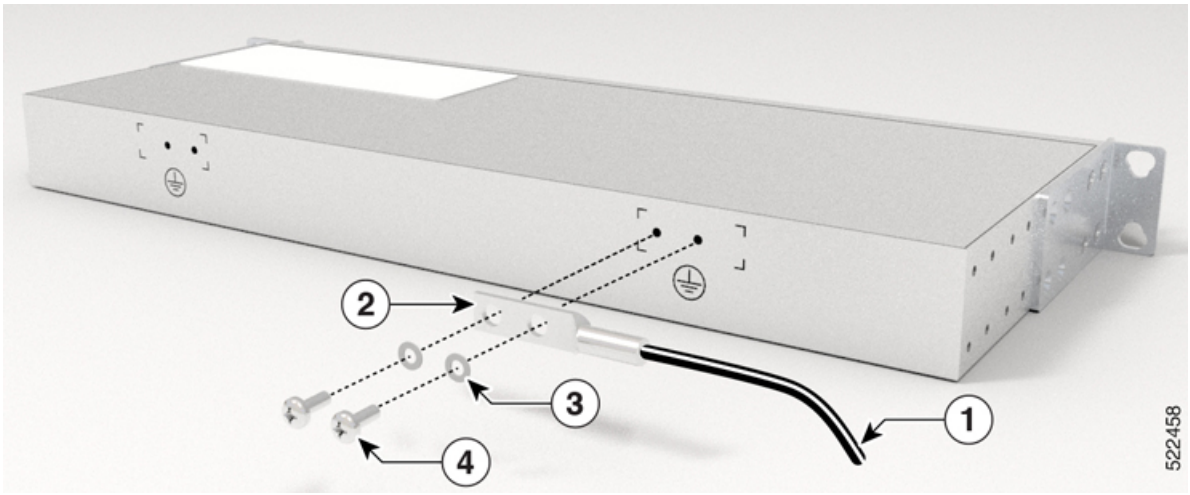
Step 4 Crimp the ground cable to the dual-hole ground lug.

Note
Use a ground lug and cable size according to your local regulations.

Step 5 Align the dual-hole ground lug to the patch panel and attach the lug to the patch panel using a M4x10mm long pan head screw.

Note
Use only M4x10mm pan head screws to avoid any damage to the patch panel.

Figure 121: Grounding the Patch Panel



1	Ground Lug Cable
2	Ground Lug
3	Lock Washers
4	6-32 UNC-2A or M4 Pan Head Phillips Screws

Step 6 Tighten the M4 pan head screw to torque value of 1.3 N-m (11.5 lbs-in).

Step 7 Terminate the other end of the ground cable either at the office ground point or the rack ground point.

What to do next

- Install NCS 1000 32-Channel Mux/Demux Patch Panels, on page 177

Rack Mount Warnings

Take note of the following rack-mount safety warnings.

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

Two 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.

Attach the Mounting Brackets

This task explains how to attach the mounting brackets to the ANSI or ETSI standard equipment rack.

Note The patch panels come preinstalled with the 19-inch mounting brackets.

Before you begin

Ensure you completed the following tasks:

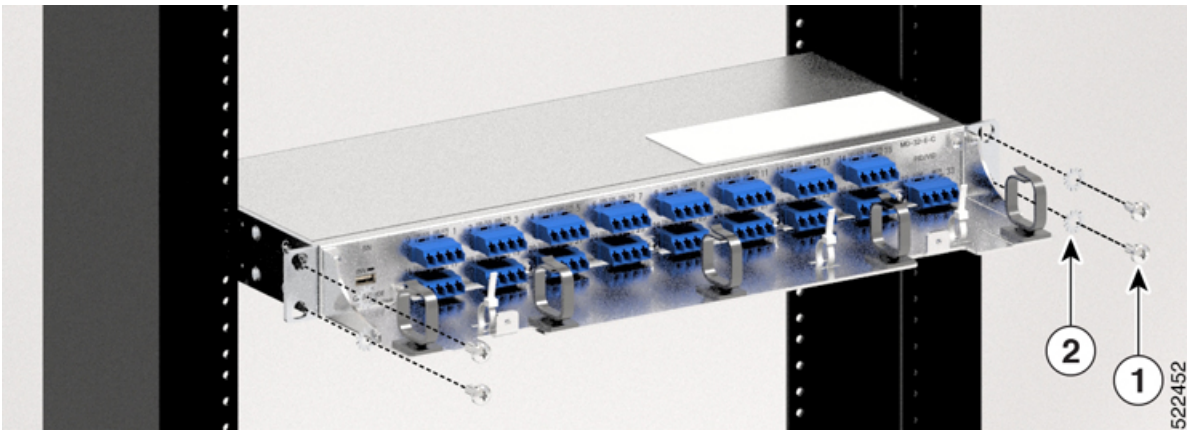
- Unpack and Verify NCS 1000 32-Channel Mux/Demux Patch Panel, on page 170
- Check for rack compatibility. See Rack Compatibility.

Procedure

Step 1 To attach the mounting bracket for each standard equipment rack, perform one of the following actions:

- For a 19 inch (482.6 mm) ANSI or IEC configuration, align the screw holes of the patch panel against the rack.

Figure 122: Installing the Adapter Bracket on a 19-inch Rack

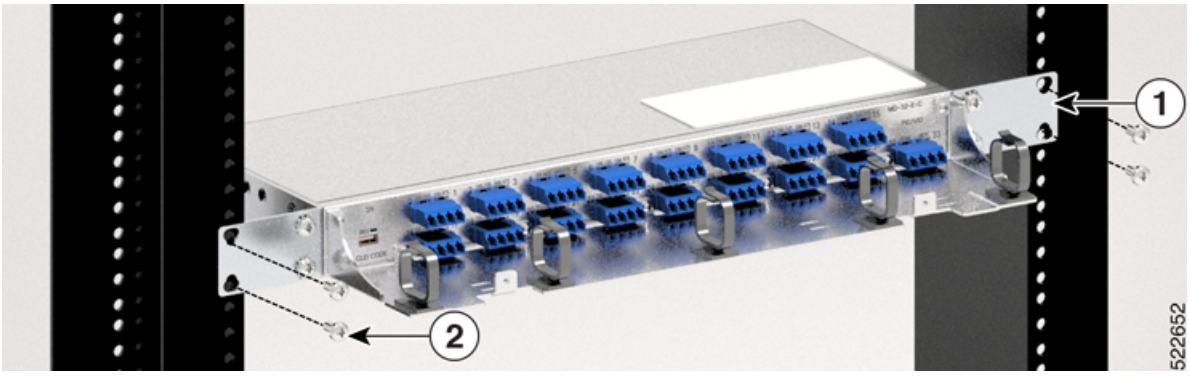


Note
The cable ties shown in the image are optional. Use the cable ties to route the USB 3.0 cable to right side of the patch panel to the NCS 1010 EITU.

1	12-24x 0.5-Inch Phillips Pan Head Screws	2	#12 Lock Washers

- For a 23 inch (584.2 mm) ANSI configuration, remove the preinstalled brackets and place the 23-inch mounting bracket against one side of the patch panel.

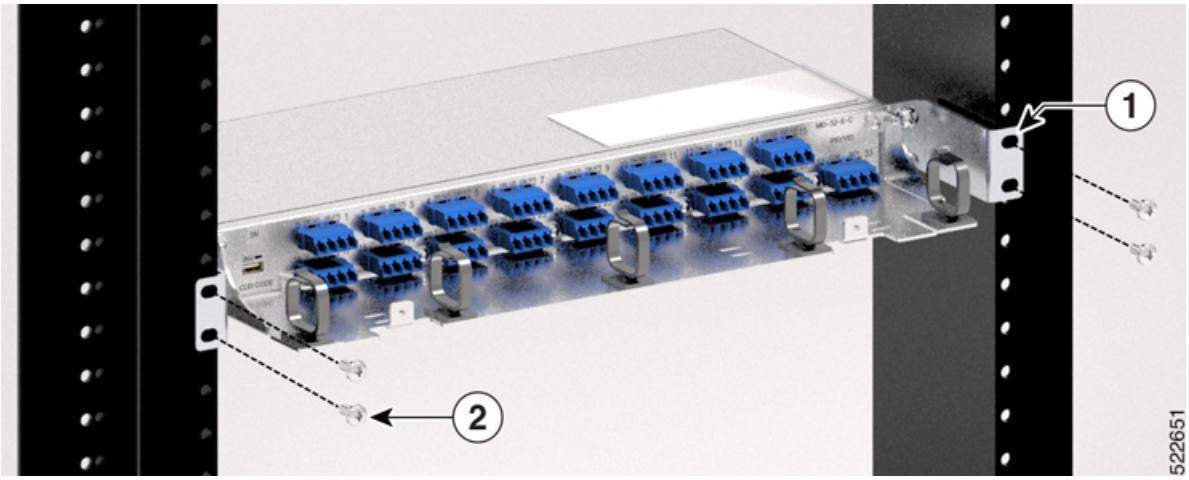
Figure 123: Installing the Mounting Bracket on a 23-inch Rack



1	23-Inch Mounting Bracket	2	12-24x 0.5-Inch Phillips Pan Head Screws

- For an ETSI configuration, remove the preinstalled brackets and place the Z-shaped bracket against one side of the patch panel.

Figure 124: Installing the Mounting Bracket on an ETSI Rack



1	ETSI Bracket	2	M6 x 12mm Phillips Pan Head Screws

Step 2 Align the mounting bracket screw holes against the patch panel screw holes.

Step 3 Insert the screws and tighten them.

Step 4 Repeat steps 2 through 3 to attach the mounting bracket on the opposite side.

What to do next

- Install NCS 1000 32-Channel Mux/Demux Patch Panels, on page 177

Install NCS 1000 32-Channel Mux/Demux Patch Panels

The patch panel is a new NCS 1000 32-Channel Mux/Demux that can be installed either above or below the DWDM generating equipment according to the local site practice.

The patch panel is 1 rack unit (RU) high. Each package includes one set of the following brackets:

- 19 inch (482.6 mm) or 23 inch (584.2 mm) reversible (two-way) mounting brackets that can be rotated to fit either rack size. These reversible brackets are used for EIA and IEC standard racks.
- ETSI brackets that are used for ETSI standard racks.

Note The unit is shipped with the mounting brackets in the 19 inch (482.6 mm) position.

The patch panel is passive and requires no power cabling or connections. All connectors are on the front panel and are equipped with LC/MPO bulkhead adapters and with a USB Type A receptacle connector for Inventory purpose. Fiber-optic cables equipped with the corresponding (LC/MPO) connector type are used. The module ports are labeled on the front panel. For more information on the port assignments of the module, see Cisco NCS 1010 Datasheet.

Caution Use only the fastening hardware provided with the patch panel to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.

Caution When mounting the patch panel in a frame with a nonconductive coating (such as paint, lacquer, or enamel) use either the thread-forming screws that are provided with the shipping kit or remove the coating from the threads to ensure electrical continuity.

This task describes the steps to install the patch panels.

Before you begin

Ensure the rack is compatible. See the Rack Compatibility, on page 171 section.

Procedure

Step 1 Set the mounting brackets to the rack you are using. See Attach the Mounting Brackets, on page 175.

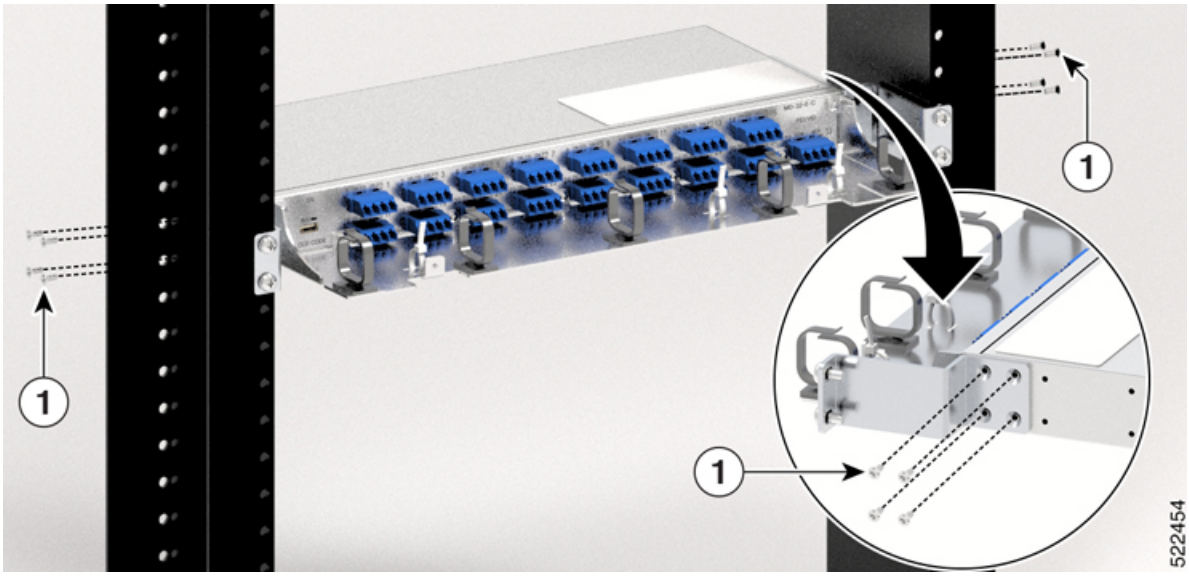
Note
The patch panels can be mounted on 19 inch (482.6 mm), 23 inch (584.2 mm) EIA standard racks, on a 19 inch (482.6 mm) IEC rack, or on a 600 x 600 mm or 600 x 300 mm ETSI racks.

A single patch panel is 17.21 inches (437.1 mm) wide and occupies 1 RU in a rack.

The patch panel mounting brackets can be mounted such that the patch panels project either 2.25, 5, 6, or 6.5 inches from the front of the EIA standard racks fixing plane, or 40 mm from the front of the IEC or ETSI standard racks fixing plane.

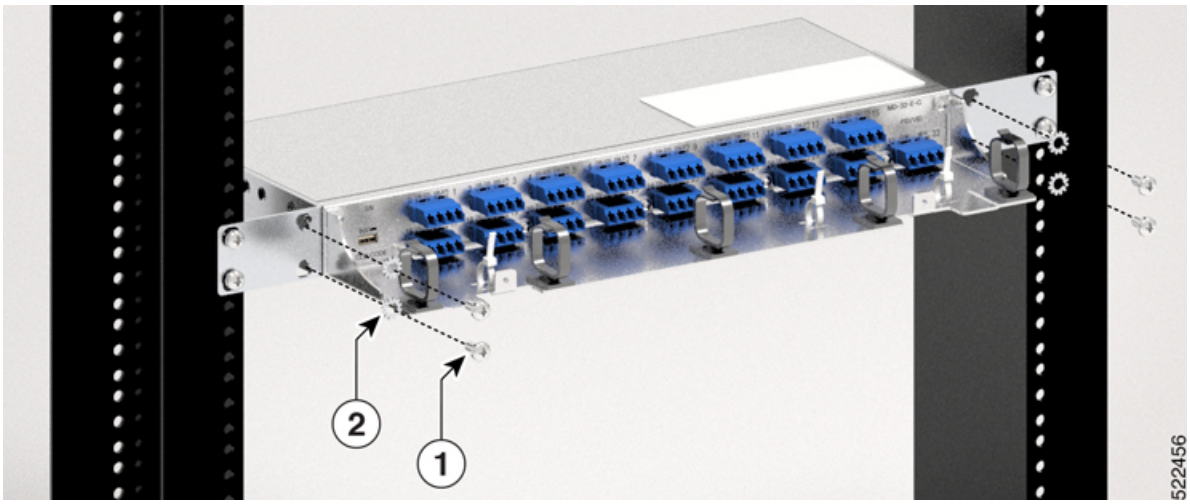
Step 2 Secure the unit to the rack using the mounting screws.

Figure 125: Mounting the Patch Panel on the ETSI Rack



1	M4 Phillips Flat Screw

Figure 126: Mounting the Patch Panel on the 23-Inch Rack



1	12-24x0.5" Phillips Pan Head Screw	2	#12 Lock Washer

Step 3 Using a screwdriver, tighten the screws to a torque of 4.65 N-m (41 lbs-in).

Step 4 Establish grounding for the patch panel. The ground position is present on the rear side of the patch panel. For more information, see Ground NCS 1000 32-Channel Mux/Demux Patch Panels, on page 173.

Note
When the patch panel is installed in the ETSI 600x300 cabinet, only the lateral ground position must be used.

Install and Route Fiber-Optic and USB Cables

All connectors are on the front of the patch panel and are equipped with LC bulkhead adapters and with a USB Type A receptacle connector for inventory purpose. For port label description, see Port Label Descriptions, on page 162. The LC-LC patch cords are used to connect the patch panel to the NCS 1010 chassis.

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.

Note Always clean all fiber connectors thoroughly before making the connection with the mating adapter. Very small particles can permanently damage the end of the mating fiber inside the patch panel, which makes regular cleaning imperative. For cleaning instructions see Clean Fiber-Optic Cable Connectors, on page 182.

Caution The patch panel has LC bulkhead adapters for optical connections. Always use fiber-optic cables equipped with the corresponding LC connector type. Using any other type of connector results in damage to the connector or adapter, or both.

This task describes the steps to install and route the fiber-optic and USB cables from the patch panel.

Procedure

Step 1 To connect the fibers as appropriate, perform the following:

a) Remove the LC adapter cap from the LC-LC adapter of the patch panel.
b) Place the LC/UPC cable connector in front of the corresponding bulkhead adapter on the front panel of the patch panel.
c) Align the keyed ridge of the cable connector with the slot in the receiving adapter.
d) Gently push the cable connector into the adapter until you hear a click, which indicates that the latching system is engaged.
e) Route the cables through the left or right fiber holder clip.
f) (Optional) Secure the fibers further by placing them into one or more adhesive clips. The adhesive clips can be placed on the fiber management plate as per the actual installation conditions.
g) Place the extra fiber length of the two LC-LC patch cords used to connect the patch panel with its plugged patch panel.

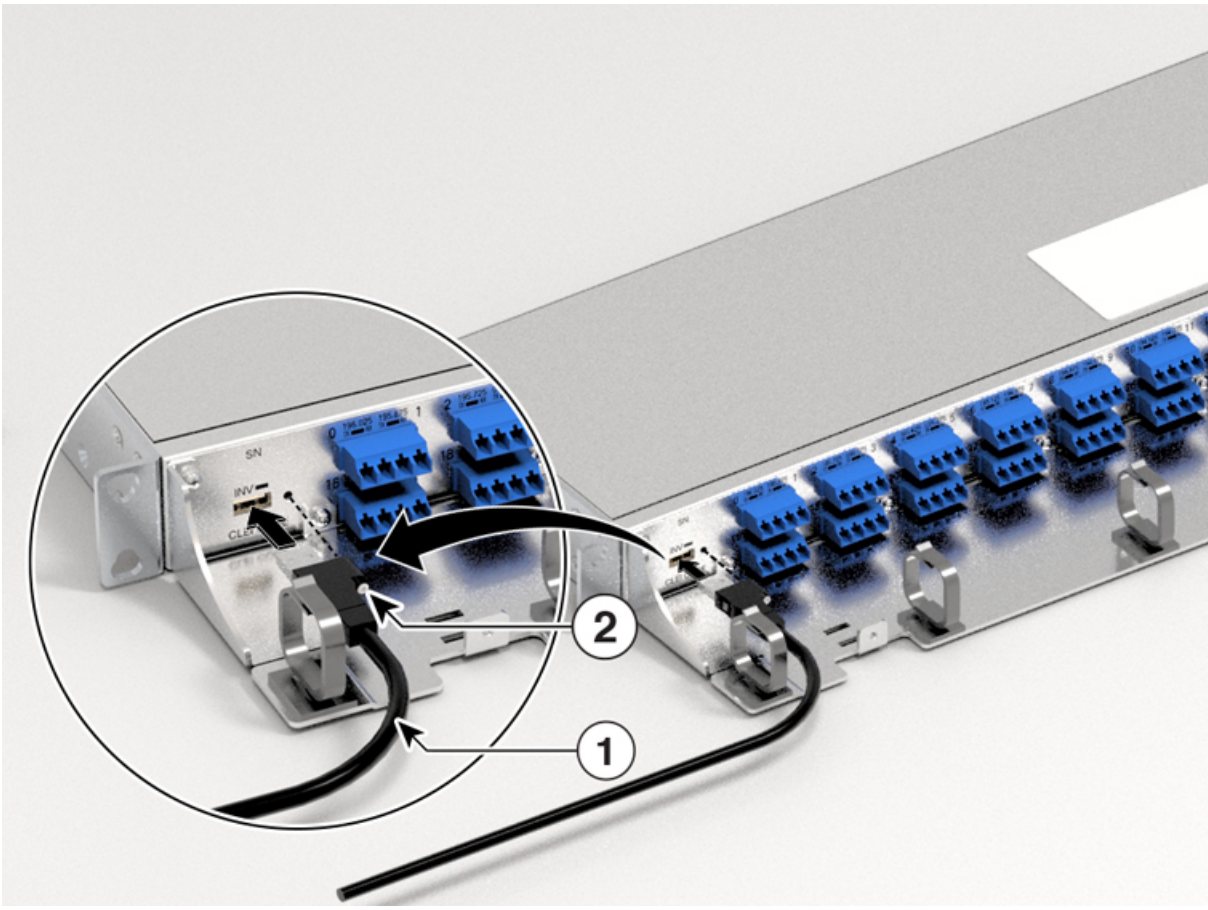
Step 2 To secure the fibers, bundle the fibers using one of the four Velcro strips that is provided.

Step 3 **Note**
This step is not applicable for the **N1K-MD-32E-C=** patch panel, you can skip this step.

To connect and secure the inventory USB Type A plug connector to the inventory USB Type A receptacle connector, perform the following:

a) Route the inventory USB cable through the left fiber holder clip from NCS 1010 EITU.
b) Connect the USB Type A plug connector to the USB Type A receptacle connector.
c) Tighten the captive screw on top of the USB connector to secure the USB plug.

Figure 127: Connecting USB Cable



1	USB 3.0 Cable
2	USB 3.0 Cable Screw

d) (Optional) Secure the USB cable with a tie-wrap at one of the three available locations on the patch panel.

Note
Perform Step d if you are routing the USB cable to the right side of the patch panel to the NCS 1010 EITU.

Cleaning and Maintaining Fiber-Optic Connectors

Connector cleaning is required to maintain the performance of fiber-optic circuits. It is important that both the LC/UPC connector at the end of the fiber-optic cable and the optical mating adapter on the front panel of the device are clean before the connection is made.

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.

The following warning applies to disposal of chemicals and other materials used to clean connectors and adapters:

Warning **Statement 9001—**Product Disposal

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

Note Before installing the fiber-optic cable, always perform the cleaning procedure for cable connectors described in the following section. Whenever possible, inspect each connector before connecting it to the optical mating adapter on the front panel.

Note The LC optical mating adapter on the faceplate of the device is less likely to get dirty if it is capped when not in use. On some devices, the optical mating adapter has a shutter. The shutter automatically closes when the LC/UPC connector is disconnected. This prevents entry of dirt.

The procedure for a thorough cleaning of these adapters is complicated. Use a commercially available cleaning kit and closely follow the instructions included with the kit.

Clean Fiber-Optic Cable Connectors

This task describes the steps to clean the fiber-optic cable connectors.

The tools required to clean fiber connectors are:

- Inspection microscope
- Type A fiber-optic connector cleaner (CLETOP reel)
- Optical swab
- Optical receiver cleaning stick

Procedure

Step 1 Using an inspection microscope, inspect each fiber connector for dirt, cracks, or scratches.

Step 2 Replace any damaged fiber connectors.

Note
Replace all dust caps whenever the equipment is unused for 30 minutes or more.

Note
Do not reuse optical swabs. Keep unused swabs away from work surfaces.

Step 3 Clean the fiber connectors with CLETOP reel:

a. Remove the dust cap from the fiber connector.

b. Press the lever down to open the shutter door. Each time you press the lever, you expose a clean wiping surface.

c. Insert the connector into the CLETOP cleaning cassette slot, rotate one-quarter turn, and gently swipe downwards.

d. Use an inspection microscope to inspect each fiber connector for dirt, cracks, or scratches. If the connector is not clean, repeat the above substeps.

e. Insert the fiber connector into the applicable adapter or attach a dust cap to the fiber connector.

Note
If you must replace a dust cap on a connector, first verify that the dust cap is clean. To clean the dust cap, wipe the outside of the cap using a dry lint-free wipe and the inside it using a CLETOP stick swab (14100400).

Customer-supplied Cleaning Materials

The Type A fiber optic connector cleaners (for example, CLETOP reel) are recommended to clean the cable connectors, but are not supplied with the device.

If properly maintained (only used with clean, defect-free fiber connectors and capped when not in use), the mating adapter would not require cleaning. However, if you suspect the adapter is dirty, clean it by using the CLETOP stick swab.

Note For multifiber cable assemblies, use specific cleaning tools or materials designed for the assembly type.

Cleaning the Optical Mating Adapter

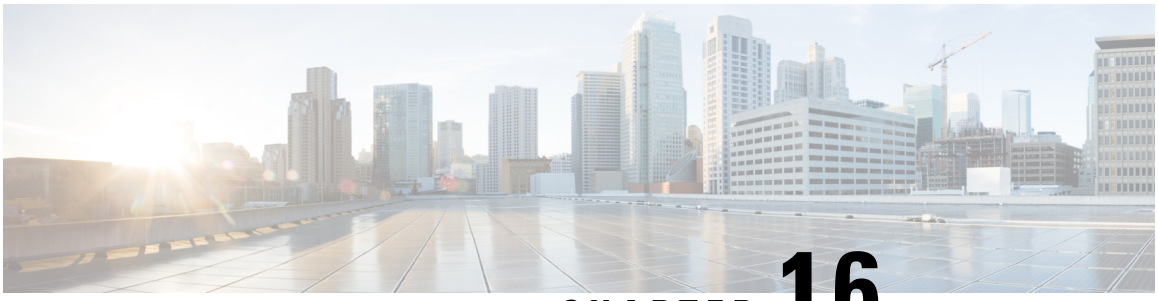
This task describes the steps to clean the optical mating adapters.

Procedure

Step 1 Read the cartridge cleaning instructions (provided by the manufacturer) to insert the cartridge cleaning tip into the optical mating adapter.

Step 2 Slide the lever on the cartridge to swipe the mating surface.

Note
Always keep unused adapter ports and fiber connectors capped with a clean dust cap. The optical mating adapters that have shutter need not be capped.



CHAPTER 16

Remove and Replace NCS 1000 32-Channel Mux/Demux Patch Panel

This chapter describes the tasks to remove and replace the Cisco NCS 1000 32-Channel Mux/Demux Patch Panel.

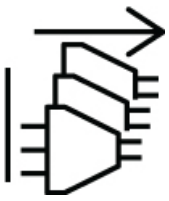
Note This chapter also applies to the **N1K-MD-32E-C=** patch panel in the Cisco NCS 1000 Series Mux/Demux Patch Panels, unless otherwise specified.

Note In this chapter, "patch panel" refers to the "Cisco NCS 1000 32-Channel Mux/Demux Patch Panel".

Caution Always populate the modular slots in the Cisco NCS 1010 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 Celsius. Complete the OIR of modules within five minutes to prevent overheating of the components.

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.

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.

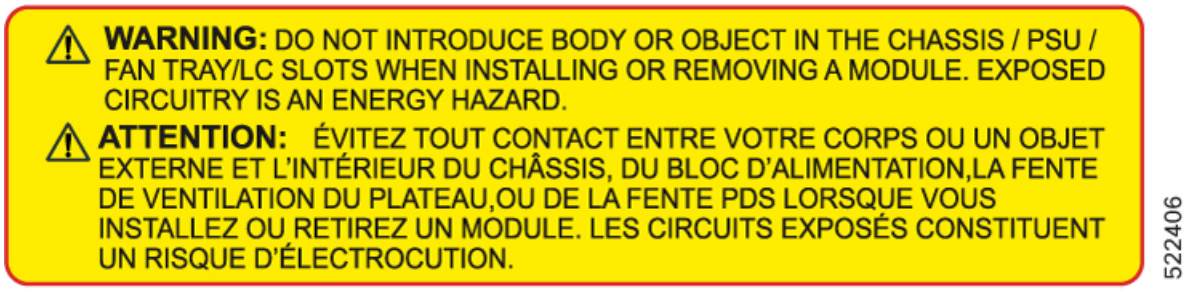
Warning **Statement 1090**—Installation by a Skilled Person

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

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.

Note The maximum operating altitude for OIR is 1800 m.



- Remove and Replace NCS 1000 32-Channel Mux/Demux Patch Panel, on page 187

Remove and Replace NCS 1000 32-Channel Mux/Demux Patch Panel

This task describes the steps for removing the patch panel from the rack.

Procedure

Step 1 Gently disconnect the fiber-optic connectors in the LC-LC adapters.

Step 2 **Note** This step is not applicable for the **N1K-MD-32E-C=** patch panel, you can skip this step.

Disconnect the inventory USB cable releasing it in the USB cable and in the USB receptacle.

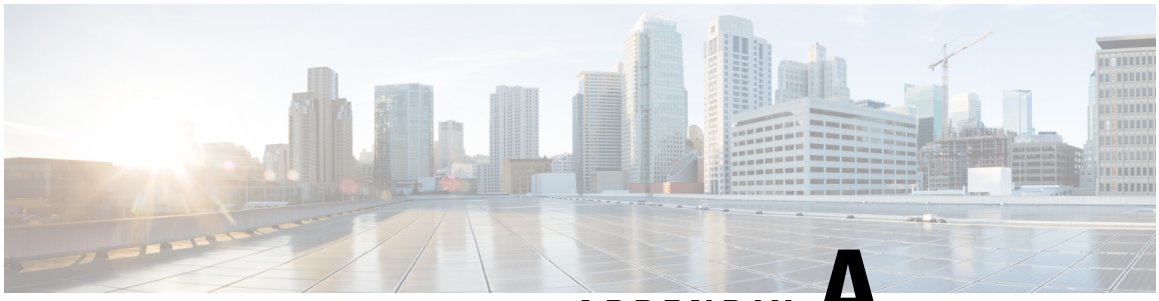
Step 3 Clear the front of the patch panel from any cable or fiber.

Step 4 Disconnect the ground lug.

Step 5 Loosen the mounting screws and remove the patch panel from the rack.

What to do next

- Install NCS 1000 32-Channel Mux/Demux Patch Panels, on page 177



APPENDIX A

PIDs

This chapter describes the list of PIDs for Cisco NCS 1010 and its modules.

- PIDs, on page 189

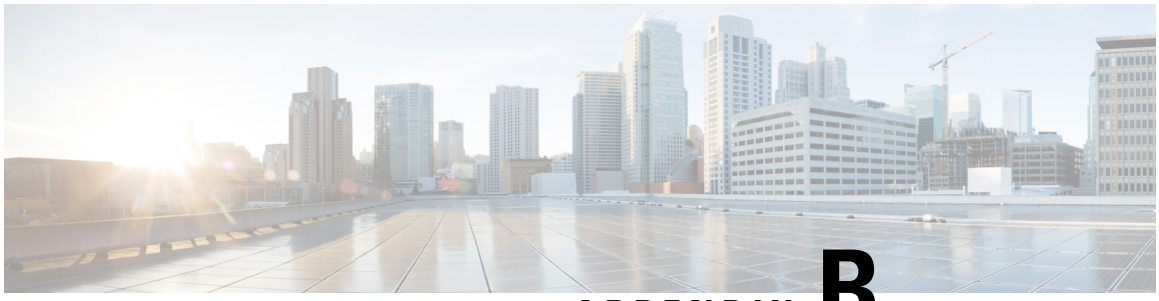
PIDs

The following table lists the PIDs of Cisco NCS 1010 and its modules:

Table 23: PIDs for Cisco NCS 1010 and Its Modules

Product ID	Product Description
NCS1010-CNTLR-K9=	NCS 1010 Controller, 112500bps default console baud rate
NCS1010-CTLR-B-K9=	NCS 1010 Controller, 9600bps console baud-rate
NCS1010-SA	NCS 1010 Shelf Assembly
NCS1010-SYS	NCS 1010 Assemble to Order
NCS1010-FAN	NCS 1010 Shelf Fan Assembly
NCS1010-DC-PSU	NCS 1010 DC Power Supply Unit
NCS1010-AC-PSU	NCS 1010 AC Power Supply Unit
NCS1010-FTF	NCS 1010 Fan Tray Filter
NCS1010-ACC-KIT	NCS 1010 Accessory Kit for 19-inch racks
NCS1010-23-KIT	NCS 1010 Accessory Kit add-on for 23inch racks
NCS1010-ETSI-KIT	NCS 1010 Accessory Kit add-on for ETSI racks
NCS1K-OLT-C	C-band Optical Line Terminal without Raman
NCS1K-OLT-R-C	C-band Optical Line Terminal with Raman
NCS1K-ILA-C	C-band In-Line Amplifier without Raman

Product ID	Product Description
NCS1K-ILA-R-C	C-band In-Line Amplifier with one side Raman
NCS1K-ILA-2R-C	C-band In-Line Amplifier with both sides Raman
NCS1K-OLT-L=	L-band Optical Line Terminal without Raman
NCS1K-ILA-L=	L-band In-Line Amplifier without Raman
NCS1K-E-OLT-C=	C-band Optical Line Terminal without Raman, enhanced
NCS1K-E-OLT-R-C=	C-band Optical Line Terminal with Raman, enhanced
NCS1K-E-ILA-R-C=	C-band In-Line Amplifier with one side Raman, enhanced
NCS1K-E-ILA-2R-C=	C-band In-Line Amplifier with both sides Raman, enhanced
NCS1K-E-ILA-R-C-2=	C-band In-Line Amplifier with west-facing Raman, enhanced
NCS1K-BRK-SA	NCS 1000 breakout patch panel
NCS1K-BRK-8	8 ports colorless channels breakout module
NCS1K-BRK-16	16 ports colorless channels breakout module
NCS1K-BRK-24	24 ports colorless channels breakout module
NCS1K-MD-32O-C	32-channels spaced at 150 GHz on the Odd ITU grid
NCS1K-MD32E-C	32-channels spaced at 150 GHz on the Even ITU grid
NCS1010-SSD=	NCS 1010 SSD for NCS 1012,1020 with a capacity of 480 GB



APPENDIX B

System Environmental Specifications

This chapter describes the environmental specifications for Cisco NCS 1010.

- System Environmental Specifications, on page 191

System Environmental Specifications

The Cisco NCS 1010 has the following environmental specifications:

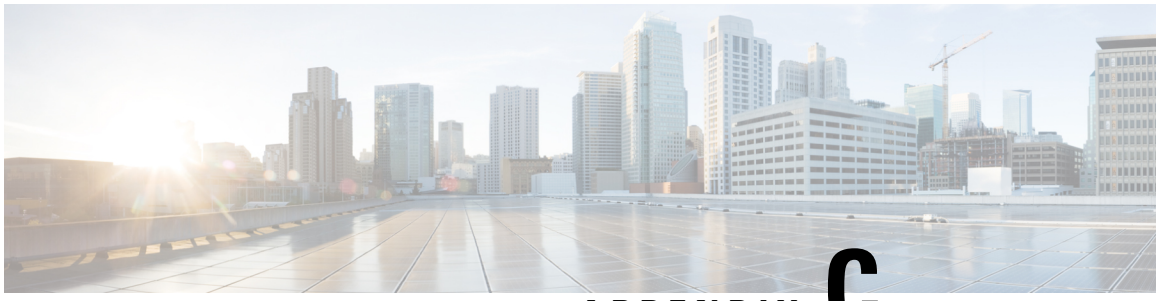
Table 24: Environmental Specifications for Cisco NCS 1010

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 A fan failure means that one of the fans on both fan trays stopped working (5 out of 6 fans are working). Replace a failed fan tray as per the replacement procedure within the OIR time limits.

System Environmental Specifications



APPENDIX C

Power Cable Specifications

This chapter describes the power cables that are supported by the Cisco NCS 1010 AC and DC PSUs.

- Supported Cables, on page 193

Supported Cables

Each power supply has a separate power cable. Standard power cables or jumper power cables are available for connection to the appliance. The jumper power cables, for use in racks, are available as an optional alternative to the standard power cables.

Note Only the approved power cables or jumper power cables that are provided with the appliance are supported.

The following power cords are supported.

AC Power Cables

- Argentina

  Figure: CAB-250V-10A-AR AC power cable, 250 V, 10 A, CAB-250V-10A-AR

- Australia

  Figure: CAB-9K10A-AU AC power cable, 250 V, 10 A, 3112 plug, CAB-9K10A-AU

- Brazil

  Figure: CAB-250V-10A-BR AC power cable, 250 V, 10 A, CAB-250V-10A-BR

- China

  Figure: CAB-250V-10A-CN AC power cable, 250 V, 10 A, CAB-250V-10A-CN

- Europe

  Figure: CAB-9K10A-EU AC Power cable, 250 V, 10 A; CEE 7/7 Plug, CAB-9K10A-EU

- Europe and North America

  Figure: NCS1010-DC-CBL-ET= AC power cable, 10 A; C13 to C14, recessed receptacle, CAB-C13-C14-AC

- Israel

  Figure CAB-250V-10A-IS AC Power cable, 250 V, 10 A, CAB-250V-10A-IS

- Italy

  Figure: CAB-9K10A-IT AC power cable, 250 V, 10 A, CEI 23-16/VII plug, CAB-9K10A-IT

- India

  Figure: CAB-250V-10A-ID AC power cable, 250 V, 10 A, CAB-250V-10A-ID

- Japan PSE Mark

  Figure: CAB-C13-C14-2M-JP AC Power cable, C13 to C14, CAB-C13-C14-2M-JP

- North America

  Figure: CAB-C13-C14-AC AC power cable, 125 V, 13 A, NEMA 5–15 plug, CAB-9K12A-NA

- North America

  Figure: CAB-AC-L620-C13 AC power cable, NEMA L6-20 to C13 connectors – If rated for greater than 12.5 A, it is compliant with North America, CAB-AC-L620-C13

  ,

- Switzerland

  Figure: CAB-9K10A-SW AC power cable, 250 V, 10 A, MP232 plug, CAB-9K10A-SW

- Taiwan

  Figure: CAB-ACTW AC power cable, 250 V, 10 A, CAB-ACTW

- United Kingdom

  Figure: CAB-9K10A-UK AC power cable, 250 V, 10 A (13-A fuse), BS1363 plug, CAB-9K10A-UK

- Europe, North America, United Kingdom, Australia, New Zealand, Morocco, and Korea

  Figure: CAB-C13-CBN AC cabinet jumper power cable, 250, 10 A, C13 to C14, Compliant with Europe and North America at 200-240V, CAB-C13-CBN

- Europe, North America, United Kingdom, Australia, New Zealand, Morocco, Korea, China, and Russia

  Figure: CAB-C13-C14-2M AC cabinet jumper power cable, 250, 10 A, C13 to C14, Compliant with Europe and North America at 200-240V, CAB-C13-C14-2M

DC Power Cables

- Europe

  Figure: NCS1010-DC-CBL-ET= CABASY, WIRES, DC POWER, 10AWG, 930W / NCS 1010 DC Cable - ETSI compliant, NCS1010-DC-CBL-ET=

- Worldwide

  Figure: CAB-48DC-40A-8AWG DC power cable, –48 VDC, 40 A, 8 AWG, Three-socket Mini-Fit connector to three-wire, CAB-48DC-40A-8AWG, and CAB-48DC-40A-10AWG

Note We recommend using NCS1010-DC-CBL-ET= with the ETSI 300-mm cabinet to remain compliant with the 300-mm footprint.

The following figures depict the power cables:

Figure 128: CAB-250V-10A-AR (Argentina)

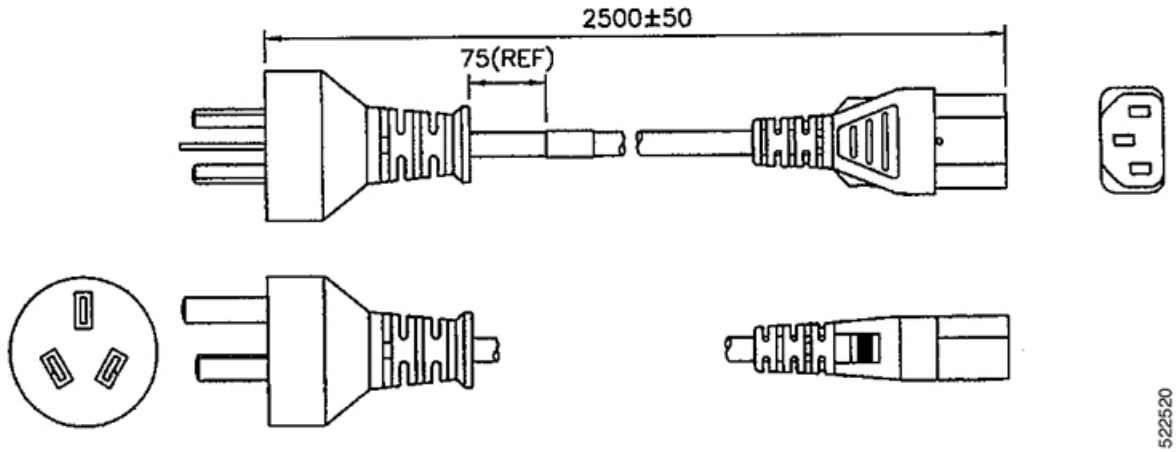


Figure 129: CAB-9K10A-AU (Australia)

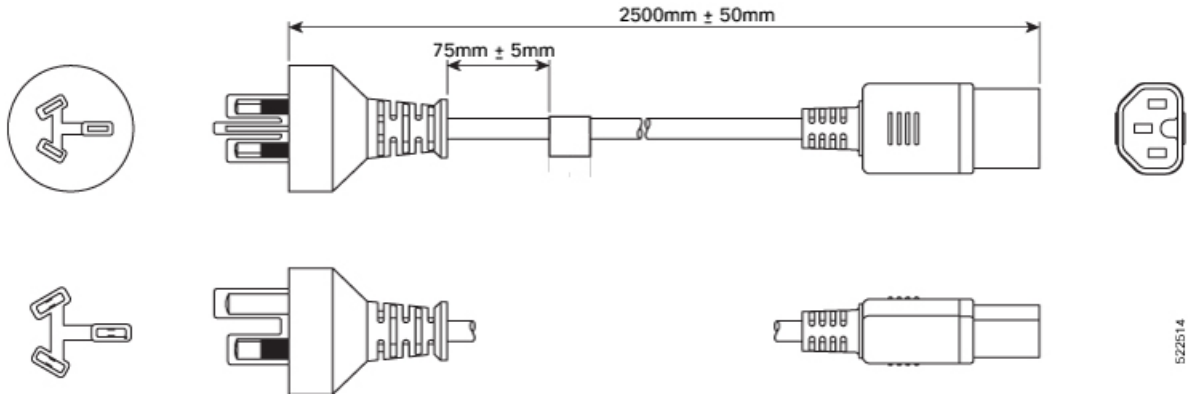
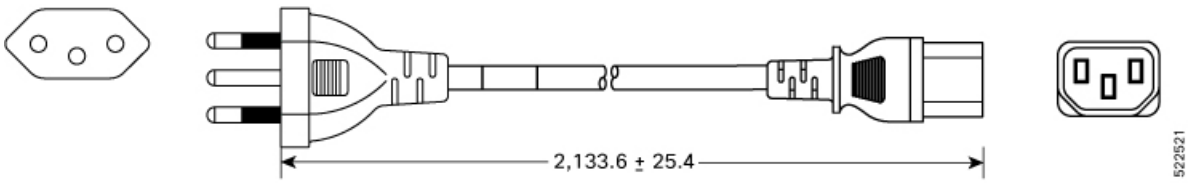


Figure 130: CAB-250V-10A-BR (Brazil)



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Figure 131: CAB-250V-10A-CN (China)

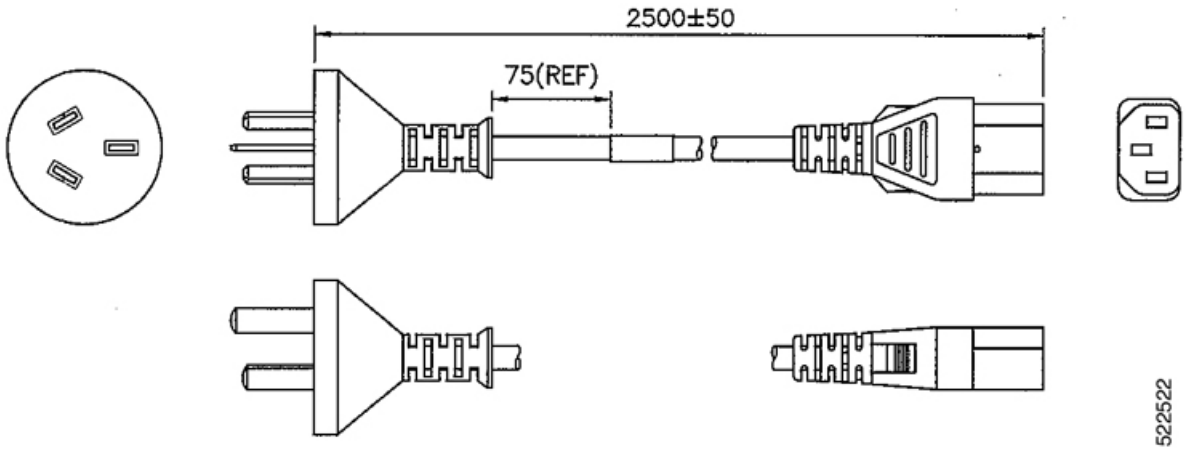


Figure 132: CAB-9K10A-EU (Europe)

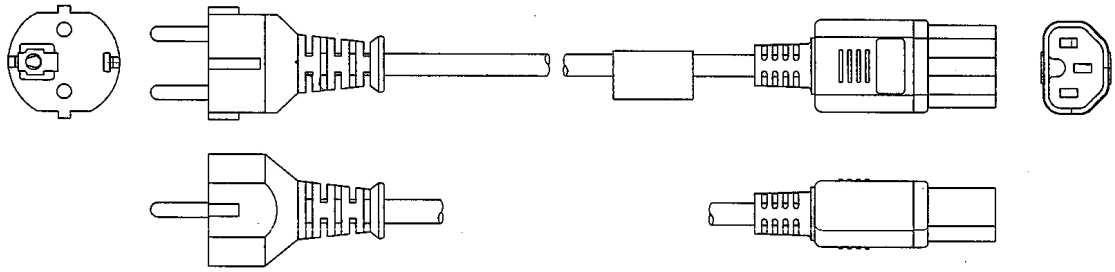


Figure 133: CAB-250V-10A-IS (Israel)

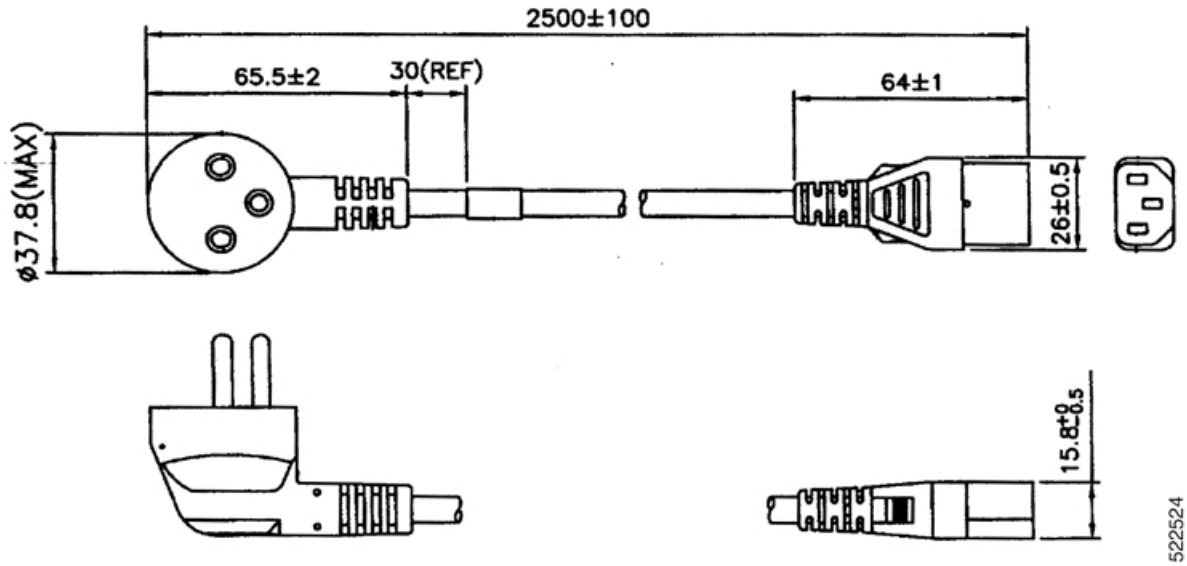


Figure 134: CAB-9K10A-IT (Italy)

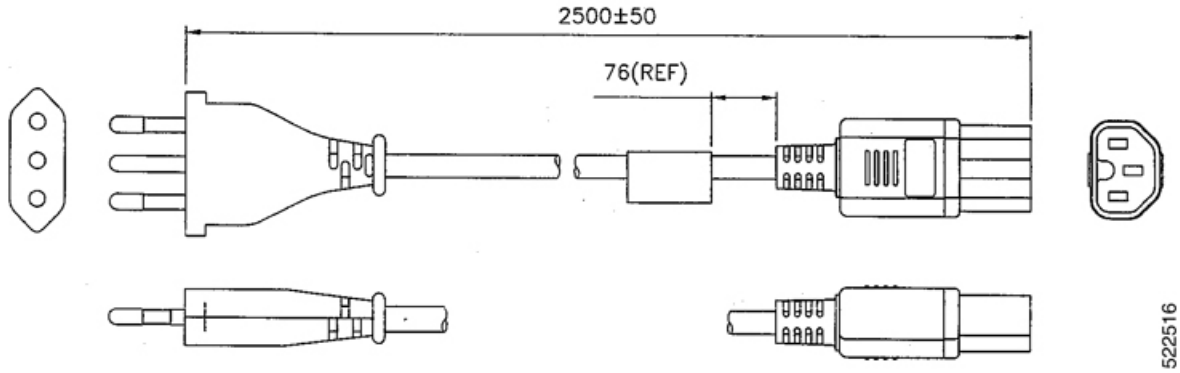


Figure 135: CAB-250V-10A-ID (India)

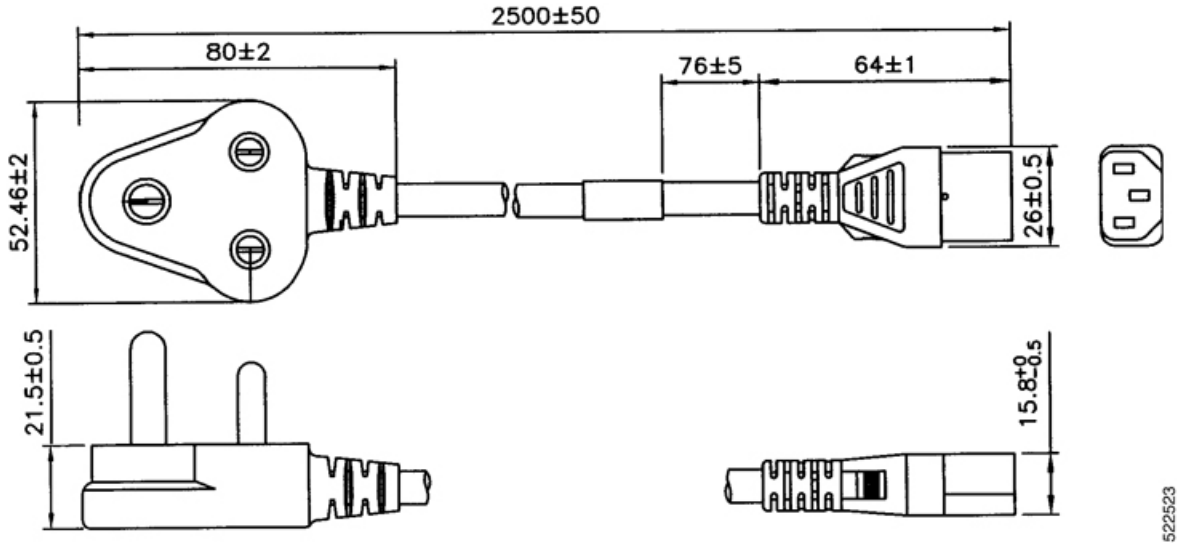


Figure 136: CAB-C13-C14-2M-JP (Japan)

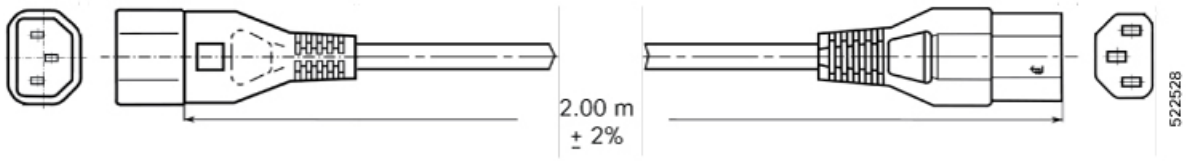
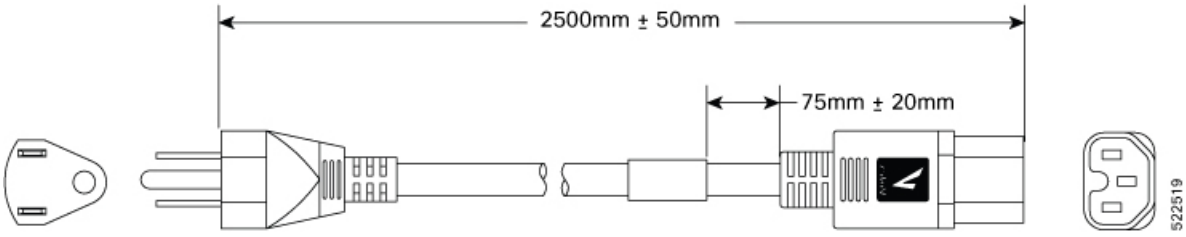


Figure 137: CAB-9K12A-NA (North America)



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Figure 138: CAB-9K10A-SW (Switzerland)

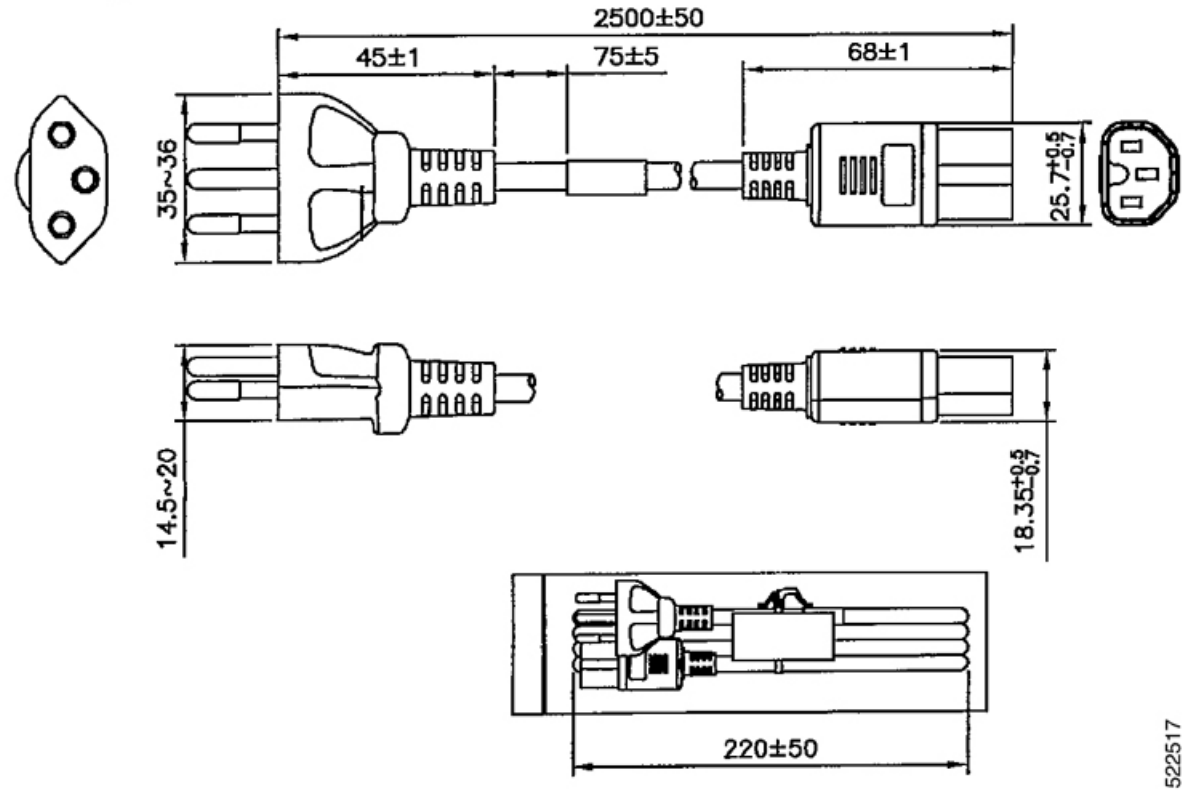


Figure 139: CAB-ACTW (Taiwan)

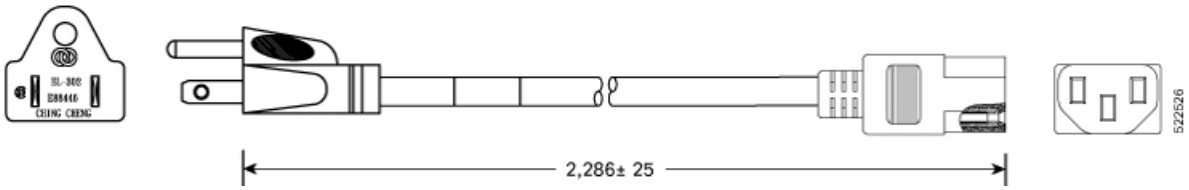


Figure 140: CAB-9K10A-UK (United Kingdom)

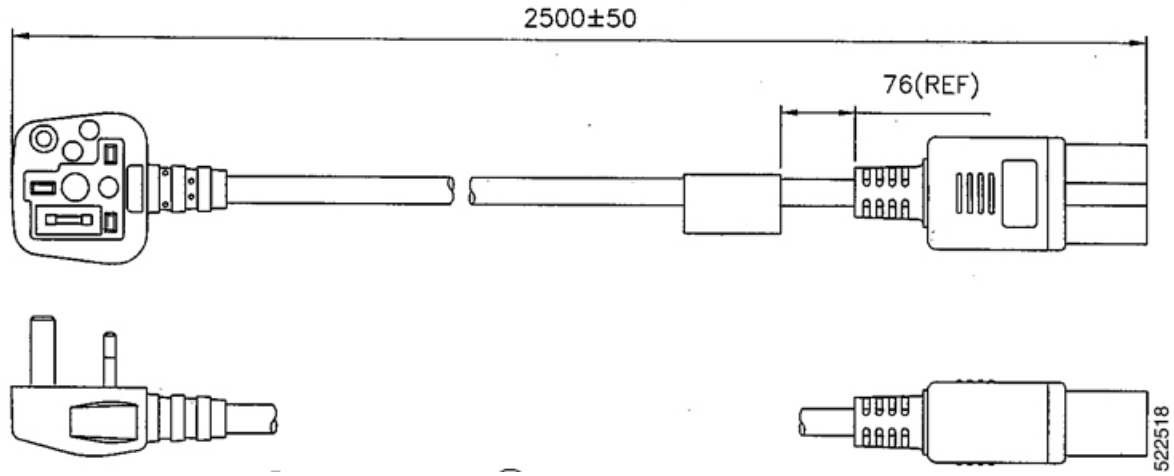


Figure 141: CAB-AC-L620-C13 (North America)

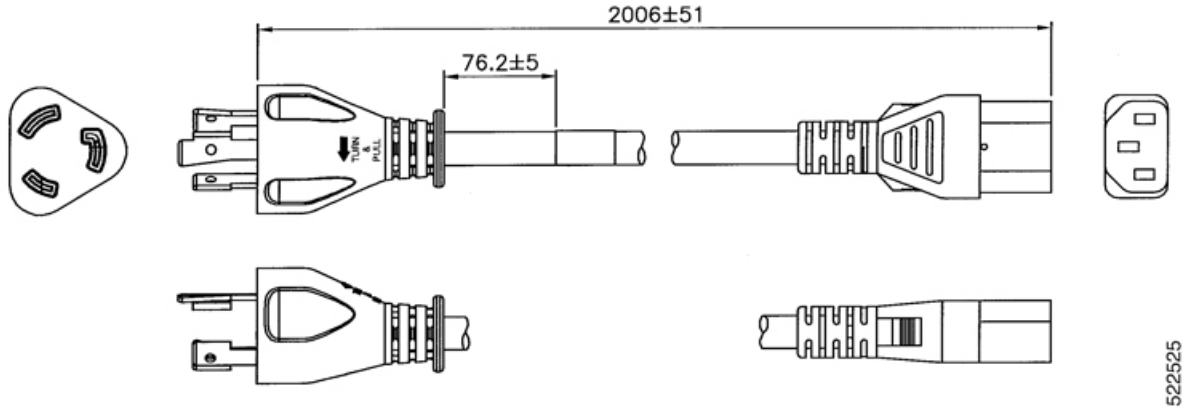
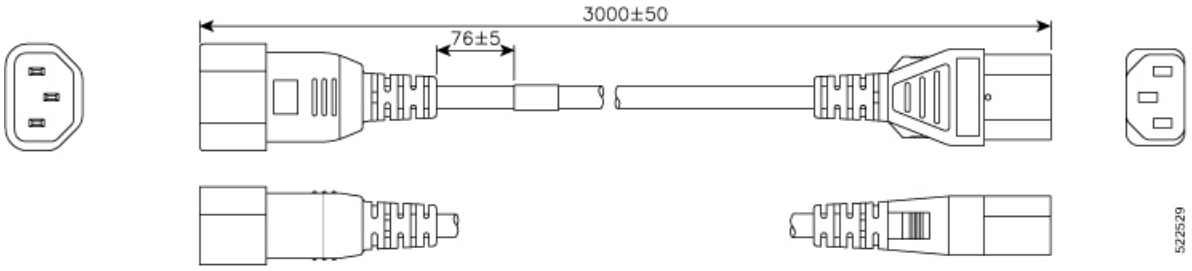


Figure 142: CAB-C13-C14-AC (Europe and North America)



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Figure 143: CAB-C13-CBN

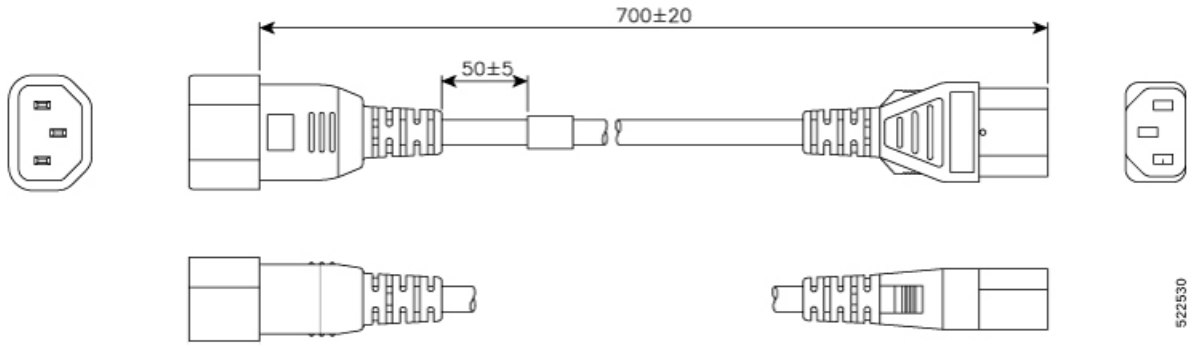


Figure 144: CAB-C13-C14-2M

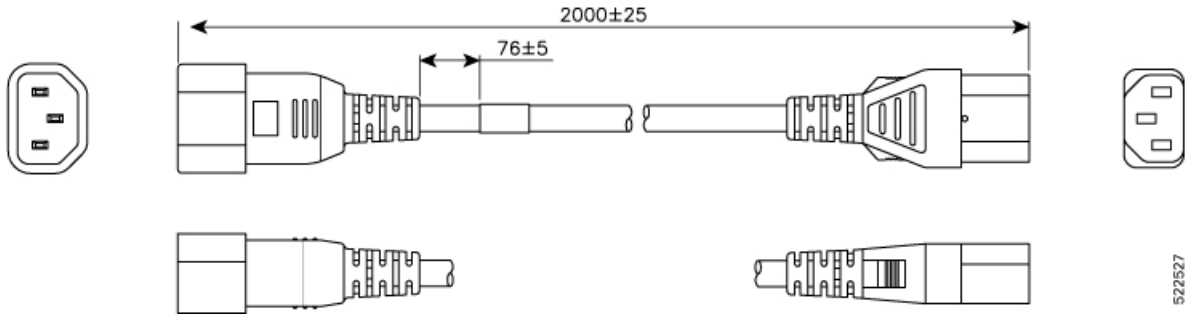


Figure 145: NCS1010-DC-CBL-ET= (Europe)

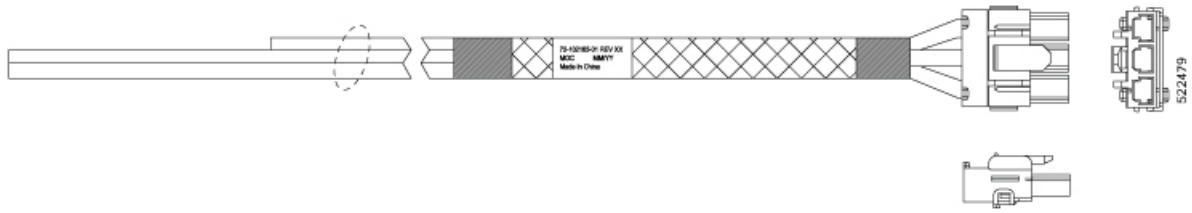
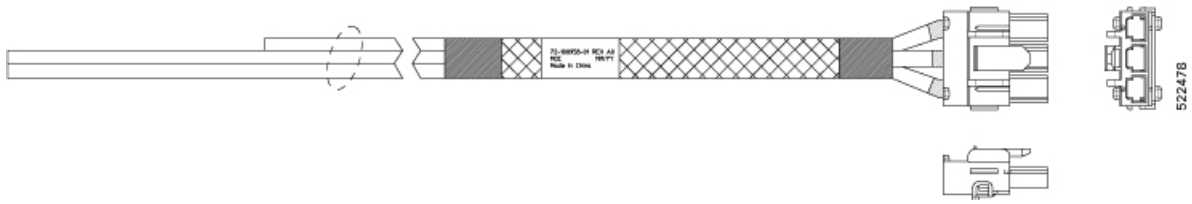
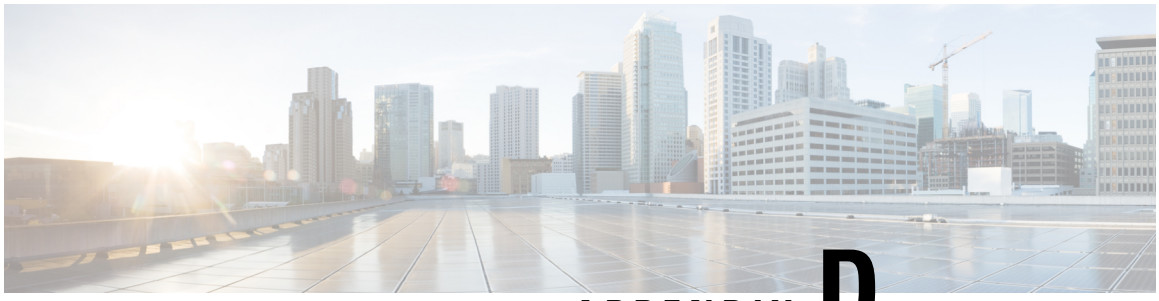


Figure 146: CAB-48DC-40A-8AWG (Worldwide)





APPENDIX D

Replace OLT-C with E-OLT-C Card on Cisco NCS 1010

Use this section to plan, execute, and verify the replacement while preserving circuit state and alarms.

Scope

The procedure covers prechecks, actions during the maintenance window, and postcheck validation using the Cisco IOS XR command-line interface (XR CLI), Cisco Optical Site Manager (COSM) UI, and Cisco Optical Network Controller (CONC) UI.

- OLT-C with E-OLT-C replacement, on page 201
- Requirements and limitations of OLT-C with E-OLT-C replacement, on page 202
- How to replace OLT-C with E-OLT-C card, on page 202
- Collect baseline logs and exports before maintenance, on page 203
- Replace the OLT-C line card with an E-OLT-C line card, on page 204
- Verify node status after replacement, on page 205

OLT-C with E-OLT-C replacement

The OLT-C to E-OLT-C replacement activity is a planned maintenance procedure that replaces an optical line terminal controller (OLT-C) line card with an enhanced optical line terminal controller (E-OLT-C) line card in a Cisco NCS1010 chassis.

A OLT-C to E-OLT-C replacement is a planned maintenance procedure that

- requires a maintenance window and coordinated traffic impact planning,
- uses Cisco Optical Site Manager (COSM) and Cisco Optical Network Controller (CONC) to manage configuration and circuit state, and
- restores circuits, alarms, and synchronization to the precheck state after the swap.

Audience and outcomes

This procedure is for operations teams performing line card replacements on production nodes.

Typical steps in the process include:

- Collecting precheck logs and configuration baselines,

- Replacing the line card and reapplying configuration, and
- Verifying postchecks and resolving any deviations.

Requirements and limitations of OLT-C with E-OLT-C replacement

Use this reference to confirm readiness and understand constraints for the maintenance activity.

Prerequisites

- SSH access to the target node is required.
- Session logging must be enabled for all XR CLI activity.
- An approved maintenance window for any traffic-affecting work is mandatory.
- Be aware that moving patch cords and fibers can cause service interruptions on circuits connected to the target line card.

Target nodes and duration

- Target nodes: Any node where an OLT-C to E-OLT-C swap is planned.
- Proposed duration: Up to four hours.

Current limitations

- The replacement can trigger an unexpected degree mismatch alarm unless expected remote configuration is removed during prechecks.
- You must follow all mandatory deletion and pre-provisioning steps to avoid unexpected alarms.

How to replace OLT-C with E-OLT-C card

Use this workflow to coordinate prechecks, perform maintenance window actions, and conduct postcheck validation.

Summary

Replacing OLT-C with E-OLT-C cards requires coordinated action between operations engineering and management systems to ensure minimal disruption and accurate restoration of service.

The key components involved in the process are:

- **Operations engineer**: Executes CLI, UI, and physical replacement steps throughout the maintenance workflow.
- **Cisco Optical Site Manager (COSM) and Cisco Optical Network Controller (CONC)**: Manage inventory, configuration, and circuit state required during the replacement and validation.

- **Cisco IOS XR CLI**: Validates chassis status and monitors alarms before and after the replacement.

Workflow

The process involves these stages:

1. **Prechecks and baseline capture**: The operations engineer collects logs, exports configurations, and captures labeling information to preserve the system state before any changes.
2. **Replacement execution**: The operations engineer removes the expected remote configuration, deletes circuits and degrees, removes the OLT-C card, installs the E-OLT-C card, and completes insertion and cabling with support from COSM/CONC.
3. **Postcheck validation**: The operations engineer restores required configuration, uses COSM/CONC to verify correct circuit and system status, and validates alarms, circuit restoration, and synchronization via the CLI and management tools.

Result

The OLT-C card is successfully replaced with an E-OLT-C card. All critical inventory, configuration, and circuit states are restored, and the system is validated to ensure proper operation and alarm clearance following the replacement.

Collect baseline logs and exports before maintenance

Collect key logs and exports before performing any planned maintenance or network changes.

Performing these steps before a scheduled maintenance window provides a known good reference for troubleshooting, ensures compliance, and enables successful change validation.

Before you begin

- Schedule the upcoming maintenance window.
- Ensure a storage location is available for log files and exports.
- Confirm SSH access to the target node.
- Confirm access to the Cisco Optical Site Manager (COSM) and Cisco Optical Network Controller (CONC) user interfaces.

Procedure

Step 1 Open an SSH session to the target NCS1010 chassis and start logging the session output.

Store the log file on an external system to ensure its preservation.

Step 2 Collect a full technical snapshot from the chassis.

Example:

```
show tech ncs1010 detail
```

Copy the output off the node.

Step 3 Clear the trustpool entries to avoid extended recovery during any future reloads.

Example:

```
crypto ca trustpool import url clean
crypto ca trustpool import url
```

Step 4 In COSM UI, remove the expected remote configuration for the target degrees and adjacent nodes.

Step 5 Download COSM data and exports for baseline comparison.

- Download the COSM database and diagnostics.
- Download node configuration XML from Optical setup.
- Export inventory, alarms, and the OXC list.

Step 6 Label all patch cords and fibers connected to the target OLT-C card.

Step 7 In the CONC UI, export the circuits traversing the target OLT-C card and record their lifecycle and service states.

Export the current alarms for comparison during post checks.

You have a complete set of pre-maintenance logs and exports. These serve as a baseline for verifying the success of your maintenance activities and facilitate troubleshooting if issues arise afterward.

What to do next

Review all the collected files and exported data to confirm completeness and accessibility before beginning the maintenance window.

Replace the OLT-C line card with an E-OLT-C line card

Swap a legacy OLT-C line card for a newer E-OLT-C line card in your device to support enhanced features and ensure hardware compatibility.

This procedure is performed during scheduled maintenance to minimize network disruption and ensure a smooth transition to the upgraded line card.

Procedure

Step 1 Delete all circuits using the target OLT-C card in the Cisco Optical Network Controller (CONC) UI, and wait for the changes to complete.

Step 2 In Cisco Optical Site Manager (COSM), delete the target IPC and degree configurations associated with the target OLT-C card in the Optical setup window.

Step 3 In the COSM topology window, delete the OLT-C module while it is still physically installed. This step is mandatory.

Step 4 Remove all patch cords and fibers connected to the OLT-C module. Then, physically remove the OLT-C line card from the chassis.

Step 5 Pre-provision the replacement E-OLT-C module in the COSM Web UI before physically inserting the card. This step is mandatory.

Step 6 Insert the E-OLT-C line card into the chassis. Wait for the card to finish booting.

Step 7 On the IOS XR system, verify that no unexpected alarms exist and then reconnect the patch cords and fibers to the correct ports on the new module.

Step 8 Restore the IPC and degree configuration. In the CONC UI, confirm that COSM is connected. Perform a resync action from CONC on the node where the replacement was completed.

Step 9 Recreate all the previously deleted circuits in the CONC UI.

The E-OLT-C line card is successfully installed and configured. All relevant circuits and configurations are restored, and normal operation resumes.

Verify node status after replacement

Ensure system integrity and successful hardware replacement by confirming the node returns to its expected state.

After replacing node hardware, confirm that all system states, alarms, and device synchronization align with the pre-replacement baseline.

Procedure

Step 1 Check system traffic and alarms for unexpected conditions.

Step 2 Verify field-programmable device (FPD) status and upgrade FPDs if required.

Example:

```
fpd upgrade
```

Step 3 In Cisco Optical Site Manager (COSM) UI, confirm that devices show sync as completed and that alarms and OXCs match the precheck state.

Step 4 In Cisco Optical Network Controller (CONC) UI, export circuits and alarms, and confirm that their lifecycle and service states match the precheck baseline.

Step 5 If issues persist, collect diagnostics for escalation.

- Run the **show tech ncs1010 detail** command.
- Gather COSM diagnostics from the Web UI.
- Archive logs by running the **sudo sedo diagnostics archive-logs /tmp** command.

  If using CONC R26.1.1 and later, collect logs through the UI: Navigate to **CONC** > **Logs** > **Tech Dump** > **Collect** > **Download**.

If the node status matches the precheck baseline, the replacement was successful and system integrity is ensured. If issues are identified, diagnostics are available for escalation.