Hardware Installation Guide for Cisco NCS 1004

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CHAPTER 1

Cisco NCS 1004 Overview

This chapter provides an overview for Cisco NCS 1004.

Cisco NCS 1004 Overview

The Cisco NCS 1004 chassis is a 2RU chassis that delivers a universal transponder solution which provides excellent performance for metro, long-haul and submarine applications.

Cisco NCS 1004 chassis has the following modules:

- Removable controller
- Two replaceable power supply units (PSU)
- Three replaceable fan units
- Four line card slots

NCS 1004 chassis supports the following line cards:

- NCS1K4-1.2T-K9
- NCS1K4-1.2TL-K9
- NCS1K4-2-QDD-C-K9
- NCS1K4-OTN-XP
- NCS1K4-QXP-K9

For more information about the Cisco NCS 1004 chassis, see Cisco NCS 1004 datasheet.

Note "1.2T" refers to the NCS1K4-1.2T-K9 C-band line card, "1.2TL" refers to the NCS1K4-1.2TL-K9 L-band line card, "2-QDD-C" refers to the NCS1K4-2-QDD-C-K9 C-band line card, "OTN-XP" refers to the NCS1K4-OTN-XP line card, and "QXP-K9" refers to the NCS1K4-QXP-K9 line card.

The controller is on the front side. The PSUs and the fan units are on the rear side of the chassis. The line cards can be inserted in to the four slots as shown in the following figure.

Figure 1: NCS 1004 Front View
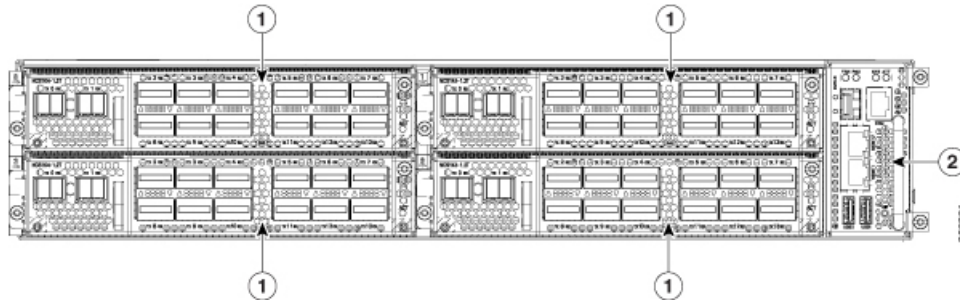
1	Line Cards
2	Controller

The slots for the PSUs and fan units are indicated in the following figure.

Figure 2: NCS 1004 Rear View
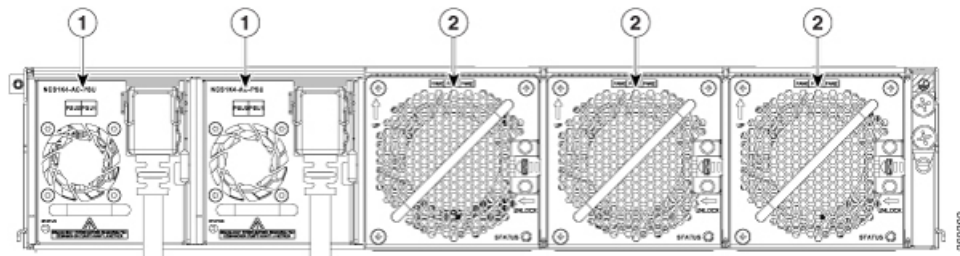
1	Power Supply Units (Slots 0 and 1)
2	Fan Units (Slots 0,1,2)

Both the power supply modules should be AC or DC. Mixed configuration is not allowed.

Cisco NCS 1004 has a front to back airflow scheme. The air inlet is at the front side of the chassis and the exhaust is on the rear side. Ensure that the airflow is not obstructed or impeded by any object as it may lead to reduced airflow in the system, causing components to operate at a higher temperature.

Figure 3: Airflow in NCS 1004
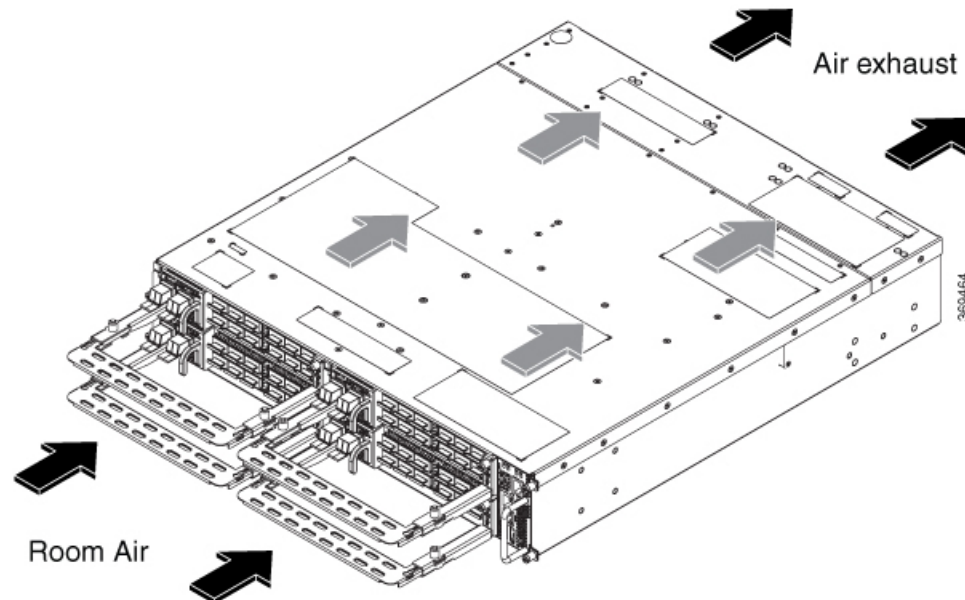
Class 1M Laser Product Label

The Class 1M Laser Product label is shown in the following figure.

Figure 4: Class 1M Laser Product Label

CAUTION
HAZARD LEVEL 1M INVISIBLE LASER RADIATION
DO NOT VIEW DIRECTLY WITH NON-ATTENUATING
OPTICAL INSTRUMENTS
WAVELENGTH: 850 nm TO 1610 nm

Complies with 21 CFR 1040.10 and 1040.11 except for
conformance with IEC 60825-1 Ed. 3., as described in
Laser Notice No. 56, dated May 8, 2019.

Conforme à la norme 21 CFR 1040.10 et 1040.11, sauf
conformité avec la norme IEC 60825-1 Ed. 3., comme décrit
dans l'avis relatif au laser no. 56, daté du 8 Mai 2019.

Supported Pluggables

Table 1: Feature History

Feature Name	Release	Description
Pluggables Support	Cisco IOS XR Release 7.3.1	The following pluggables are supported: • QSFP-40/100-SRBD • QSFP-100G-ER4L-S • QSFP-DD QDD-400G-FR4-S • QDD-400-AOCxM
Pluggables Support	Cisco IOS XR Release 7.3.2	The QSFP-100G-DR-S pluggable is supported.
Pluggables Support	Cisco IOS XR Release 7.5.2	The following pluggables are supported: • QSFP-100G-LR-S • DP04CFP2-M25-K9 (supported only on OTN-XP card)
Pluggables Support	Cisco IOS XR Release 7.10.1	The following pluggables are supported on the QXP card: • DP04QSDD-HK9 • DP01QSDD-LK9 These are Cisco 400G QSFP-DD High-Power (Bright) Optical Modules.
Pluggables Support	Cisco IOS XR Release 24.1.1	The ONS-QC-4X3G-LW pluggable is supported on the OTN-XP card.

The following table provides you the list of client and trunk plaggables supported by the NCS 1004 cards and the releases from which they are supported:

Table 2: Supported Client and Trunk Pluggables

Pluggables	Pluggable Type	NCS1K4 -1.2T-K9	NCS1K4 -1.2TL-K9	NCS1K4 -2-QDD-C-K9	NCS1K4 -OTN-XP	NCS1K4 -QXP-K9
QSFP 28 BiDi	Client optics	7.3.1	7.3.1	—	—	—

Pluggables	Pluggable Type	NCS1K4 -1.2T-K9	NCS1K4 -1.2TL-K9	NCS1K4 -2-QDD-C-K9	NCS1K4 -OTN-XP	NCS1K4 -QXP-K9
QSFP-100G-ER4	Client optics	7.3.1	7.3.1	—	7.3.1	—
QSFP-100G-ER4L-S	Client optics	7.3.1	7.3.1	—	7.3.1	—
QSFP DR-S	Client optics	7.3.2	7.3.2	7.3.2	—	—
QSFP-100G-FR-S	Client optics	7.2.1	7.2.1	—	7.3.1	7.7.1
QSFP-100G-SM-SR	Client optics	7.0.1	7.2.1	7.3.1	7.3.1	—
QSFP-100G-CWDM4-S=	Client optics	7.0.1	7.2.1	7.3.1	7.3.1	7.8.1
QSFP-100G-LR4-S=	Client optics	7.0.1	7.2.1	7.3.1	7.3.1	7.7.1
QSFP-100G-SR4-S	Client optics	7.0.1	7.2.1	7.3.1	7.3.1	7.8.1
ONS-QSFP28-LR4=	Client optics	7.1.1	7.2.1	7.5.1	7.2.1	7.7.1
QSFP-100G-AOC1M	Client optics	7.2.1	—	7.3.1	7.3.2	—
QSFP-100G-AOC3M	Client optics	7.2.1	—	—	7.3.1	—
QSFP-100G-AOC10M	Client optics	7.2.1	—	—	7.3.1	—
QSFP-100G-AOC20M	Client optics	7.2.1	—	—	7.3.1	—
QSFP-100G-AOC25M	Client optics	7.2.1	—	—	7.3.1	—
QSFP-100G-CU1M	Client optics	7.2.1	—	—	—	—
QSFP-100G-CU2M	Client optics	7.2.1	—	—	—	—
QSFP-100G-CU3M	Client optics	7.2.1	—	—	—	—

Pluggables	Pluggable Type	NCS1K4 -1.2T-K9	NCS1K4 -1.2TL-K9	NCS1K4 -2-QDD-C-K9	NCS1K4 -OTN-XP	NCS1K4 -QXP-K9
QSFP-100G-CU5M	Client optics	7.2.1	—	—	—	—
QSFP-100G-AOC3M	Client optics	7.2.1	7.2.1	7.3.1	7.3.2	—
QSFP-100G-AOC1M	Client optics	7.2.1	7.2.1	7.3.1	7.3.2	—
QSFP-100G-AOC10M	Client optics	7.2.1	7.2.1	7.3.1	7.3.2	—
QSFP-100G-AOC20M	Client optics	7.2.1	7.2.1	7.3.1	7.3.2	—
QSFP-100G-AOC25M	Client optics	7.2.1	7.2.1	7.3.1	7.3.2	—
QDD-400G-FR4-S	Client optics	—	—	7.3.1	7.3.1	7.7.1
QDD-400G-DR4-S	Client optics	—	—	7.3.2	7.3.1	7.7.1
ONS-QSFP-4X10-MLR	Client optics	—	—	—	7.2.1	—
QSFP-40G-SR4	Client optics	—	—	—	7.2.1	—
QSFP-100G-LR-S=	Client optics	7.5.2	—	—	7.5.2	7.7.1
QDD-400-AOC15M	Client optics	—	—	7.3.2	7.3.2	7.7.1
ONS-QC-16GFC-SW	—	—	—	—	7.5.2	—
QDD-4x100G-LR-S	Client optics	—	—	—	—	7.7.1
QSFP-100G-DR-S	Client optics	7.3.2	7.3.2	7.3.2	7.3.2	7.7.1
DS-SFP-4X32G-SW	—	—	—	—	7.5.2	—
ONS-QC-4X32G-LW	—	—	—	—	24.1.1	—
ONS-QC-4X3G-LW	—	—	—	—	24.1.1	—
DP04QSDD-HK9	Client optics	—	—	—	—	7.10.1

Pluggables	Pluggable Type	NCS1K4 -1.2T-K9	NCS1K4 -1.2TL-K9	NCS1K4 -2-QDD-C-K9	NCS1K4 -OTN-XP	NCS1K4 -QXP-K9
DP01QSDD-LK9	Client optics	—	—	—	—	7.10.1
QSFP-40/100-SRBD	Client optics	7.3.1	7.3.1	—	—	—
QDD-400G-FR4-S	Client optics	—	—	—	7.3.1	7.10.1
QDD-400G-DR4-S	Client optics	—	—	—	7.3.1	7.10.1
QDD-400G-LR8	Client optics	—	—	—	7.3.2	—
QDD-400G-ZRP-S	Trunk optics	—	—	—	7.3.2	7.7.1
ONS-CFP2D-400G-C	Trunk optics	—	—	—	7.3.1	—
DP04CFP2-M25-K9	Trunk optics	—	—	—	7.5.2	—
CFP2-WDM-DETS-1HL	Trunk optics	—	—	—	7.8.1	—

C H A P T E R   2

Safety Guidelines

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

Review the complete list of safety warnings available at Regulatory Compliance and Safety Information for *Cisco NCS 1004 Series*.

Standard Warning Statements

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

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

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

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

Warning
    Mount the device on a rack that is permanently affixed to the building. Statement 1049

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

General Safety Guidelines for Personal Safety and Equipment Protection

Follow these safety guidelines:

- Never attempt to lift an object that might be too heavy for you to lift by yourself.

- Always unplug power cables when performing maintenance or working on the chassis, unless the replacement part is hot swappable and designed for online insertion and removal (OIR).

- Keep the work area clear and dust free during and after installation.

- Keep tools and chassis components away from walkways and equipment rack aisles.

- Do not wear loose clothing, jewelry (including rings and chains), or other items that could get caught in the equipment.

- Fasten your tie or scarf and sleeves.

- Operate Cisco equipment safely by using it in accordance with its electrical ratings and product usage instructions.

- Do not work alone if potentially hazardous conditions exist.

- Ensure that the installation of the router is in compliance with national and local electrical codes: in the United States, National Fire Protection Association (NFPA) 70, United States National Electrical Code; in Canada, Canadian Electrical Code, part I, CSA C22.1; in other countries, International Electrotechnical Commission (IEC) 364, part 1 through part 7.

Safety Precaution for Module Installation and Removal

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

Warning **Invisible laser radiations present.** Statement 1016

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

Safety with Electricity

Warning **Before working on a chassis or with power supplies, unplug the power cord on AC units. Disconnect the power at the circuit breaker on DC units.**Statement 12

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

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

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

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

Warning **When installing or replacing the unit, ensure the ground connection first and disconnected last.** Statement 1046

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

Power Connection Guidelines

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

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

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

Warning   **Use copper conductors only.** Statement 1025

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

Safety Precaution for Energy Hazard

Warning   **Do not reach into a vacant slot when installing or removing a module. Exposed circuitry is an energy hazard.** Statement 206

The Cisco NCS 1004 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 1004 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 5: Class 1M Laser Product Label

Figure 6: Class 1M Laser Product Label

Warning

Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.

Conforme à la norme 21 CFR 1040.10 et 1040.11, sauf conformité avec la norme IEC 60825-1 Ed. 3., comme décrit dans l'avis relatif au laser no. 56, daté du 8 Mai 2019.

Statement 291

Warning

Invisible laser radiations present. Statement 1016

Warning

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

Prevent Electrostatic Discharge Damage

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

• Ensure that the device chassis is electrically connected to earth ground.

• Wear an ESD-preventive wrist strap, ensuring that it makes good skin contact.

• Handle components by only their handles or edges; do not touch the printed circuit boards or connectors.

• Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.

NEBS Regulatory Compliance Statements

The NEBS-GR-1089-CORE regulatory compliance statements and requirements are discussed in this section.

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

Warning   **The intra-building port(s) (Management Ethernet Ports) of the equipment or subassembly must use shielded intra-building cabling/wiring that is grounded at both ends.** Statement 7003

Warning   **The intra-building port(s) (Management Ethernet Ports) of the equipment or subassembly is suitable for connection to intra-building or unexposed wiring or cabling only. The intra-building 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 intra-building 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.** Statement 7005

Products that have AC power ports that are intended for deployments where an external Surge Protective Device (SPD) is utilized at the AC power service equipment (see definition in National Electric Code). Statement 7012

This product is designed for a Common Bonding Network (CBN) installation. Statement 7013

This product can be installed in network telecommunication facilities or locations where the National Electric Code applies. Statement 8015 and 8016

The DC return connection to this system should remain isolated from the system frame and chassis (DC-I). Statement 7016

CHAPTER 3

Prepare to Install Cisco NCS 1004

This chapter explains how to prepare for the Cisco NCS 1004 installation.

Shipping and Receiving

The chassis is shipped in one of the following ways:

- Chassis with filler cards and line cards— you receive the chassis with preinstalled line cards (based on the number of line cards you have ordered) and the rest of the line card slots have filler cards. If you have preordered four line cards, then, the chassis does not contain any filler cards. There are four fiber management brackets in the package, for each of the line card or filler cards preinstalled in the chassis. The controller and the three fan units are also preinstalled. The other items available in the same package (with the chassis) are:

  - Accessory kit, that has all the installation hardware.

  - Spare Serial Number label.

  - Two PSUs - AC or DC. Installation of PSUs is discussed in the Install Cisco NCS 1004 Modules chapter.

    AC chassis - while ordering for an AC chassis, select the power cable. Based on your choice (NEMA or CEE), you get a pair of 90 degree and straight cables for each PSU. All the AC cables are 4.25 m long.

Table 3: Power cables for the chassis

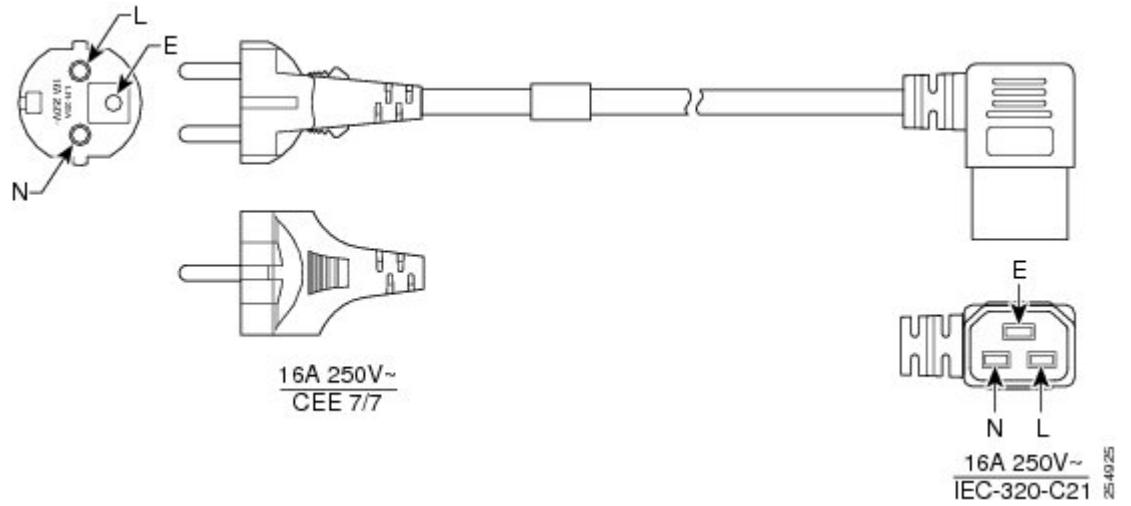| Type of Cable	P1 Connector	P2 Connector	CPN
Straight cable	NEMA L6-20P	IEC 60320 – C21	72-101432-01
	CEE 7/7 (Europe)	IEC 60320 – C21	72-101434-01
90-degree cable	CEE 7/7 (Europe)	IEC 60320 – C21	72-101425-01
	NEMA L6-20P	IEC 60320 – C21	37-1138-01

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

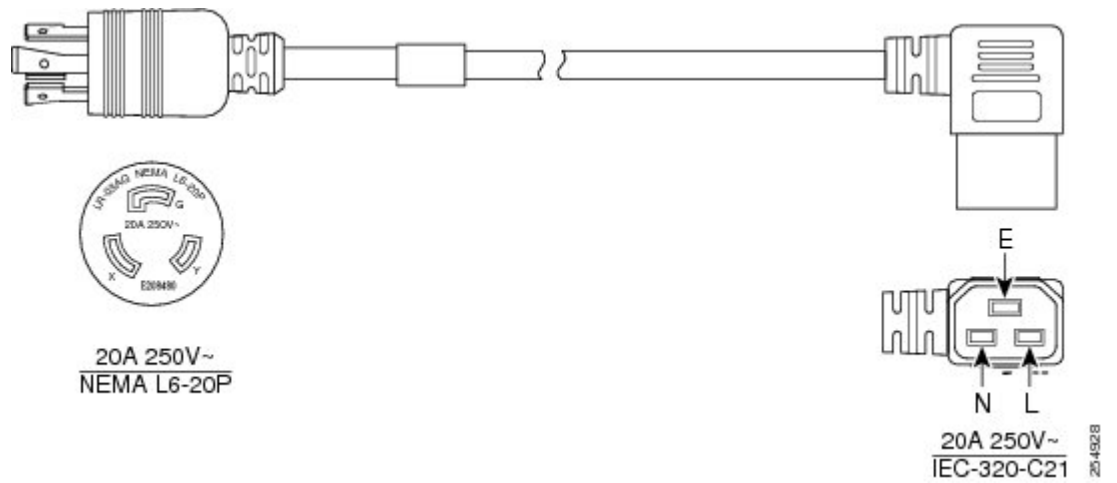*Figure 8: 90-degree Cable (NEMA L6-20P)*
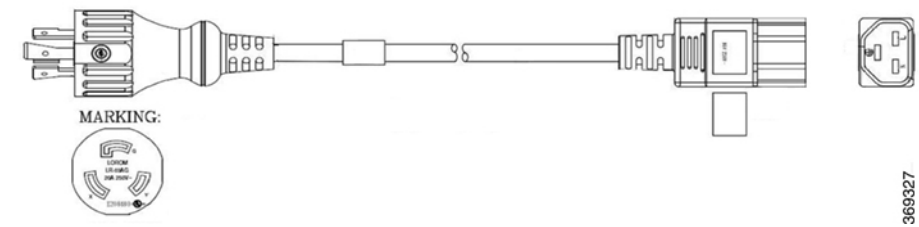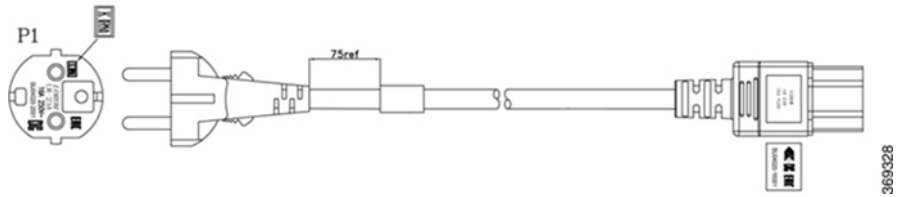

Figure 9: Straight Cable (NEMA L6-20P)

Figure 10: Straight Cable (CEE 7/7)

Note The 90deg cable is used only for ETSI racks to maintain a footprint of 600 mm.

DC chassis - when you order for a DC chassis, you get four power lugs for each PSU (a pair of 90-degree and a pair of 180-degree lugs). 180-degree lugs are used for ETSI racks to maintain a footprint of 600 mm.

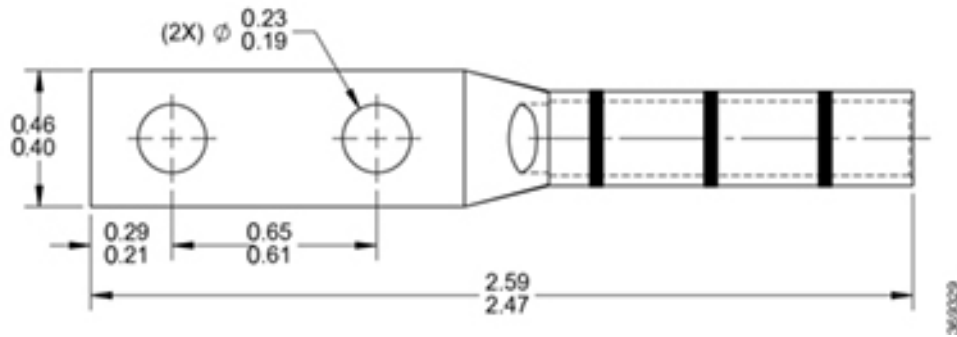Figure 11: DC Power Cable Lug (180-degree)
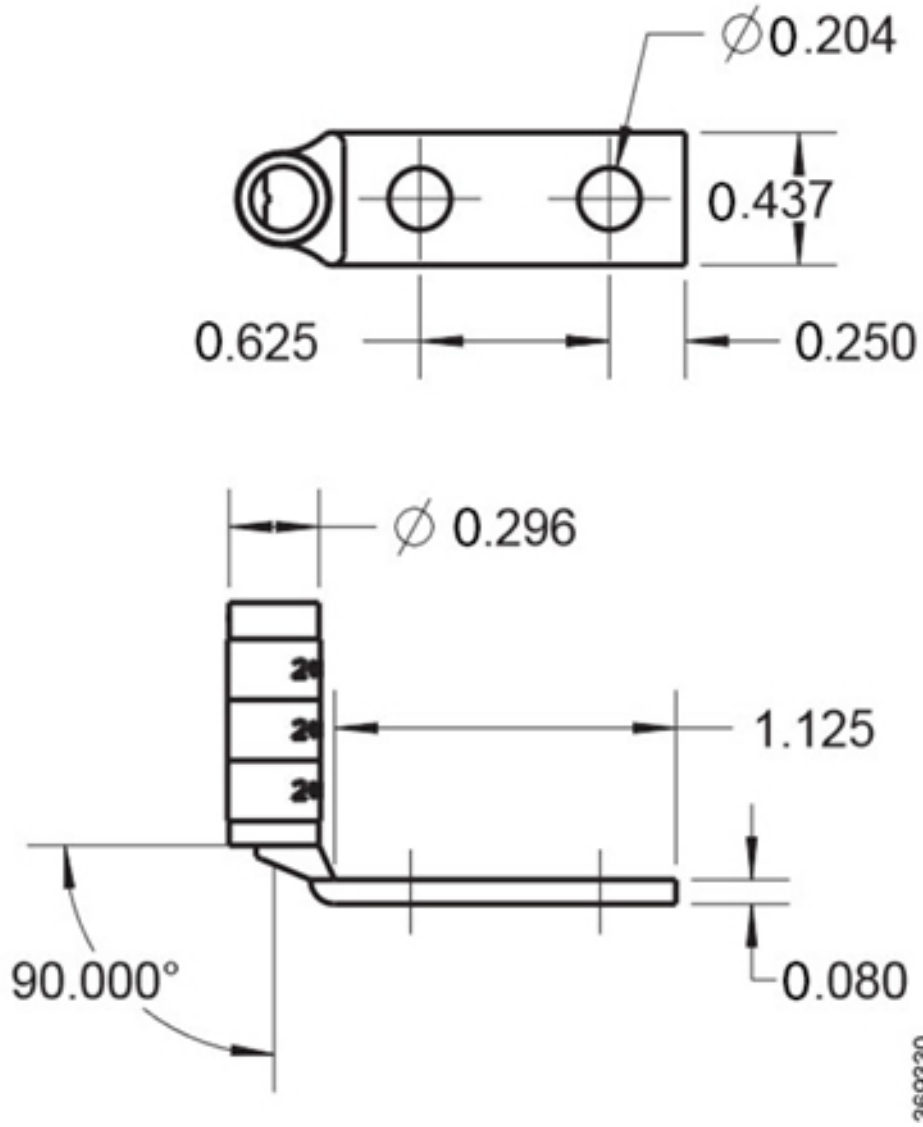
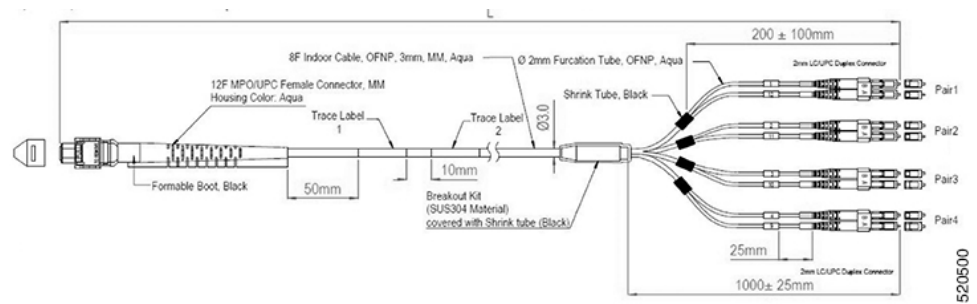*Figure 12: DC Power Cable Lug (90-degree)*

Figure 13: Breakout Cable

✎

Note   The breakout cable is used only for ETSI racks to maintain a footprint of 600 mm.

Table 4: Specifications of Breakout Cables

PID	CPN	MPN	Overall Length (in m)
ONS-4X10-MMCBL-5=	72-101758-01	BCJ7F3FM005CSO008	05 plus or minus 0.30
ONS-4X10-MMCBL-10=	72-101759-01	BCJ7F3FM010CSO008	10 plus or minus 0.30
ONS-4X10-MMCBL-20=	72-101760-01	BCJ7F3FM020CSO008	20 plus or minus 0.60

Figure 14: Cable with Formable Boot and Standard Boot

The formable boot must be used on the side of the line card.

Table 5: PIDs of Cable with Formable Boot and Standard Boot

PID#	CPN#	MPN#	Overall Length (M)
-ONS-FMPO-SM-5=	72-101717-01	MDD3F 3GM005CSO001	05±0.30 m
-ONS-FMPO-SM-10=	72-101718-01	MDD3F 3GM010CSO001	10±0.30 m
-ONS-FMPO-SM-20=	72-101719-01	MDD3F 3GM020CSO001	20±0.60 m
-ONS-FMPO-SM-30=	72-101720-01	MDD3F 3GM030CSO001	30±0.90 m
-ONS-FMPO-SM-40=	72-101721-01	MDD3F 3GM040CSO001	40±1.20 m
-ONS-FMPO-SM-50=	72-101722-01	MDD3F 3GM050CSO001	50±1.50 m
-ONS-FMPO-SM-60=	72-101723-01	MDD3F 3GM060CSO001	60±1.50 m

| PID#	CPN#	MPN#	Overall Length (M)
-ONS-FMPO-SM-70=	72-101724-01	MDD3F 3GM070CSO001	70±1.50 m
-ONS-FMPO-SM-80=	72-101725-01	MDD3F 3GM080CSO001	80±1.50 m
-ONS-FMPO-SM-90=	72-101726-01	MDD3F 3GM090CSO001	90±1.50 m
-ONS-FMPO-SM-100=	72-101727-01	MDD3F 3GM100CSO001	100±1.50 m

Figure 15: Chassis shipped with Line Cards
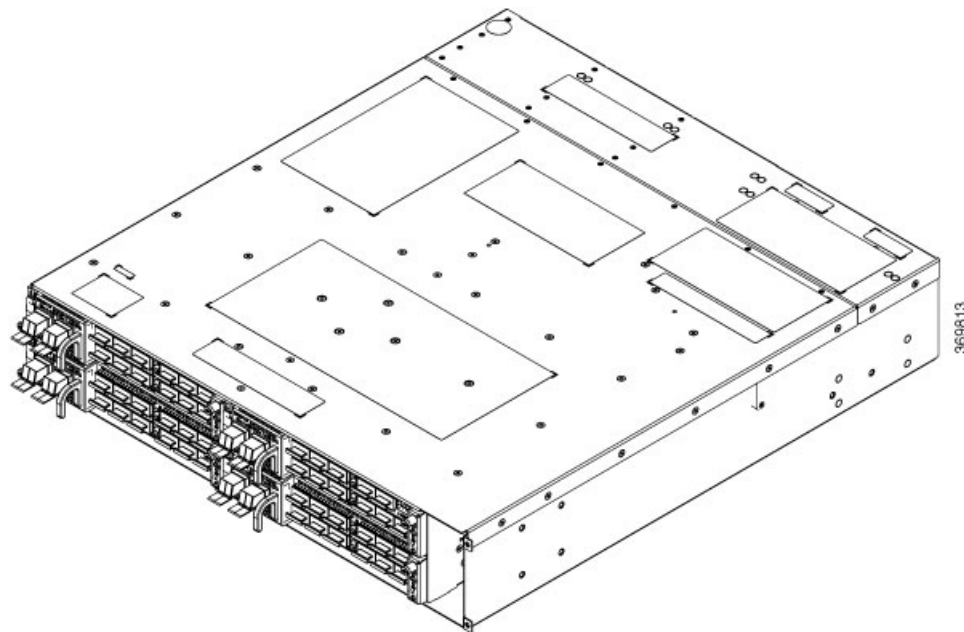
- Chassis with only filler cards— you receive the chassis with four filler cards in the line card slots. There are four fiber management brackets in the package, for each of the filler cards. Each line card ordered as a spare item is shipped separately and the extra fiber management bracket (for the line card) is available in the line card package. Only the accessory kit is available with the chassis (in the same package). You must order all the other modules (fan units, controller, PSUs) separately.

For installation procedures of the modules, see Install Cisco NCS 1004 Modules chapter.

Figure 16: Chassis shipped with Filler Cards
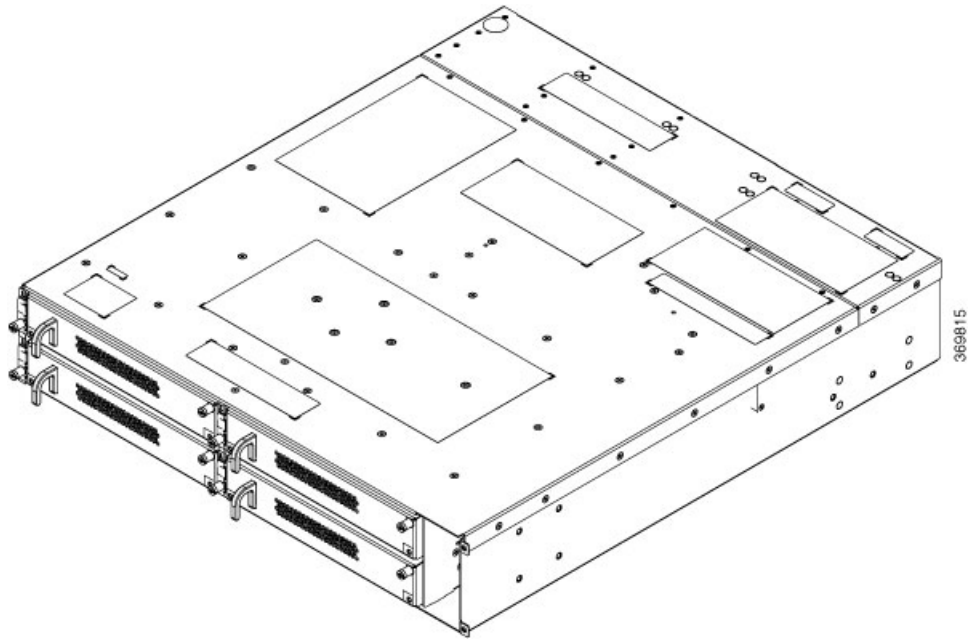
Unpack and Verify Cisco NCS 1004

This procedure enables the you to unpack and check if all the chassis modules that are required for installation have been shipped.

Step 1   When you receive Cisco NCS 1004 equipment at the installation site, open the top of the box.

Step 2   Remove accessories and foam inserts from the box. The box contains Cisco NCS 1004 and other items 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 17: Lifting the NCS 1004
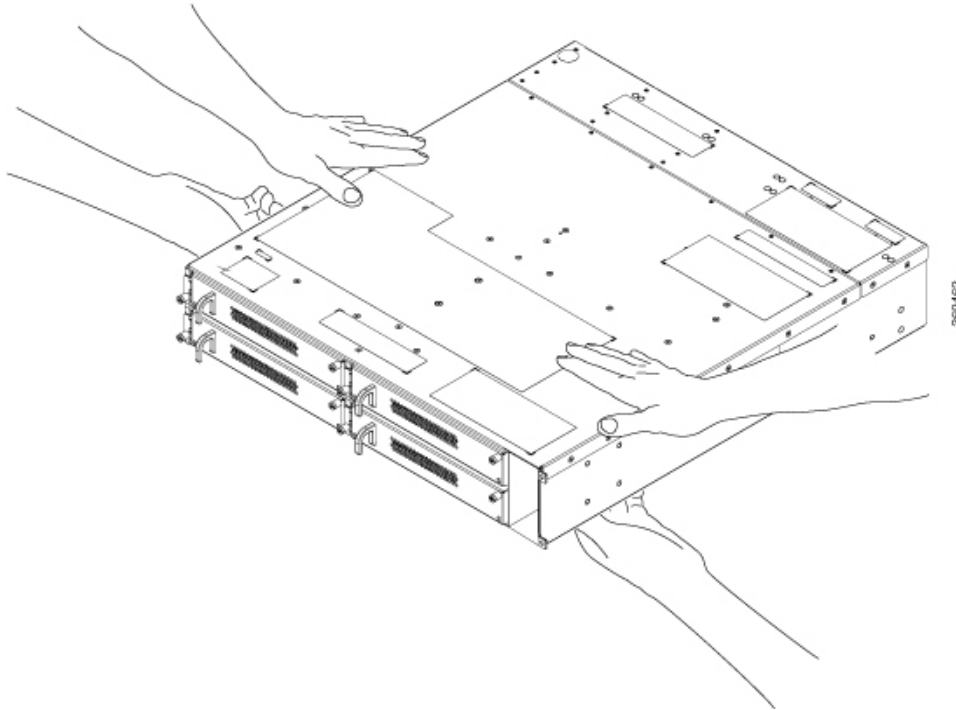
A fully loaded chassis can weigh as much as 28.7 kgs (63.3 lbs).

- Ensure that your footing is solid; balance the weight of the object between your feet.

- Lift the equipment slowly; never move suddenly or twist your body as you lift.

- Keep your back straight and lift with your legs, not your back. When bending down to lift equipment, bend at the knees (not at the waist), to reduce the strain on your lower back muscles.

Step 4   Verify the following:

- The Cisco NCS 1004 is not damaged. Check for a scratch, bend, discoloration or deformation on the Cisco NCS 1004 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.

Install Cisco NCS 1004

This chapter contains procedures to install Cisco NCS 1004.

Rack Compatibility

This section provides rack compatibility details for the Cisco NCS 1004.

Figure 18: Four Post Rack Type

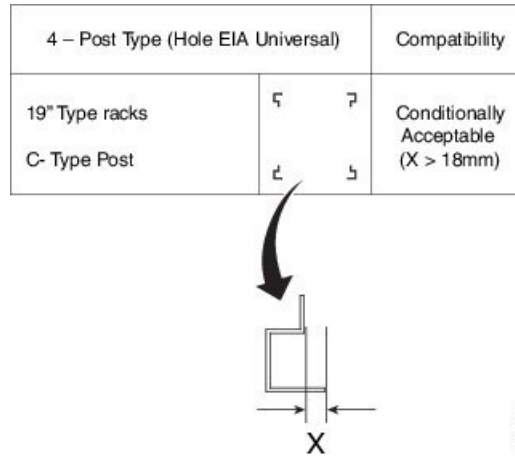| 4 – Post Type (Hole EIA Universal)		Compatibility
All 23" Type rack		✓
19" Type rack L-Type Post		✓
19" Type Racks Flat-Post		✓
19" Type racks C- Type Post		✗
ETSI Type rack (Hole ETSI Universal)		✓

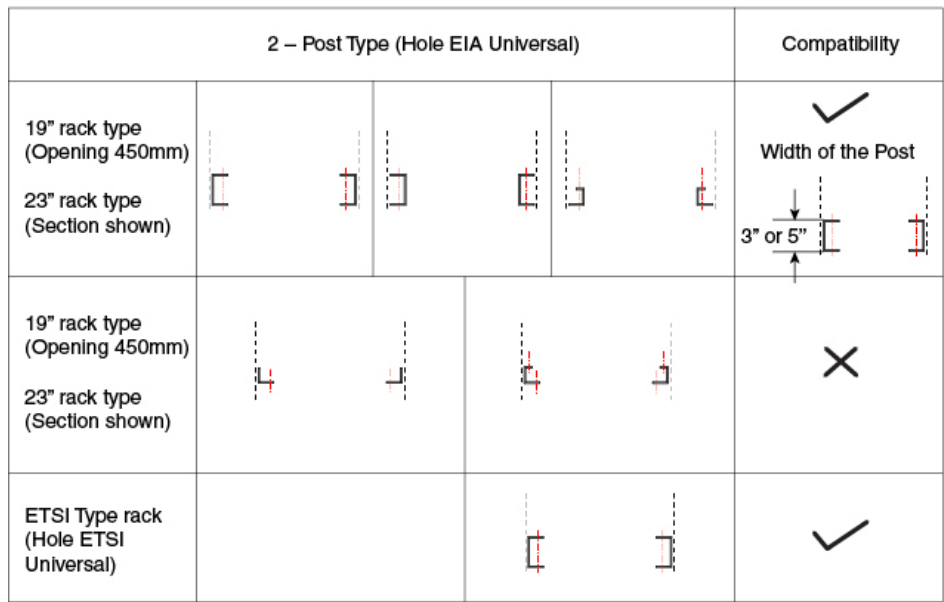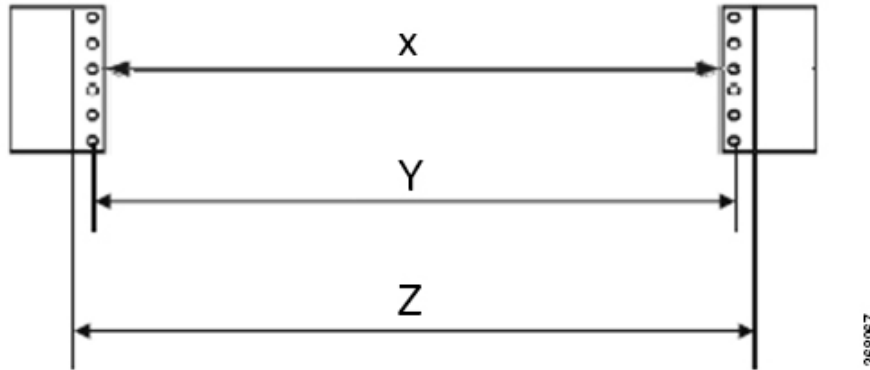*Figure 19: Four Post Rack Type*

Figure 20: Two Post Rack Type

Figure 21: 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")

Note The distance between the front and the rear post in a four post rack is 427 mm (closed position) and 707 mm (open position).

Install NCS 1004 on an EIA/ANSI/ ETSI Rack

⚠️ **Warning** **Rack Mount Instructions**

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

- Elevated Operating Ambient—If installed in a closed or multirack assembly, the operating temperature of the rack environment may be greater than room temperature. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified.

- Reduced Air Flow—Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.

- Mechanical Loading—Mounting of the equipment in the rack should be such that a hazardous condition is not achieved due to uneven mechanical loading.

- Circuit Overloading—Consideration should be given to the connection of the equipment to the supply circuit and the effect that overloading of the circuits might have on overcurrent protection and supply wiring. Appropriate consideration of equipment nameplate ratings should be used when addressing this concern.

- Reliable Earthing—Reliable earthing of rack-mounted equipment should be maintained. Particular attention should be given to supply connections other than direct connections to the branch circuit (for example, use of power strips).

It is mandatory to fix the fiber management brackets for all the cards in the chassis before installing the Cisco NCS 1004 chassis onto the rack. See Attach Fiber Management Bracket section for the detailed procedure.

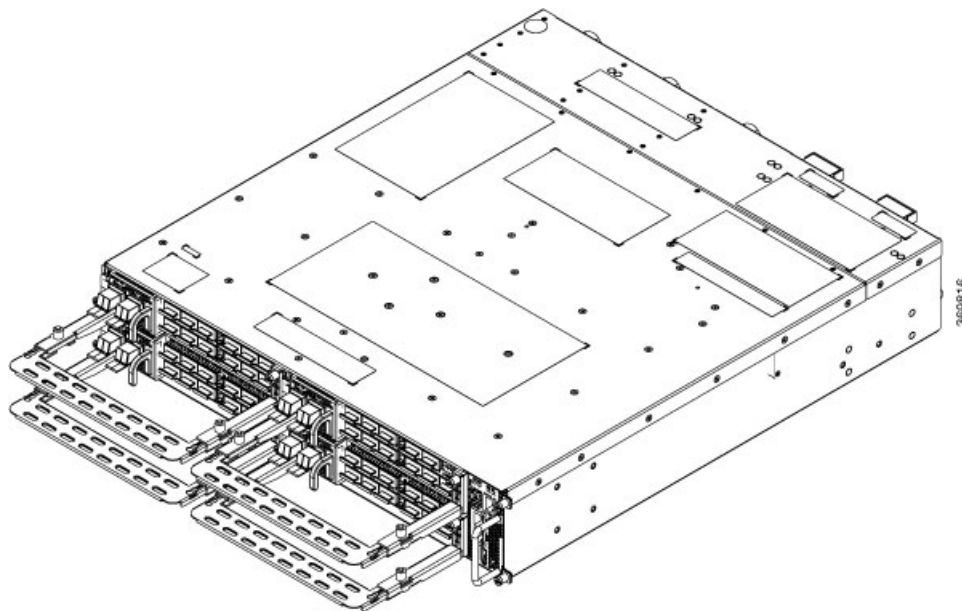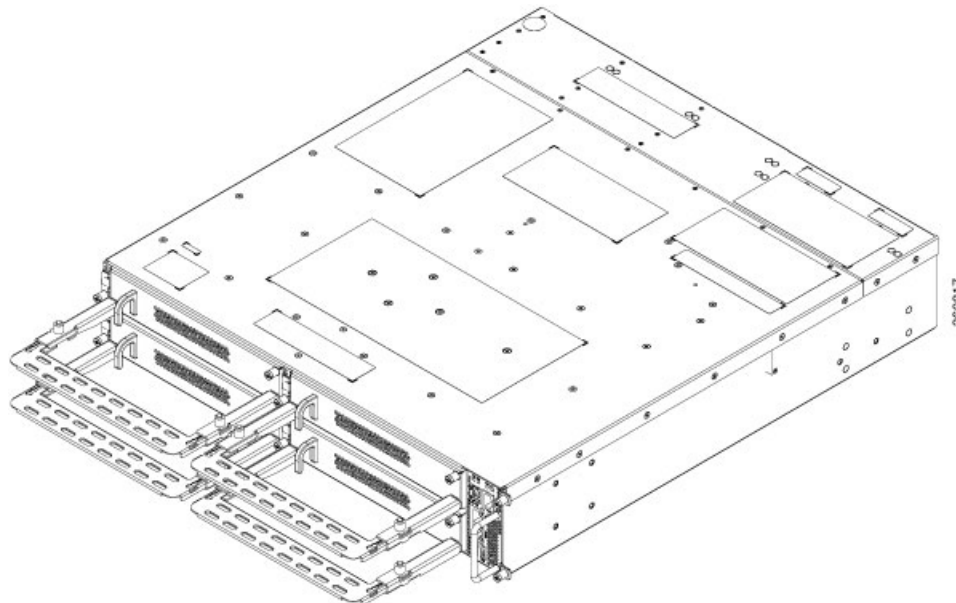**Figure 22: Line Cards fitted with Fiber Management Bracket**

Figure 23: Filler Cards fitted with Fiber Management Bracket

Note In ETSI racks, to maintain a footprint of 600 mm, the cabinet door cannot be installed and the horizontal bar of the fiber management bracket should be maintained at the shortest length. See Adjust Fiber Management Bracket of the 1.2T, 1.2TL, 2-QDD-C, and QXP-K9 Line Cards.

Caution The sliding rail must be used only for first chassis positioning. The chassis must be fixed with screws on the front side.

Caution Use only the fastening hardware provided with Cisco NCS 1004 to prevent loosening, deterioration, and electromechanical corrosion of the hardware and joined material.
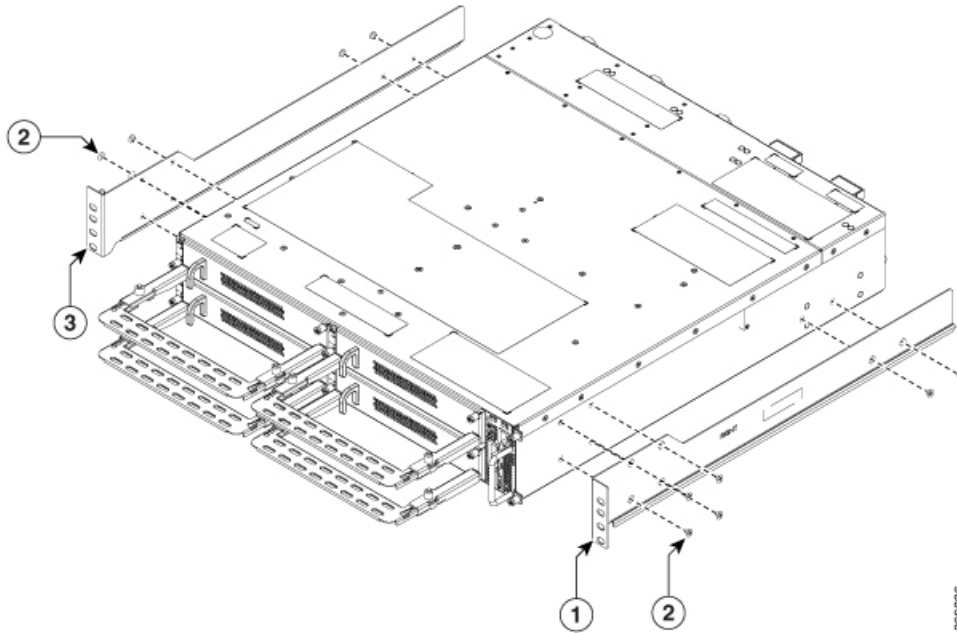
Before you begin

Ensure the rack is compatible. See the Rack Compatibility section.

Step 1 Attach the left and right mounting brackets to the chassis using the screws (48-2029-01) and tighten them to a torque value of 1.5 N-m.

The left and right brackets have been marked accordingly.

Figure 24: Fixing the Brackets

1	Right Bracket (700-116388-01)
2	Screws used for brackets
3	Left Bracket (700-116386-01)

Step 2 Install the four post slider or two post slider on the rack.

    a) Install Two Post Slider into an EIA/ANSI Rack
    b) Install Four Post Slider into an EIA/ ANSI Rack
    c) Install Two Post Slider into an ETSI Rack
    d) Install Four Post Slider into an ETSI rack

Step 3 Insert the chassis (with brackets) onto the sliders assembled on the rack.

Step 4 After the chassis is completely inserted, fasten the chassis with four screws (48-101524-01) on each side of the bracket, and using a number-2 Phillps screwdriver, tighten them to a torque value of 4.65 N-m.

See Install Air Filter, on page 67 for the air filter installation procedure, before you fasten the chassis to the rack.
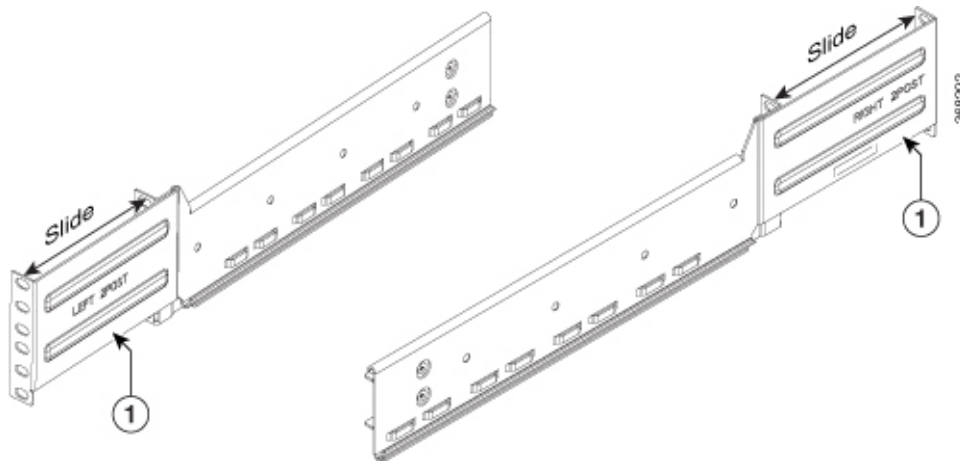
Install Two Post Slider into an EIA/ANSI Rack

This procedure has details about installing the two post slider into an EIA/ ANSI rack.

Step 1 Identify the two post slider and adjust the length of the slider (3" to 5").

Slide the inner sliders and adjust the length to mate with the rack surface.

Figure 25: Two Post Slider Identification

1	Check for marking on the sliders; the right and the left sliders are indicated.

Step 2 Integrate the two post slider with the rack. The procedure for 23" and 19" rack is discussed here:

- 19" rack - the slider can be directly fitted on to a 19" rack. On the front side, insert only the top most screw of the slider (48-101524-01) and tighten it to a torque value of 4.65 N-m. On the rear side, insert three screws (48-101524-01) and tighten to a torque value of 4.65 N-m.

- 23" rack - the slider is fitted on to a 23" rack using an adapter (refer the following image). The formed surface must always face the inner side of the rack post. On the front side of the adapter (towards the chassis), insert only the top most screw of the slider (48-101524-01) and tighten it to a torque value of 4.65 N-m. On the rear side (towards the chassis), insert three screws (48-101524-01) and tighten them to a torque value of 4.65 N-m. For the adapter portion which is towards the rack, all the six screws are fitted on the front and rear side.

Figure 26: Two Post Slider Integration - 19" Rack
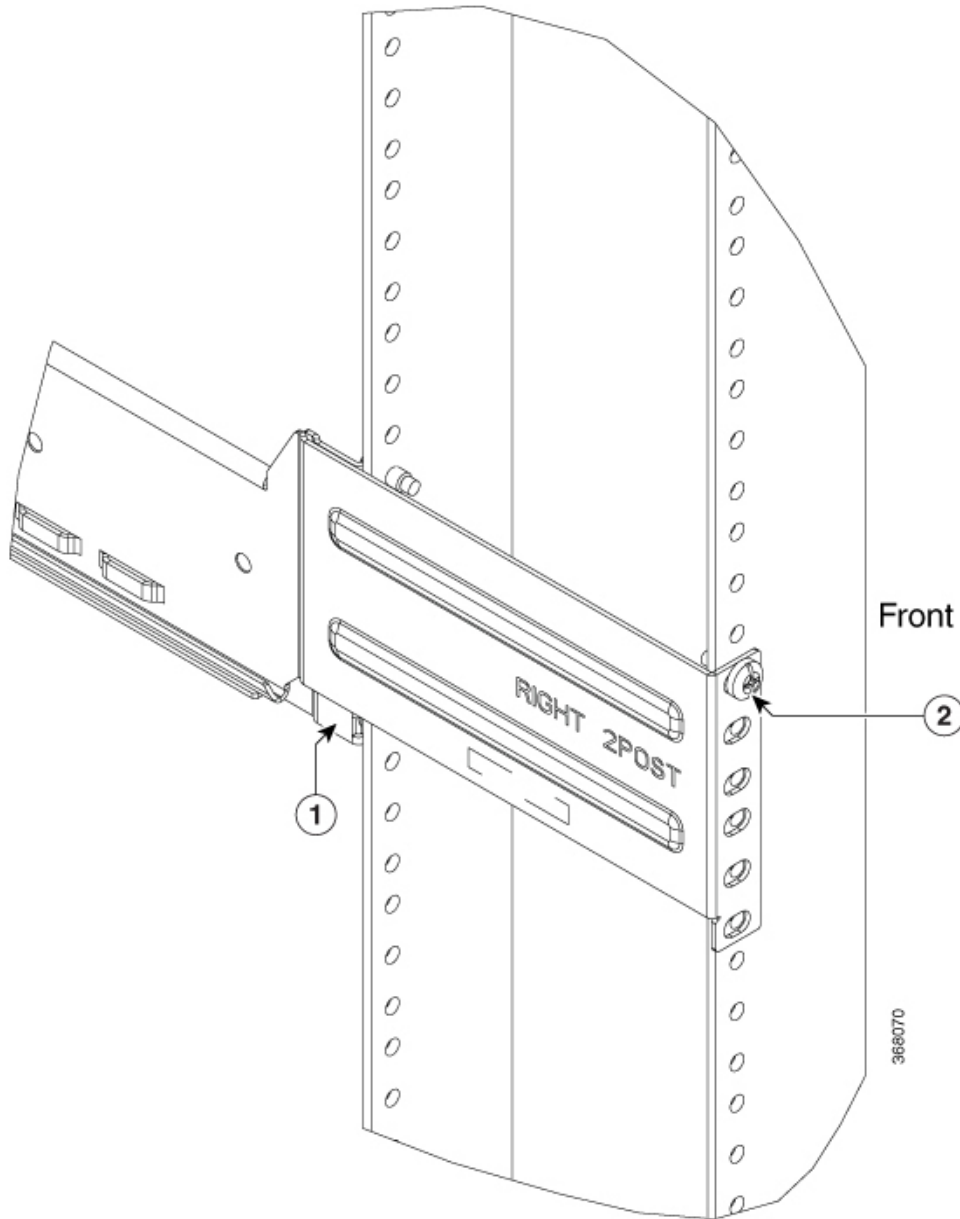
1	Inner surface of the sliding bracket.
2	Slider fixing screws (48-101524-01)

Figure 27: Two Post Slider Integration - 23" Rack
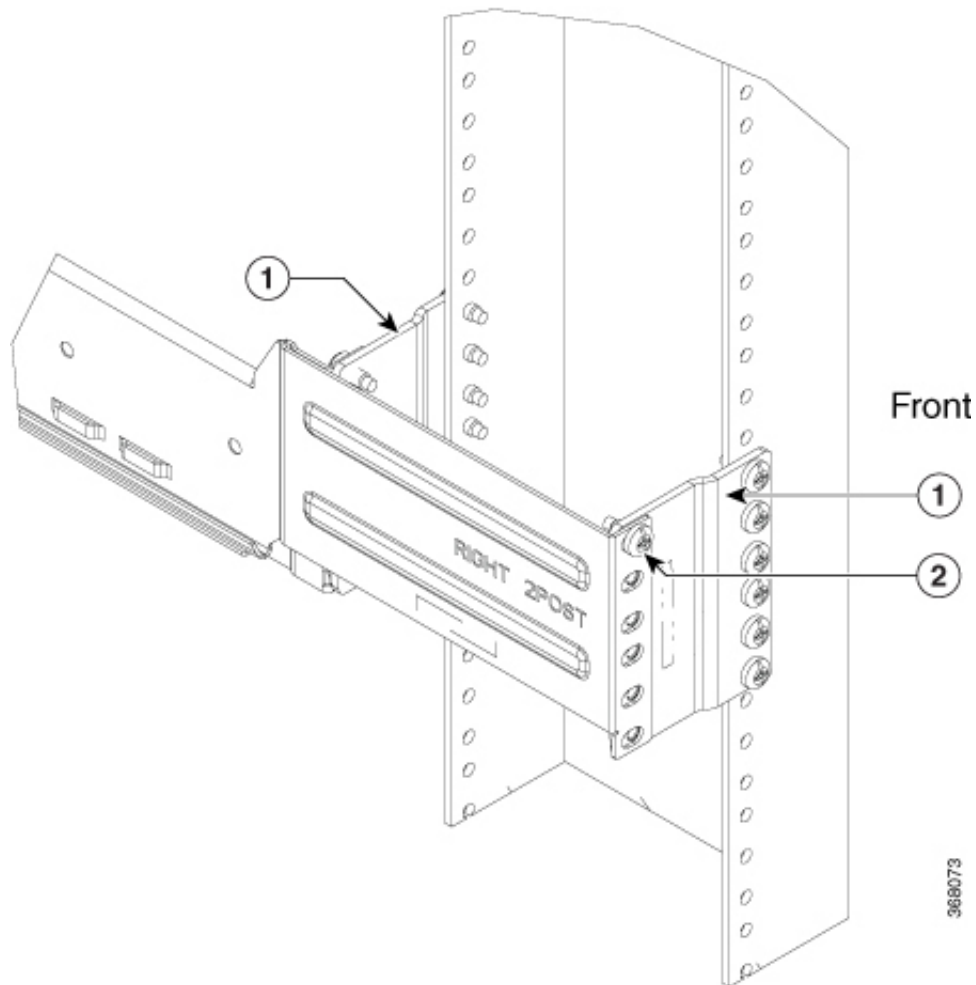

1	Adapter
2	Slider fixing screws (48-101524-01)

Install Four Post Slider into an EIA/ ANSI Rack

This procedure has details about installing the four post slider into an EIA/ ANSI rack.

Step 1   Identify the four post slider and adjust the length of the slider.

Slide the inner slider arm and adjust the length to mate with the rack surface.

Figure 28: Four Post Slider Identification
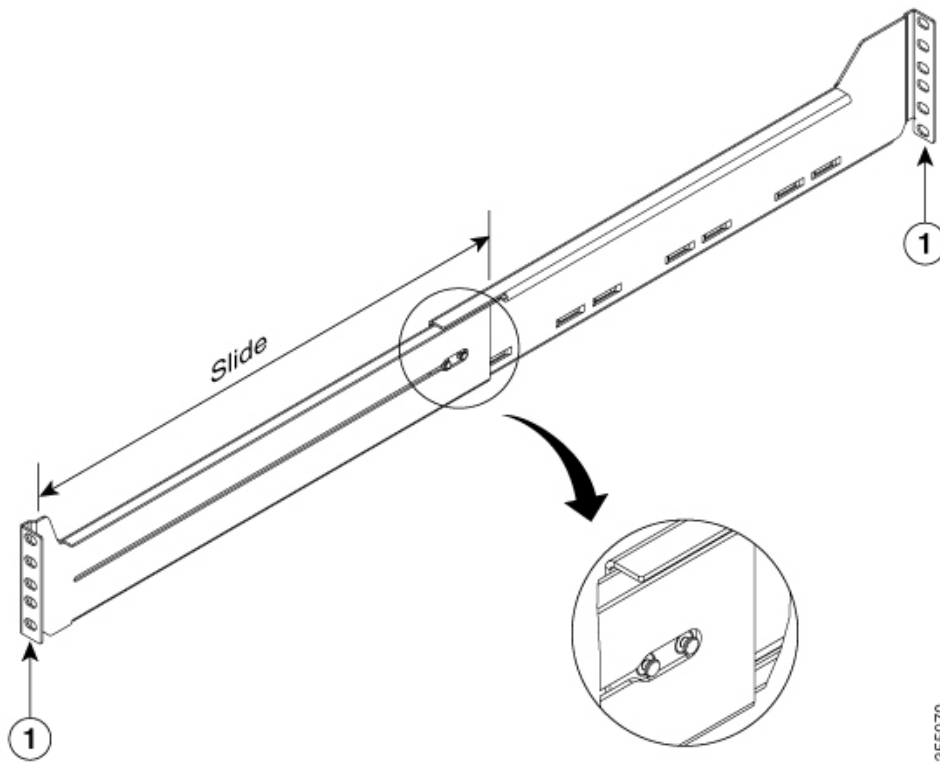
| 1 | Slide and adjust the length of the slider arm. |

Step 2   Integrate the four post slider with the rack. The procedure for the 23" and 19" rack is discussed here:

- 19" rack - the slider can be directly fitted on to a 19" rack. On the front side, insert only the top most screw of the slider (48-101524-01) and tighten it to a torque value of 4.65 N-m. On the rear side, insert five screws (48-101524-01) and tighten them to a torque value of 4.65 N-m.

- 23" rack - the slider is fitted on to a 23" rack using an adapter (refer the following image). The formed surface must always face the inner side of the rack post. On the front side (towards the chassis), insert only the top most screw of the slider (48-101524-01) and tighten it to a torque value of 4.65 N-m. On the rear side (towards the chassis), insert five screws (48-101524-01) and tighten them to a torque value of 4.65 N-m. For the adapter portion which is towards the rack, all the six screws are fitted on the front and rear side.

Figure 29: Four Post Slider Integration - 19" Rack
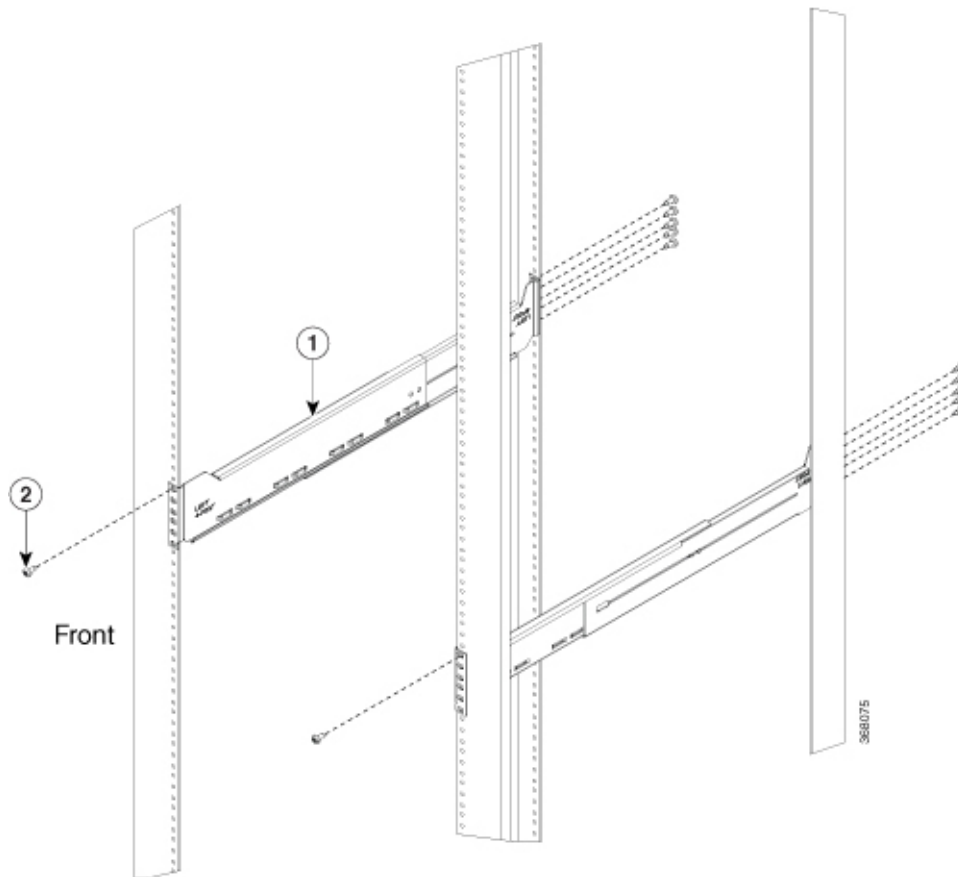
1	Edge surface of the slider
2	Slider fixing screws (48-101524-01)

Figure 30: Four Post Slider Integration - 23" Rack
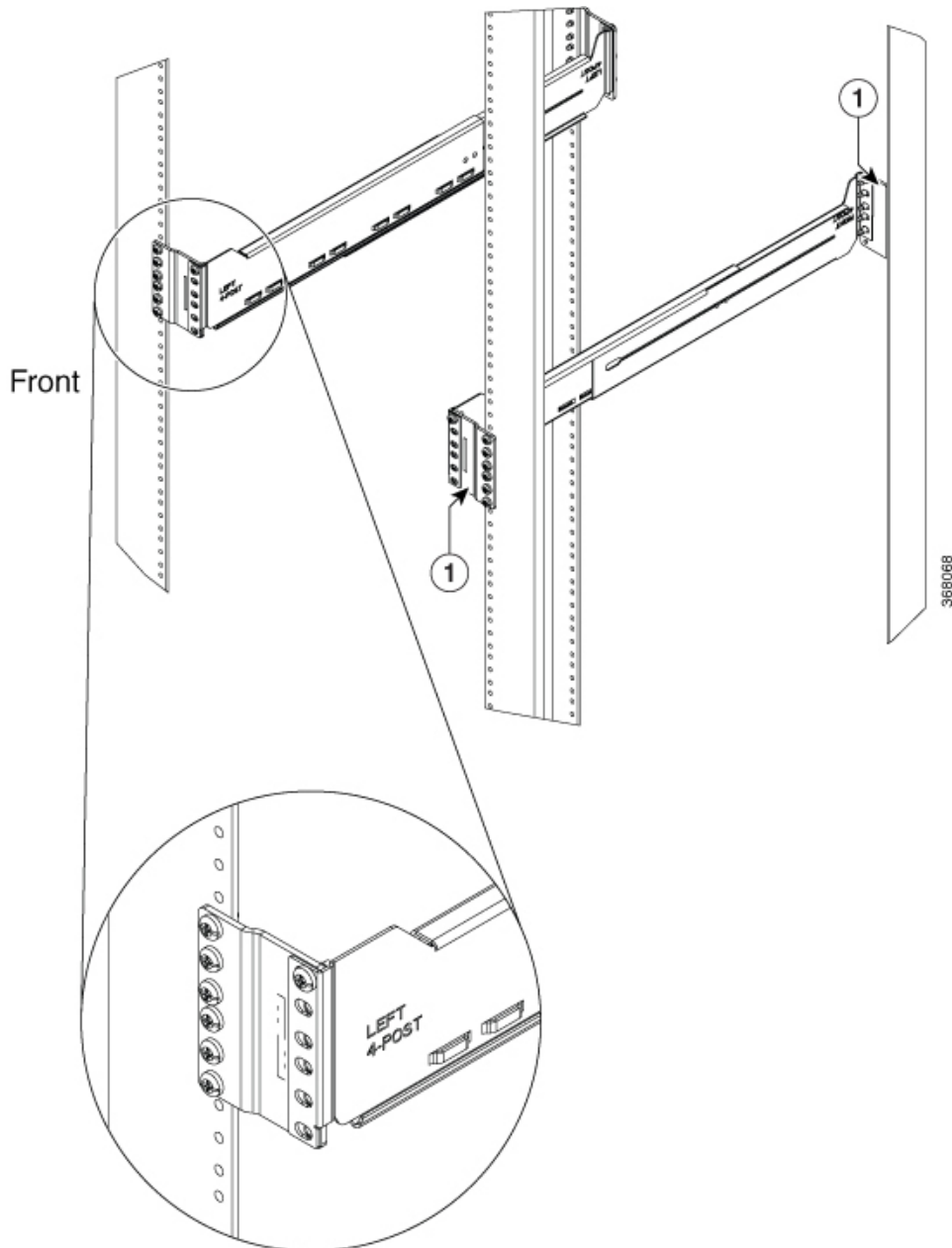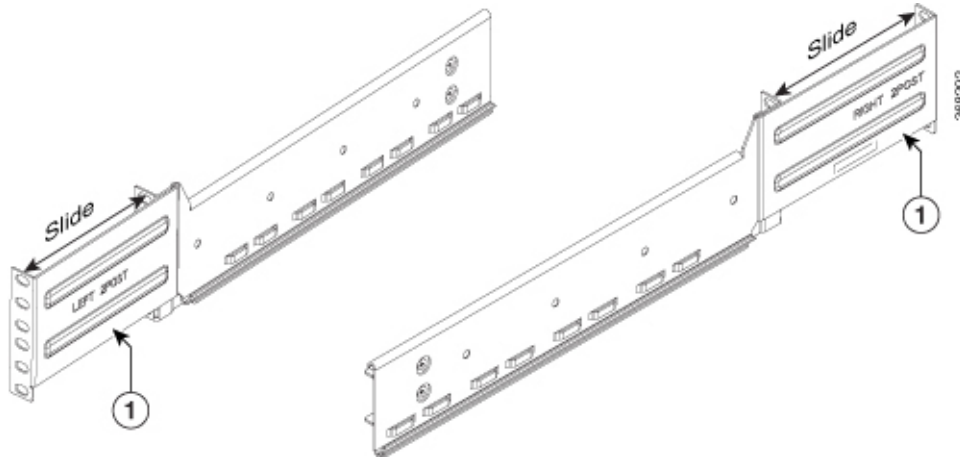

1	Adapter

Install Two Post Slider into an ETSI Rack

This procedure has details about installing the two post slider into an ETSI rack.

Step 1   Identify the two post slider and adjust the length of the slider (3" to 5").

Slide the inner sliders and adjust the length to mate with the rack surface.

*Figure 31: Two Post Slider Identification*

| 1 | Check for marking on the sliders; slide the inner sliders to adjust the length. |

Step 2   Integrate the two post slider with the rack.

The slider is fitted on to an ETSI rack using an adapter (refer the following image). The formed surface must always face the inner side of the rack post. On the front side, insert only the top most screw of the slider (48-101524-01) and tighten it to a torque value of 4.65 N-m. On the rear side, insert three screws (48-101524-01) and tighten them to a torque value of 4.65 N-m.

Figure 32: Two Post Slider Integration - ETSI Rack
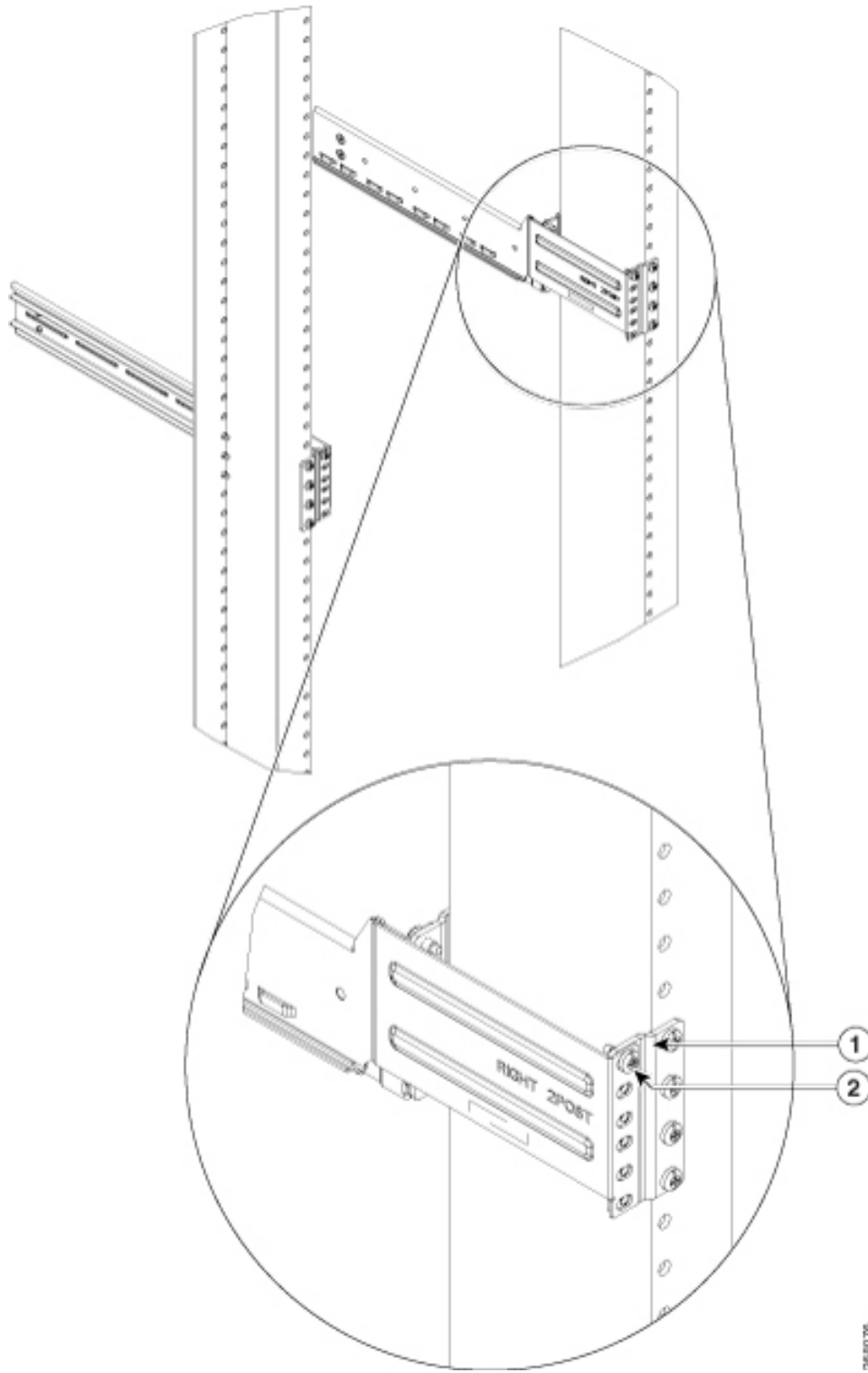
1	Adapter

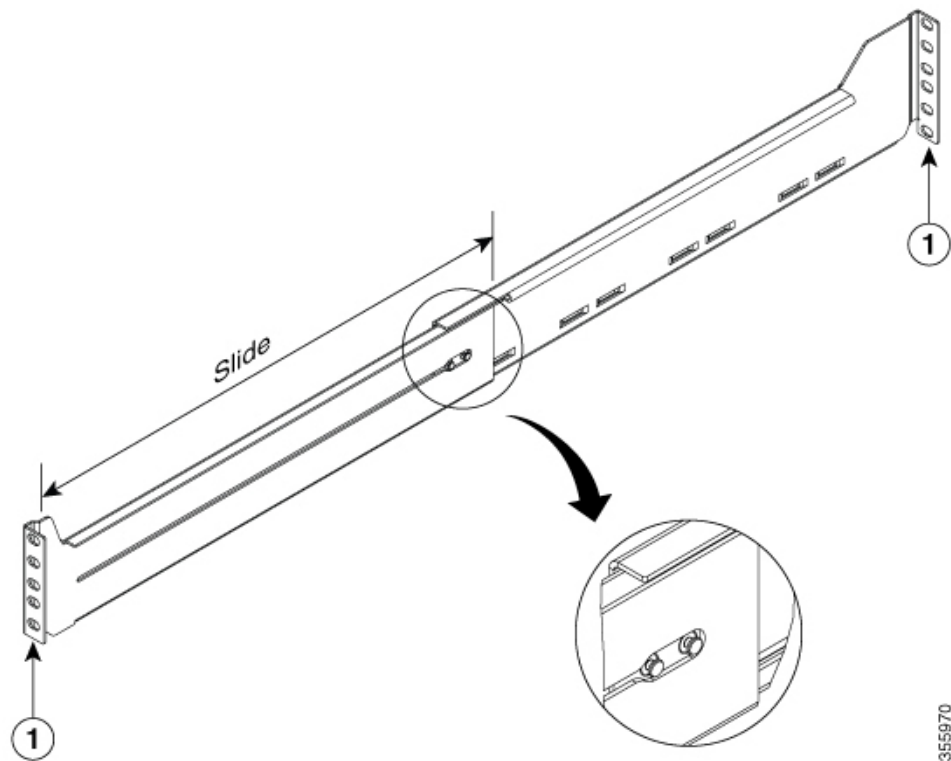| 2	Slider fixing screws (48-101524-01)

Install Four Post Slider into an ETSI rack

This procedure has details about installing a four post slider in to an ETSI rack.

Step 1   Identify the four post slider and adjust the length of the slider.

Slide the inner slider arm and adjust the length to mate with the rack surface.

**Figure 33: Four Post Slider Identification**

1	Slide and adjust the length of the slider arm.

Step 2   Integrate the four post slider with the rack.

The slider is fitted on to an ETSI rack using an adapter (refer the following image). The formed surface must always face the inner side of the rack post. On the front side, insert only the top most screw of the slider (48-101524-01) and tighten it to a torque value of 4.65 N-m. On the rear side, insert five screws (48-101524-01) and tighten them to a torque value of 4.65 N-m.

Figure 34: Four Post Slider Integration - ETSI Rack
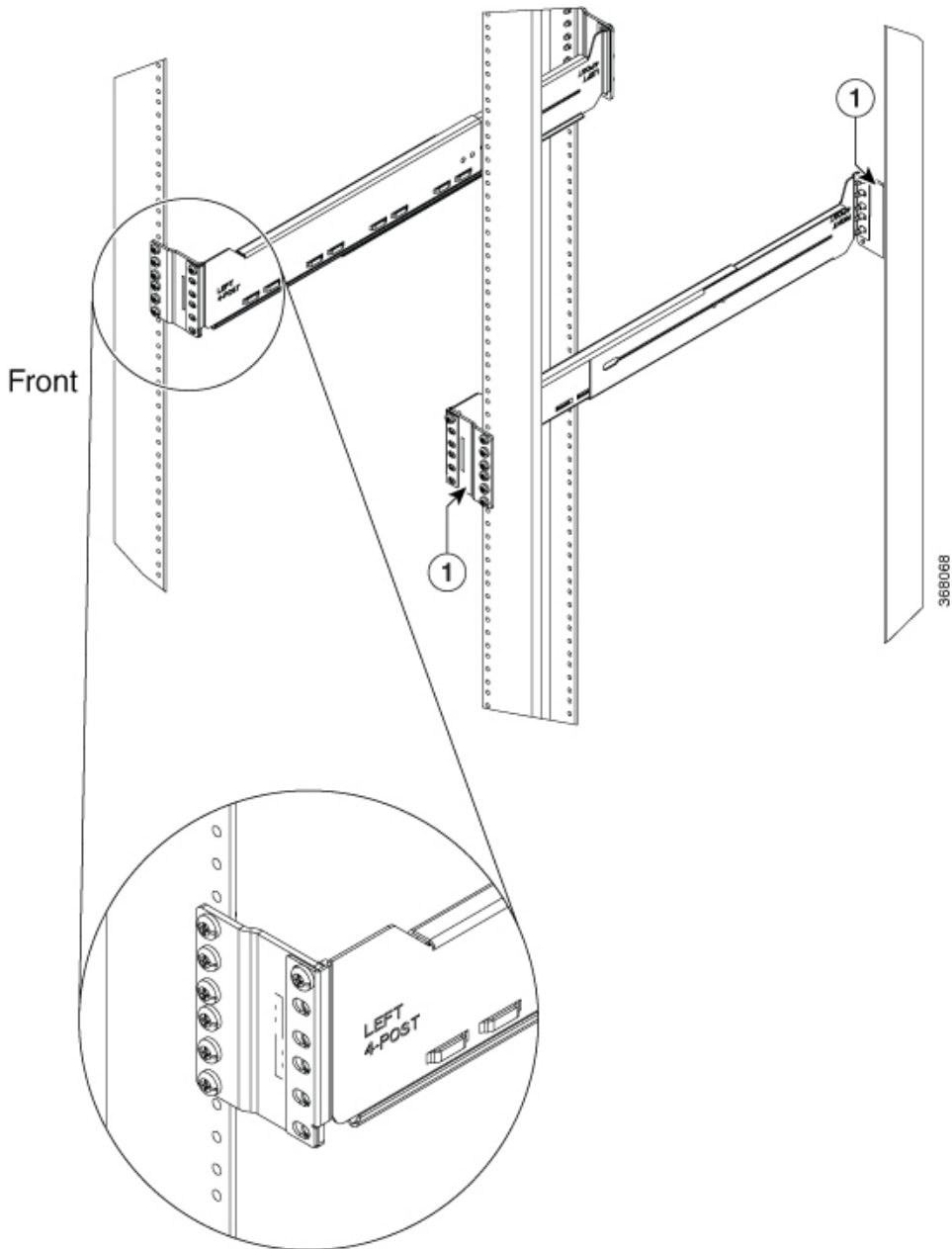
| 1 | Adapter |

Stacking NCS 1004

While stacking multiple Cisco NCS 1004 chassis in a rack, it is recommended to start at the bottom. Install the first chassis of the stack at the bottom and move upwards.
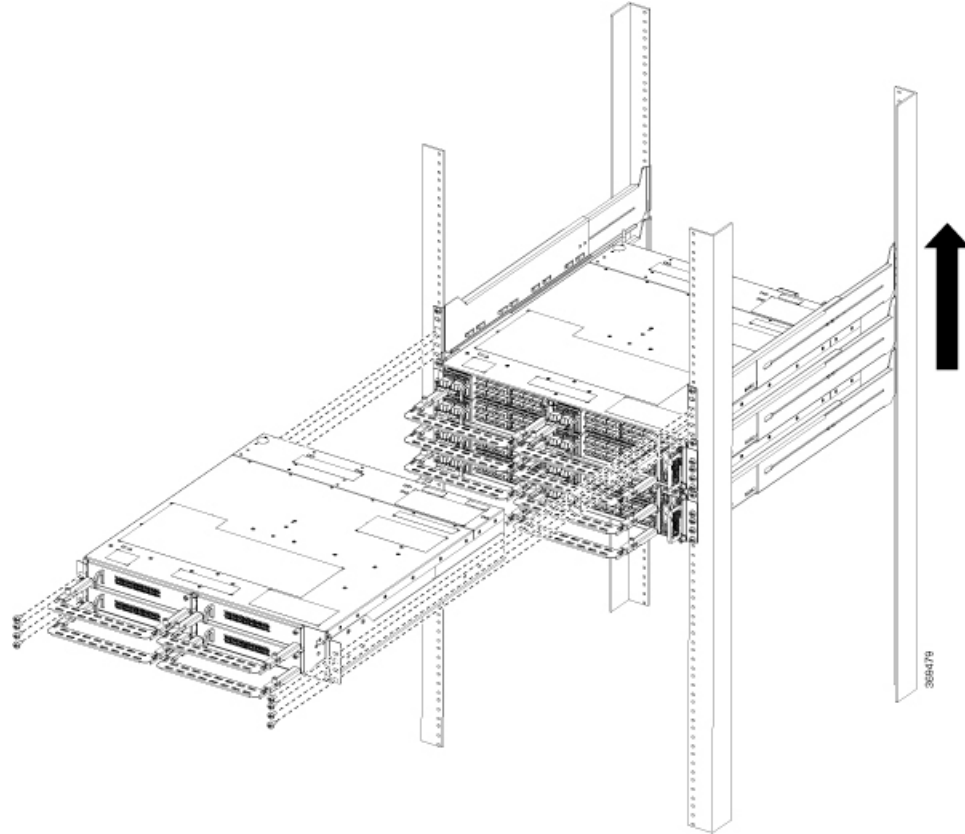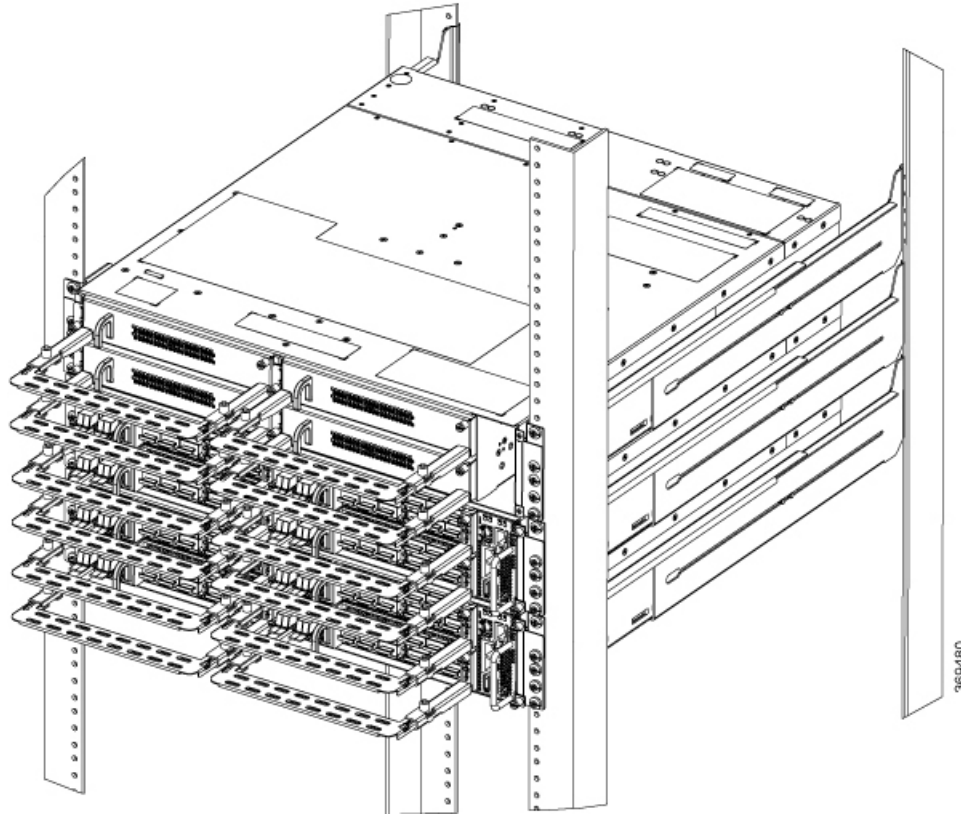
Figure 35: Stacking the NCS 1004

Figure 36: Stacking the NCS 1004

General Power and Grounding Requirements

General power and grounding requirements are:

- Installation of the routing system must follow national and local electrical codes:

  - In the United States: United States National Fire Protection Association (NFPA) 70 and United States National Electrical Code (NEC).

  - In Canada: Canadian Electrical Code, part I, CSA C22.1.

  - In other countries: International Electrotechnical Commission (IEC) 60364, parts 1 through 7.

- Two separate and independent AC or DC power sources are needed to provide 2N redundancy for system power. Each power source requires its own circuit breaker.

- Each power source must provide clean power to the site. If necessary, install a power conditioner.

- The site must provide short-circuit (over-current) protection for devices.

- Proper grounding is required at the site to ensure that equipment is not damaged by lightning and power surges.

✎

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

- Site power planning must include the power requirements for any external terminals and test equipment you will use with your system.

✎

Note Be sure to review the safety warnings in the Cisco Network Convergence System *Regulatory Compliance and Safety Information for the Cisco Network Convergence System 1004* before attempting to install the chassis.

Ground NCS 1004

This task provides the grounding details for the NCS 1004 chassis. In the installation of the chassis, ground lug should be connected first.

There is one grounding point provided at the rear side of the NCS 1004 chassis. The following warning label is affixed on the chassis.

⚠

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

⚠

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

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

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

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

Figure 37: NCS 1004 Ground Lug
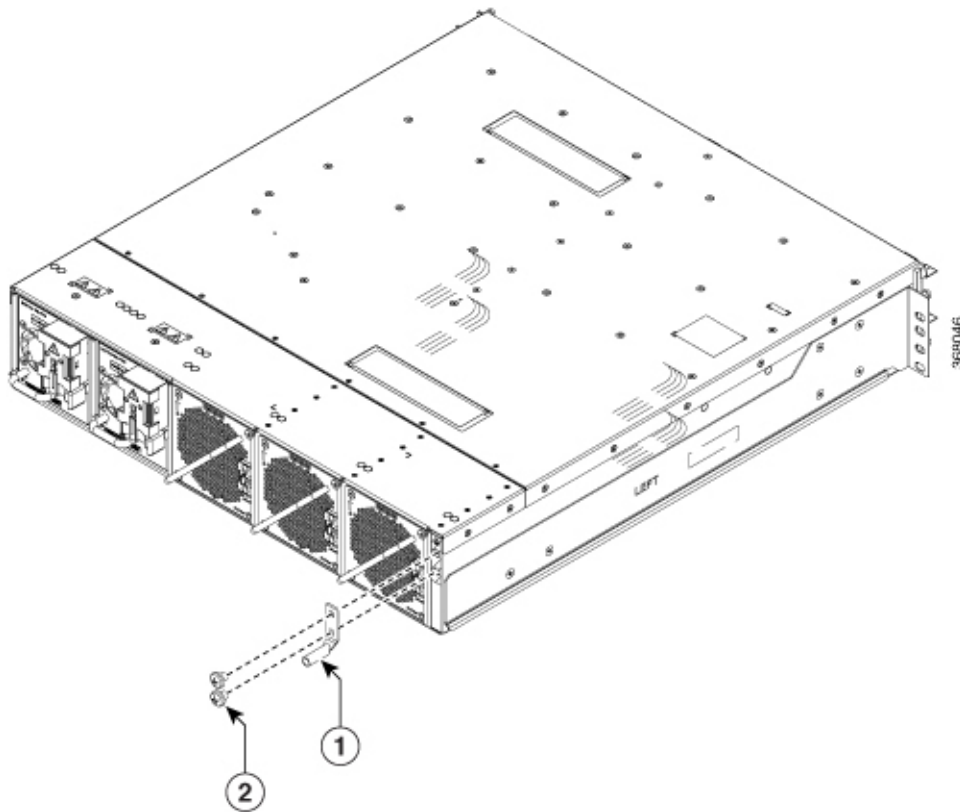
1	Lug
2	Screws used for the lug

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

For ETSI racks, 180-degree lugs are used to maintain the chassis footprint of 600 mm.

Note   Ensure a gap of 50 mm below the chassis for routing the cables.

Step 4   Tighten the M5 pan-head screw (48-1169-01) to a torque value of 3.1 N-m.

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

Power Supply

The NCS 1004 has two slots for 2.1kW AC redundant Power Supply Units (PSU). Both the PSUs must be installed in the chassis at all times, except during replacement. When only one PSU is inserted in the chassis, the Power Module Redundancy Lost major alarm is raised.

PSU power de-rating and option table , including ambient temperature details are here. The power details are for input power.

- AC high voltage range input - 2100 W upto 40-degree C for 1 PSU; 2100 W upto 55-degree C for 2 PSUs (for a short duration, as specified by Telcordia GR-63-Core).

- AC low voltage range input - 1300 W upto 40-degree C for 1 PSU; 1300 W upto 55-degree C for 2 PSUs (for a short duration, as specified by Telcordia GR-63-Core).

- DC power supply - 2100 W upto 40-degree C for 1 PSU; 2100 W upto 55-degree C for 2 PSUs (for a short duration, as specified by Telcordia GR-63-Core).

⚠️

Caution The NCS 1004 chassis needs to have both the PSUs at all times. In case, one of the PSUs is not energized (due to a fault or missing mains), ensure that the system works at an ambient temperature of not more than 40 C.

For DC-DC (2000W @12Vout)

- Input Voltage Rating = -48Vdc / -60Vdc

- Max. Input current @48Vdc = 44A

- Input Voltage range = 40.5 Vdc – 72 Vdc (operating)

- Input turn ON Voltage = -42 Vdc max

- Recommended FUSE rating = 60A max. per feed

For the AC-DC (2000W (HL) / 1300W (LL) @12Vout)

- Input Low Line (LL) Nominal voltage = 100Vac – 127Vac

- Input High Line (HL) Nominal voltage = 200Vac – 240Vac

- Max Input current @100Vac = 15A

- Max Input current @200Vac = 12A

- Input frequency rating = 50/ 60 Hz

- Input LL voltage range = 90Vac - 140 Vac

- Input HL voltage range = 180Vac - 264 Vac

- Input frequency range = 47Hz – 63Hz (nominal 50/60Hz)

- Input turn ON voltage = 80Vac / 175 Vac (LL/ HL)

- Recommended FUSE (HL) = 16A

- Recommended FUSE (LL) = 20A

For the trip time response, the breaker trip curve may be "D" or faster.

Install Cisco NCS 1004 Modules

This chapter contains procedures to install the modules of Cisco NCS 1004.

⚠️

Caution   All the modular slots in the NCS 1004 chassis should always be populated with respective modules (line-cards, controller, PSU & fan units). Empty line card slots to be populated with filler modules, which are shipped with the chassis. The replacement or upgrade of the modules (Online Insertion or Removal, OIR) to be performed only when the ambient temperature is below 30-degree C. The OIR of modules should be completed 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.

520496

Supported Controller Cards

Table 6: Feature History

Feature Name	Release Information	Description
NCS1K4-CNTLR-B-K9 Controller Card	Cisco IOS XR Release 7.5.1	NCS 1004 supports the NCS1K4-CNTLR-B-K9 controller card. The card supports a default of 9600 baud rate on the RS232 console port and runs on BIOS version 5.10.

The Cisco NCS 1004 supports the following controller cards:

- **NCS1K4-CNTLR-K9**

  The NCS1K4-CNTLR-K9 controller card supports a default of 115200 baud rate on the RS232 console port and runs on BIOS version 4.20. The controller card has two USB 3.0, two 10/100/1000 Ethernet, one RS232 console and one SFP ports. The SFP port of the controller card supports 1GE payload.

- **NCS1K4-CNTLR-B-K9**

  The NCS1K4-CNTLR-B-K9 controller card supports a default of 9600 baud rate on the RS232 console port and runs on BIOS version 5.10. The controller card has two USB 3.0, two 10/100/1000 Ethernet, one RS232 console and one SFP ports. The SFP port of the controller card supports 1GE payload.
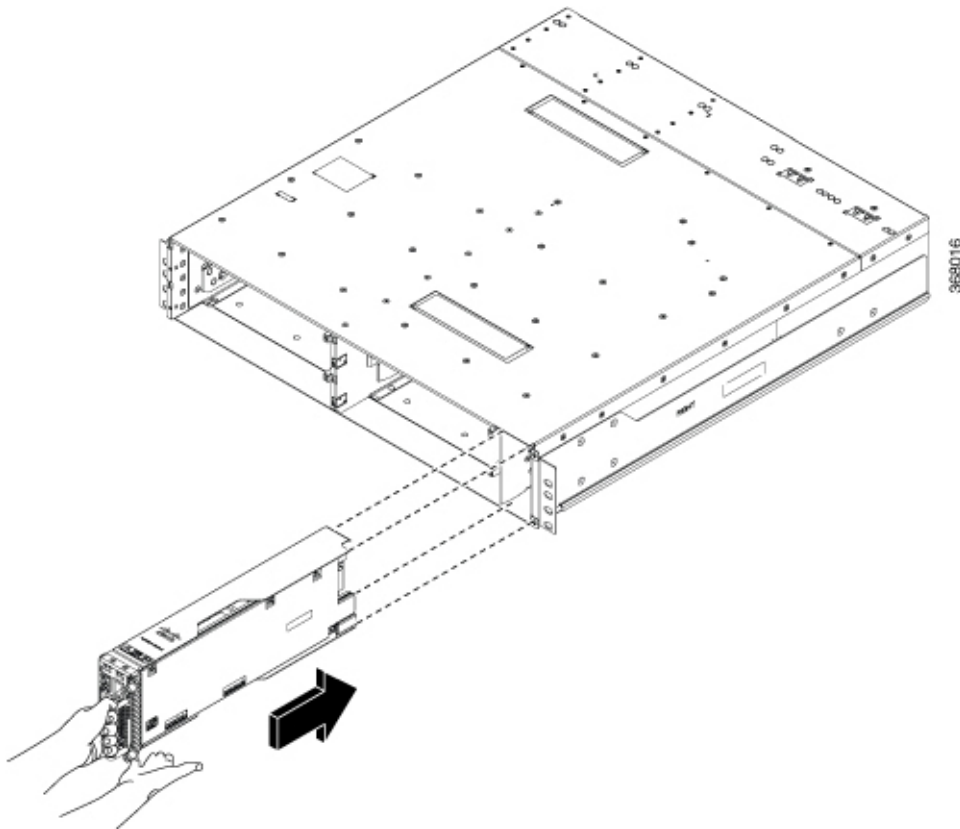
Install Controller

This task has information about installing the controller into the chassis.

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

Step 2 Supporting the controller at the bottom with one of your hands, slide the controller into the slot, using the handle.

Figure 38: Installing the Controller Unit

Step 3   Using a T15 Torx screwdriver, tighten the two M3 T15 torx screws to a torque value of 0.65 N-m.

About Line Cards

The Cisco NCS 1004 supports the following line cards:

- 1.2T DWDM Line Card

- 1.2TL DWDM Line Card

- 2-QDD-C DWDM Line Card

- OTN-XP DWDM Line Card

- NCS1K4-QXP-K9 Line Card

1.2T Line Card

1.2Tbps DWDM line card can provide up to 12 OTU4 or three 400G client ports. For more details of the 1.2T line card, see the data sheet.

The physical characteristics of the 1.2T line card are:

- Height—40.4 mm

- Breadth—191.9 mm

- Depth—277 mm without the fiber management bracket; 297.97 mm with the fiber management bracket

- Weight—3.2 kg

For the LED details of the line card, see the Line Card LEDs, on page 81 section.

1.2TL Line Card

1.2TL DWDM line card can provide up to 8 QSFP-28 based client ports and 2 trunk ports. For more details of the 1.2TL line card, see the data sheet.

The physical characteristics of the 1.2TL line card are same as that of the 1.2T line card. For the LED details of the line card, see the Line Card LEDs, on page 81 section.

2-QDD-C Line Card

Table 7: Feature History

Feature Name	Release Information	Description
NCS1K4-2-QDD-C-K9 C-Band Line Card	Cisco IOS XR Release 7.3.1	NCS 1004 supports the NCS1K4-2-QDD-C-K9 C-Band line card. The card has eight client ports (QSFP28 and QSFP-DD) and two DWDM dual sub-channel module trunk ports. Each trunk port is capable of 200, 300, and 400 Gbps line rate.

2-QDD-C DWDM line card can provide up to eight QSFP client ports, six of which can support QSFP-28 based client ports and remaining two can support QSFP-28, QSFP-DD, QSFP-ZR, and QSFP-ZR+ client ports. For more details of the 2-QDD-C line card, see the data sheet.

The eight client ports are divided into two sets of four slots each. The following two configurations are supported:

- A maximum of eight QSFP-28, four for each set, configured either as 100GE or 100G OTL4.4.

- A maximum of two QSFP-DD/ZR/ZR+, configured as 400GE.

The physical characteristics of the 2-QDD-C line card are:

- Height—40.4 mm

- Breadth—191.9 mm

- Depth—277 mm without the fiber management bracket; 297.97 mm with the fiber management bracket

- Weight—3.2 kg

For the LED details of the line card, see the Line Card LEDs, on page 81 section.

OTN-XP Line Card

The OTN-XP line card supports up to 1.6Tbps of OTN aggregation switching functionality to optimize the available bandwidth. A single line card supports 8x100GE muxponder or 2x400 GE transponder applications.

The OTN-XP line card contains:

- Eight QSFP 28 ports

- Four QSFP-DD ports

- Two CFP2 ports

For LED details of the card, see LEDs of OTN-XP Line Card , on page 84.

The OTN-XP line card supports 400GE/OTUC4, 100GE/OTU4, 10GE/OTU2/OTU2e, 16G FC, 32G FC client rates.

The supported operating modes are:

- 2x Muxponder

- 2x Transponder

- Single-card 1.2T OTN XPonder

- Dual-card 1.6T OTN XPonder

The physical dimensions of the OTN-XP line card are:

- Height—40.4 mm

- Breadth—191.9 mm

- Depth—282 mm without fiber management bracket; 366.7 mm with fiber management bracket

- Weight—2.6 kg

Note When the data path device temperature of the OTN-XP card exceeds the critical threshold level of 108° Celsius, a sensor alarm is raised and the data path is shut down. This impacts traffic. However, the card is still operational.

For more details about the OTN-XP line card, see the data sheet.

QXP-K9 Line Card

Table 8: Feature History

Feature Name	Release Information	Description
NCS1K4-QXP-K9 Line Card	Cisco IOS XR Release 7.7.1	NCS1K4-QXP-K9 line card delivers low cost 100G and 400G DWDM transmission with ZR+ optics on a router. This line card can be used in both traditional Optical Networking solution and in Routed Optical Networking solution. This line card has 16 pluggable ports with eight QSFP-DD client ports and eight QSFP-DD trunk ports.
		For more information about the NCS1K4-QXP-K9 card, see the datasheet.
		NCS1K4-QXP-K9 card supports the following key features:
		• Client rates: 400GE, 4x100GE, and 100GE Ethernet
		• Modulation formats: 16 QAM for 400GE Txp/4x100GE Mxp and QPSK for 100GE Txp
		• Smart licensing: The license calculation is based on the number of trunk slices provisioned.
		For more information about the key features, see QXP Card and smart licensing.

The QXP-K9 line card provides up to 16 QSFP-DD ports (eight QSFP-DD client ports and eight QSFP-DD trunk ports). The card supports 400G ETH, 4x100GE ETH, and 100G ETH without FEC client rates.

The supported operating modes are:

- 400G-TXP

- 4*100G MXP

- 100G TXP [without FEC]

The physical dimensions of the QXP-K9 line card are:

- Height—40.4 mm

      • Breadth—191.9 mm

      • Depth—277 mm without the fiber management bracket; 394.7 mm with the fiber management bracket

      • Weight—2.5 kg

For LED details of the line card card, see LEDs of QXP-K9 Line Card, on page 86. For more details of the QXP-K9 line card, see the data sheet.

Install Line Card

☞

Important   Release 7.0.1 requires one of these options if the line card does not restart or crashes:

      • Install the Mandatory Software Maintenance Upgrades

Cisco IOS XR Software Release	SMU File Names
7.0.1	ncs1004-7.0.1.CSCvr50760.tar
	ncs1004-sysadmin-7.0.1.CSCvr50760.tar

      • Upgrade

Migrate the software to Cisco IOS XR Software Release 7.1.1 or later. These releases do not require any of the SMUs.

See the NCS 1001 Software Download page for the latest software releases.

This task has details about installing a line card in to the NCS 1004 chassis. The chassis is shipped with filler cards and/or line cards. The Cisco NCS 1004 chassis supports a maximum of four line cards.

Before you begin

It is mandatory to attach the fiber management brackets to the filler cards and line cards before installing the chassis onto a rack. For a detailed procedure, see the Attach Fiber Management Bracket section.

✎

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

Step 1   Unscrew the Torx screws of the filler card using a T15 Torx screwdriver.

Step 2   Holding the fiber management bracket of the filler card with one hand and supporting it with the other, remove the filler card from the chassis.

Step 3   Attach the fiber management bracket to the line card that needs to be installed. Follow the procedure as mentioned at the beginning of the section.

Step 4   Orient the line card. Check for the *This Side Up* label.

Step 5   Use both the hands while inserting a line card. Use one hand to hold the line card using the fiber management bracket and the other hand along the base of the card to guide it into the slot.

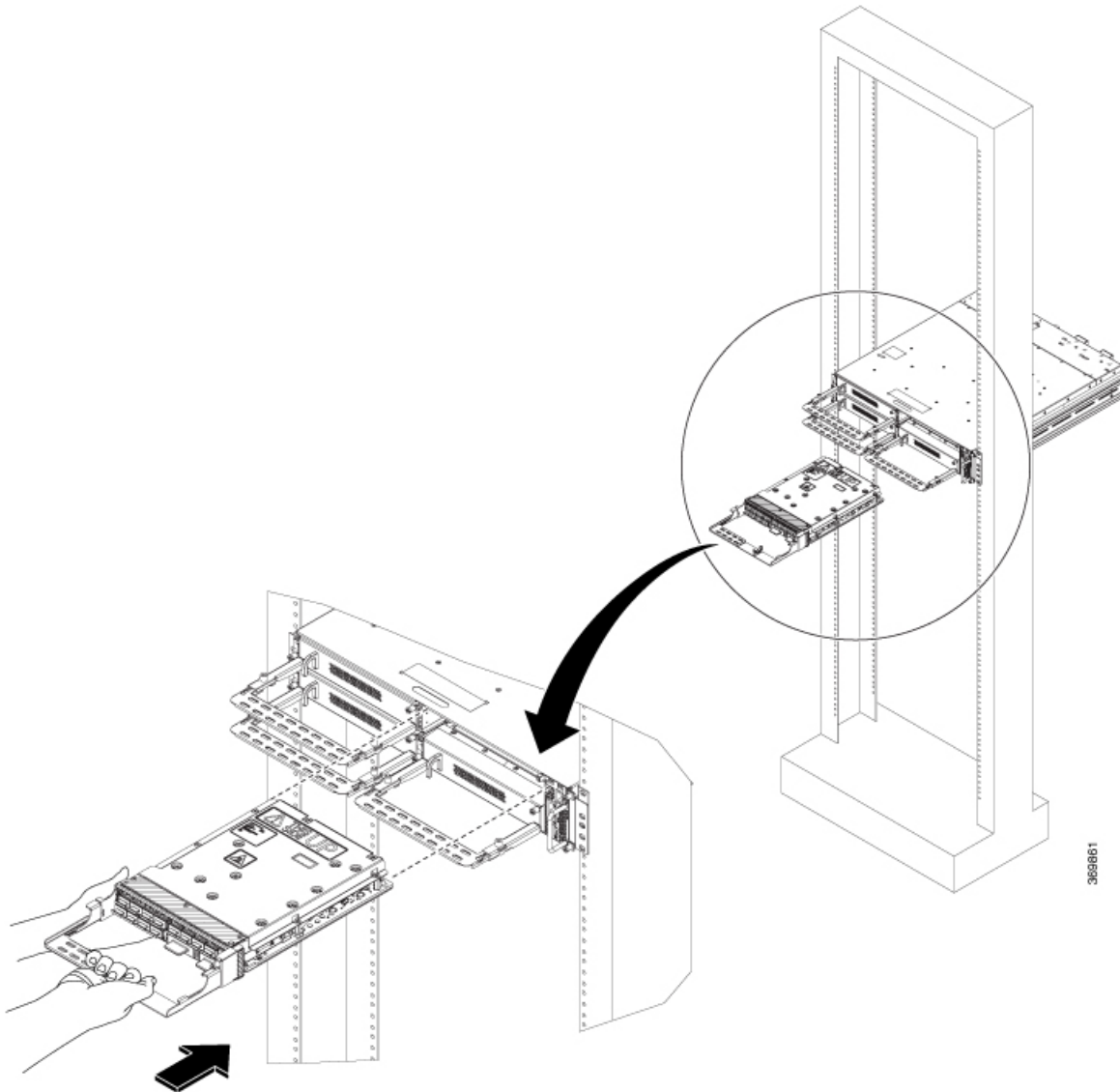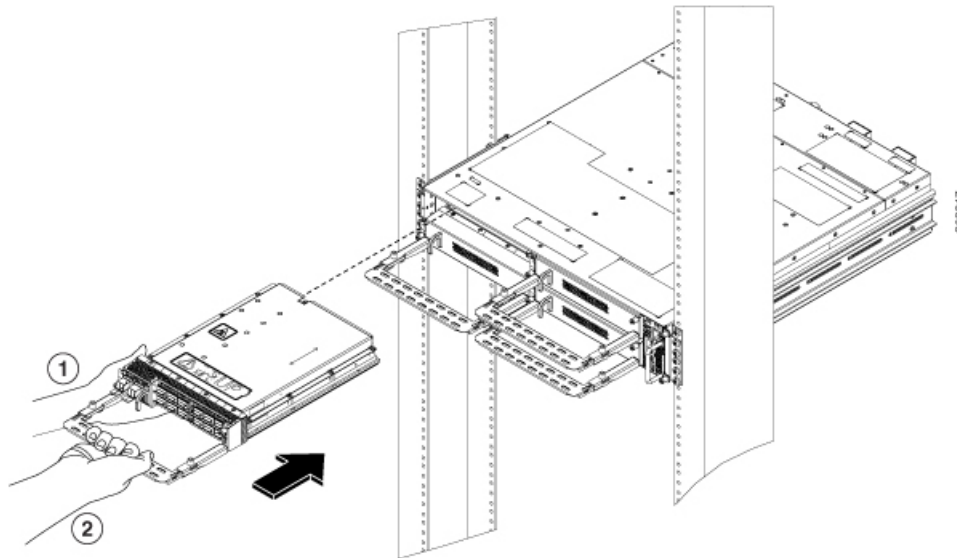*Figure 39: Installing the OTN-XP Line Card*

Figure 40: Installing the 1.2T, 1.2TL, 2-QDD-C, and QXP-K9 Line Cards

| 1 | Support the line card with your hand at the bottom, while installing (or removing) a line card. |
| 2 | Use the fiber management bracket for holding the line card. |

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

Step 6   Slide the line card completely inside, into the card guide.

Step 7   Using the Torx screwdriver, tighten the two M3, T15 Torx screws of the line card, to a torque value of 0.65 N-m.

Install Power Supply

This task has information about installing the PSUs into the NCS 1004 chassis.

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

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 (the locking latch needs to pressed and released only for removing the PSU).

Figure 41: Installing a PSU
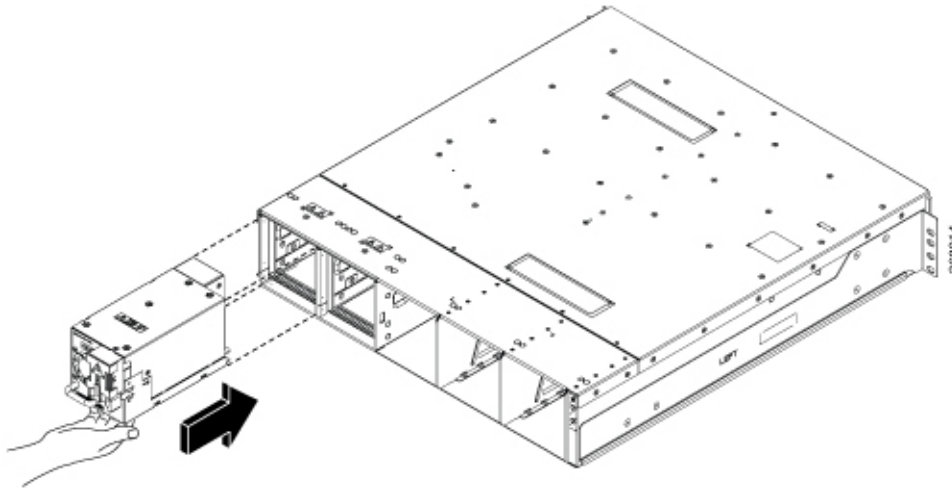
Connect DC Power to NCS 1004

⚠️

Caution   NCS 1004 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 42: Rating Label for DC Power

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

Step 2   Measure and cut the cables as needed to reach NCS 1004 from the fuse panel.

**Step 3**   Dress the power according to local practice.

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

Step 5   Affix the power lug on the unit with two screws. Tighten the screws using a torque of 2.7 Nm +/- 0.3 Nm.

> **Caution**   A torque level greater than 3.0 Nm may damage the unit.

Use #6AWG cables. Ensure a minimum gap of 50 mm below the chassis, for routing the cables. For ETSI racks, 180-degree power lugs are used to maintain 600 mm footprint.

Figure 43: Connecting DC Power
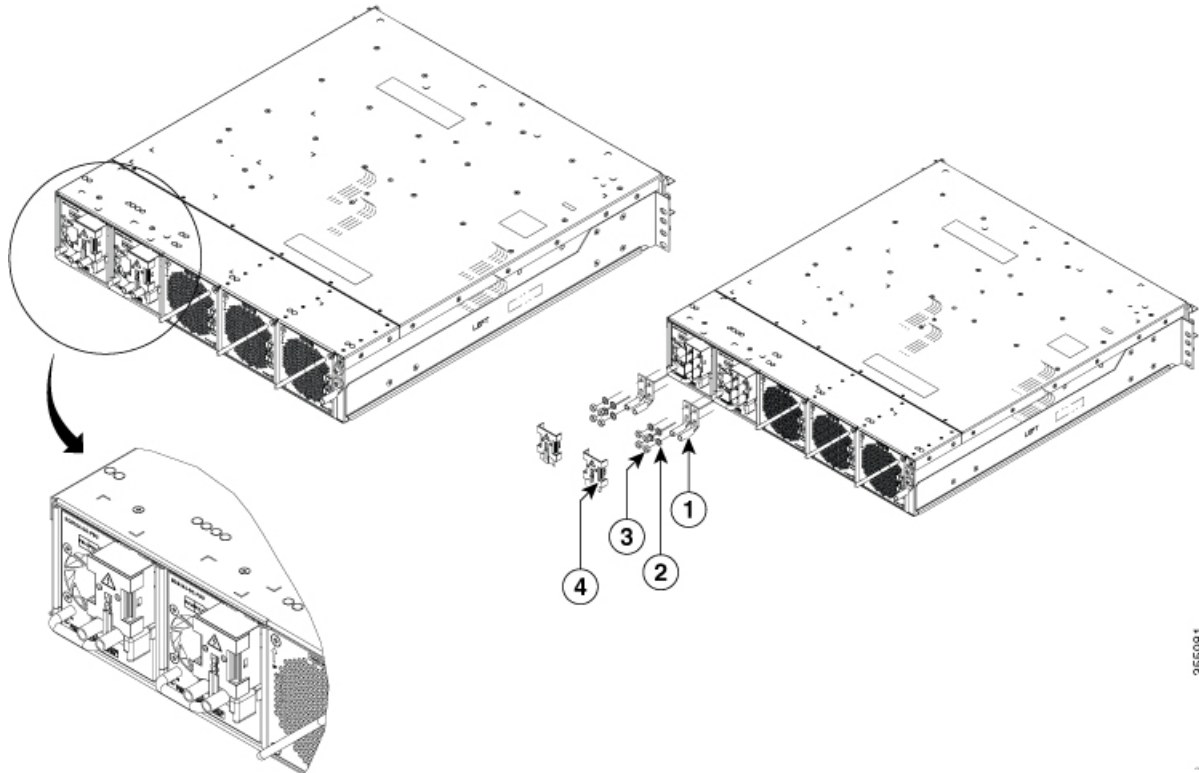
1	Lugs crimped with DC power cords
2,3	Fasteners for DC lugs
4	Protection Cover

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

Snap fit the protection cover towards the top for 90-degrees lugs and push it down for straight lugs.

Connect AC Power to NCS 1004

⚠️

Caution NCS 1004 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 44: Rating Label for AC Power

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

✏️

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 Vac to 240 Vac, and 20A for input voltage 100 Vac to 127 Vac.

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.

Note Ensure that there is a minimum gap of 50 mm for routing the cables. Use a 90-degree exit cable to maintain a footprint of 600 mm for ETSI racks.

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

Figure 45: Connecting 90-degree Power Cable
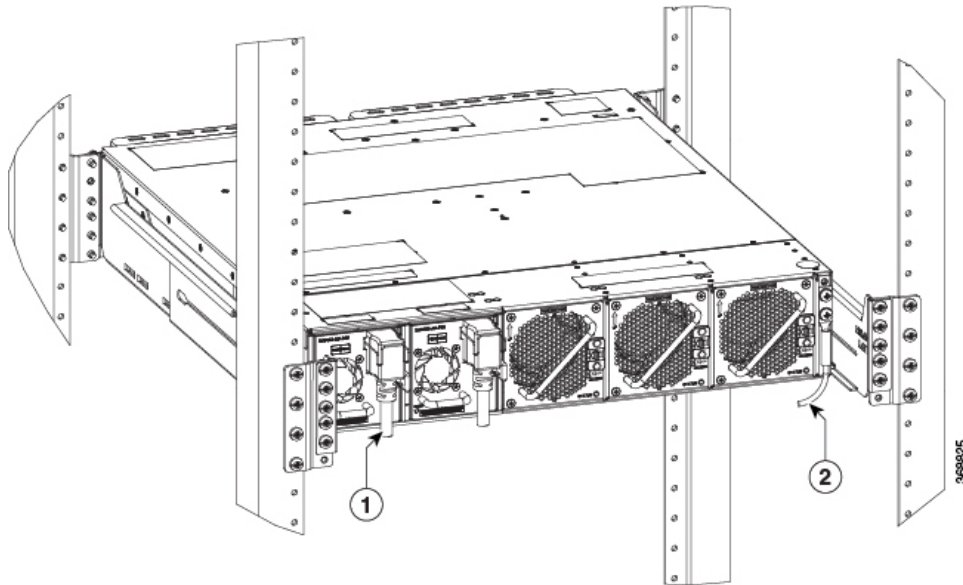
1	90-degree exit cables
2	180-degree ground lug

Figure 46: Connecting Straight Power Cable

1	Straight exit cables
2	90-degree ground lug

Install Fan Unit

This task has information about installing the fan units into the chassis.

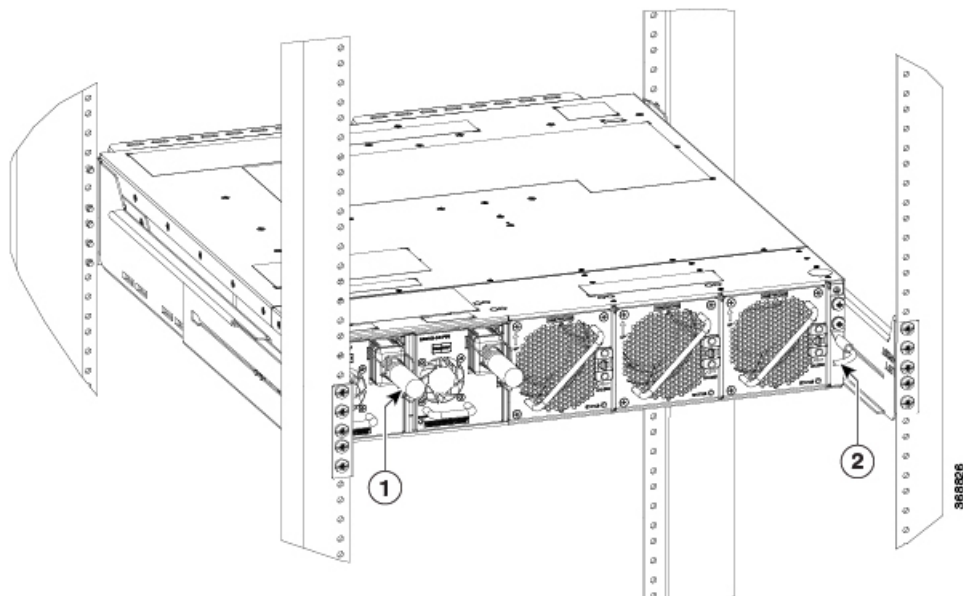**WARNING:** DO NOT INTRODUCE BODY OR OBJECT IN THE CHASSIS / PSU / FAN TRAY / LC SLOTS WHEN INSTALLING OR REMOVING A MODULE. EXPOSED CIRCUITRY IS AN ENERGY HAZARD.

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.

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

Step 2 Holding the handle with one hand and supporting the fan unit with the other hand, insert the fan unit in to the slot on the rear side of the chassis.

Push the spring loaded lever to the left and hold it in the unlock position (holding position) using your thumb while inserting the fan unit.

Figure 47: Inserting a Fan unit
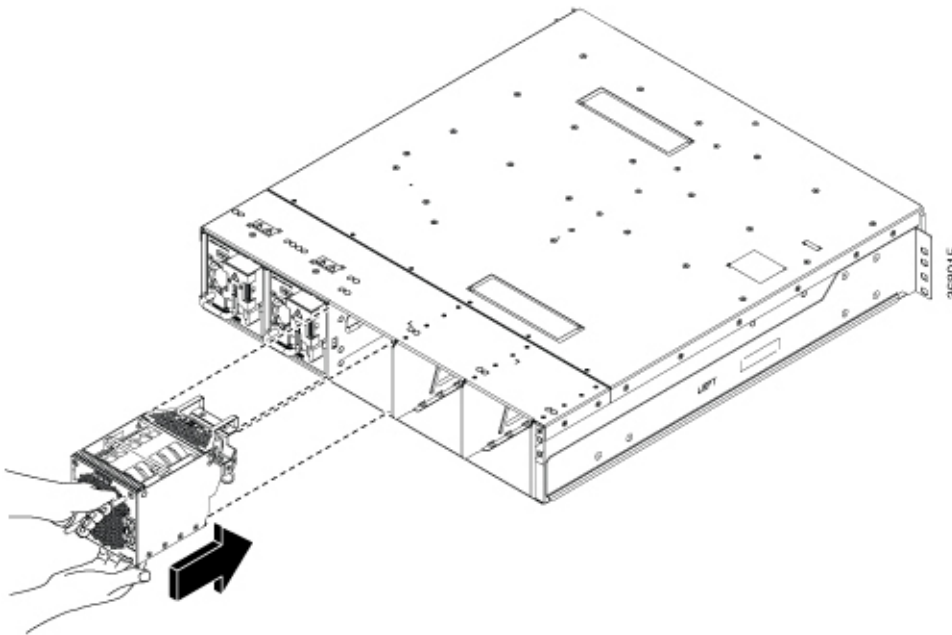
Step 3 Release the spring-loaded lever to lock the fan unit in its position.

Figure 48: Spring-loaded Lever in Released Condition
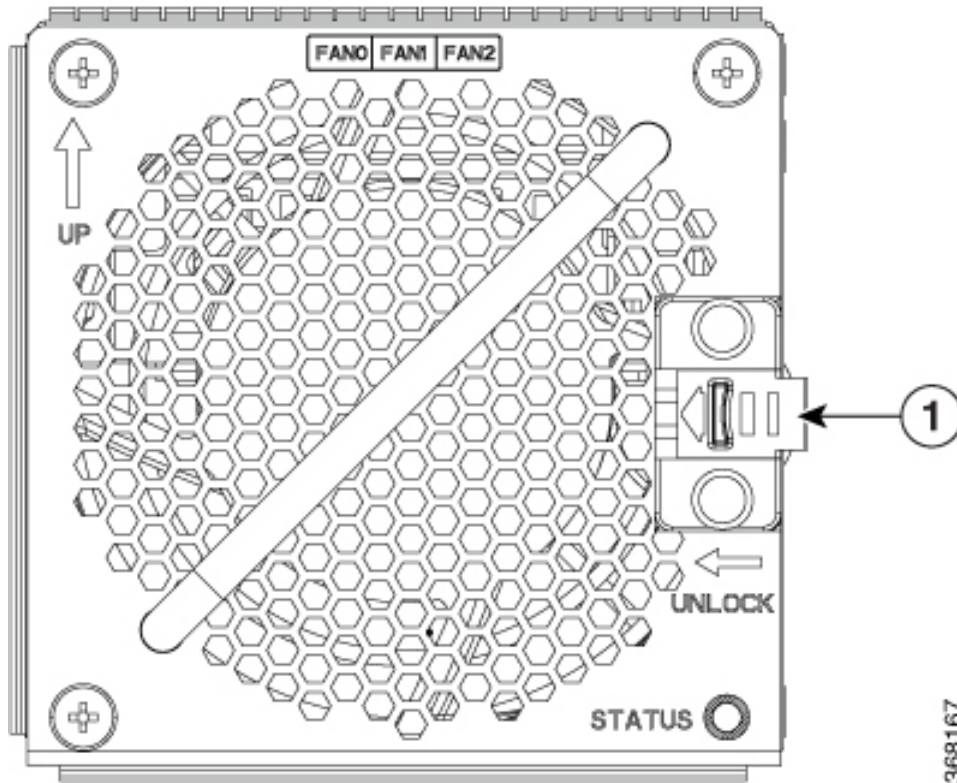
1	Sping-loaded lever

Attach Fiber Management Bracket

This task has details about attaching a fiber management bracket to a line card or filler card.

Step 1 Fix the fiber management bracket to the card (line card or filler card, as the case may be).

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

The procedure to adjust the length of the fiber management bracket is discussed in the subsequent section.

Adjust Fiber Management Bracket of the 1.2T, 1.2TL, 2-QDD-C, and QXP-K9 Line Cards

This task has details about how to adjust the length of the fiber management bracket.

Note We recommend that you maintain the fiber management bracket in the shorter position for ETSI racks, to maintain 600 mm footprint. We also recommend that you adjust the bracket length before the installation.

Step 1 Push the plunger pins downwards on both the sides of the bracket, to disengage the horizontal bar.

Figure 49: Adjusting the Fiber Management Bracket
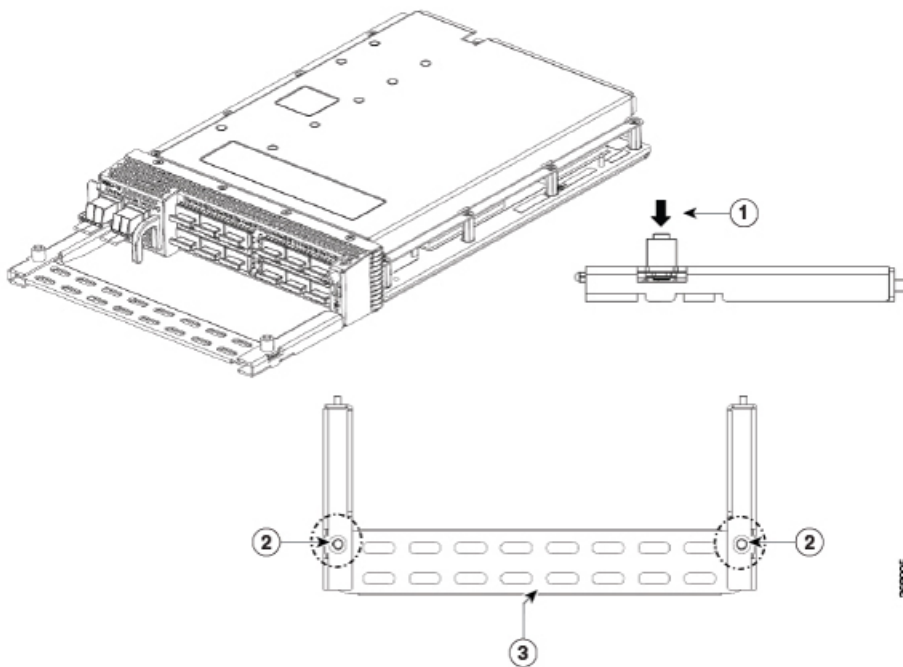
1	Press the plunger pins in the direction, as shown.
2	Plunger pins
3	Horizontal bar

Step 2 Pull the horizontal bar of the fiber management bracket outwards to increase the length of the bracket.

The plunger pins lock the bracket when the horizontal bar is fully extended.

You can verify whether the plunger pins are locked based on the visibility of their grooves.

• If both grooves are visible, the pins are disengaged.

- If no one groove is visible, the bar is in transient stage.

- If one grove is visible, the bar is correctly installed and locked.

Figure 50: Fiber Management Bracket in the Extended Position
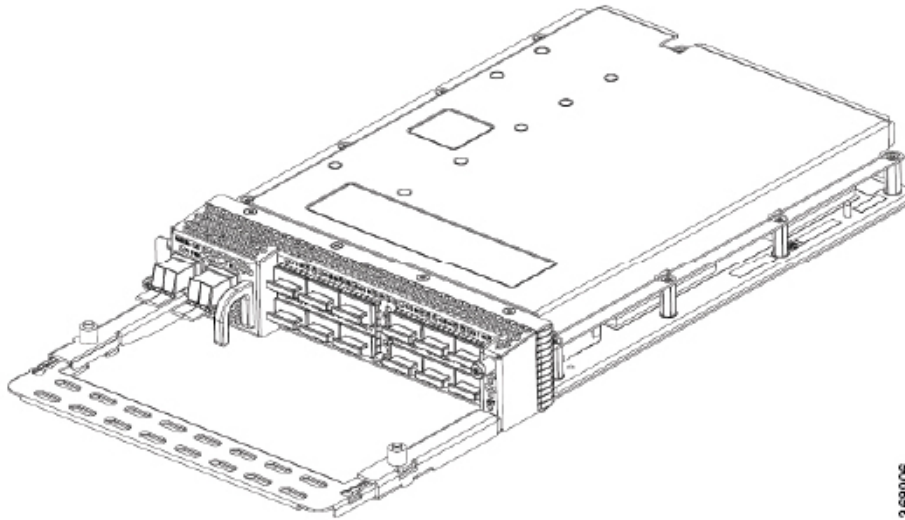
Adjust Fiber Management Bracket of the OTN-XP Line Card

This task has details about how to adjust the length of the fiber management bracket for racks.

Before you begin

It is mandatory to attach the fiber management brackets to the filler cards and line cards before installing the chassis onto a rack. For a detailed procedure, see the Attach Fiber Management Bracket section.

Using a T15 Torx screwdriver, unscrew and remove the two sets of screws on either side.

Figure 51: Fiber Management Bracket Set

1	Fiber management bracket

Install Pluggables

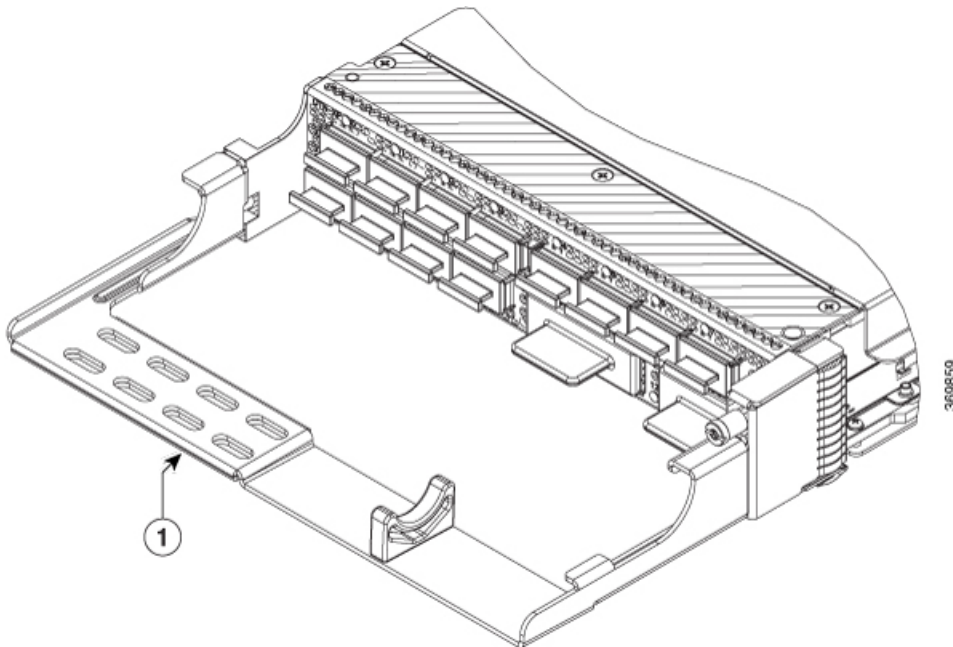This task has information about installing the pluggables on a line card. The line card is shipped with dust caps.

⚠️

Caution Protect the line card by inserting dust caps into the pluggable slots when no pluggable is inserted.

Transceivers, fiber-optic cables and optical ports on the line cards must be kept clean and free of dust to maintain high signal accuracy and to prevent damage to the connectors. They must be covered with protection or dust cap when not in use.

Step 1 Remove the dust plugs.

You can retain and reuse the dust plugs.

Step 2 Orient the pluggable as shown in the following figure and slide it into the slot.

Figure 52: Inserting QSFP Pluggable (1.2T Line Card)
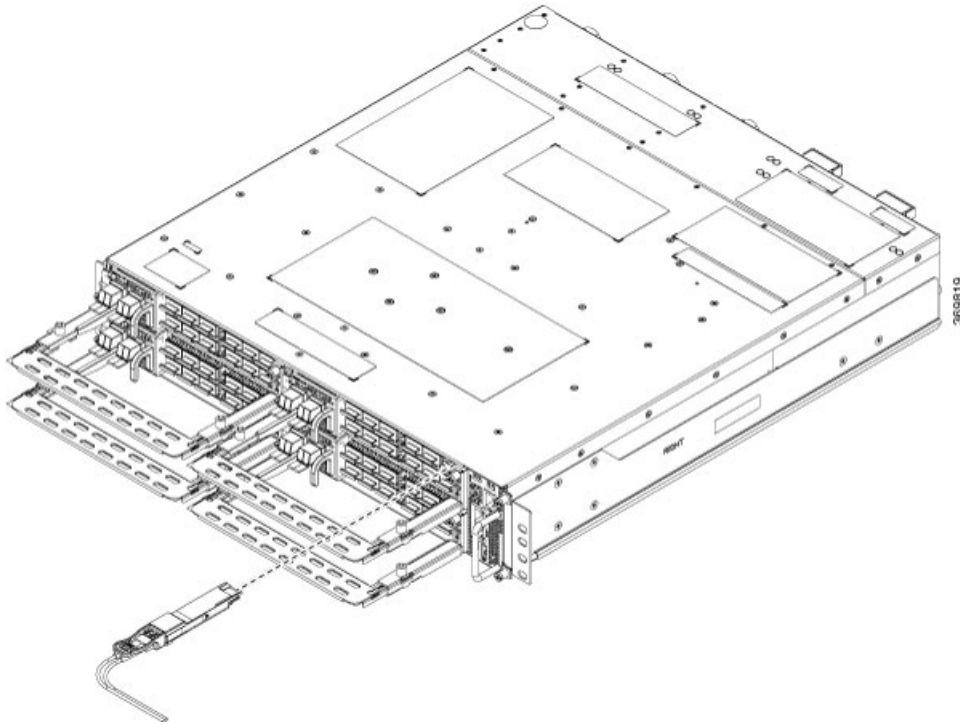
Figure 53: Inserting QSFP-DD Pluggable (OTN-XP Line Card)
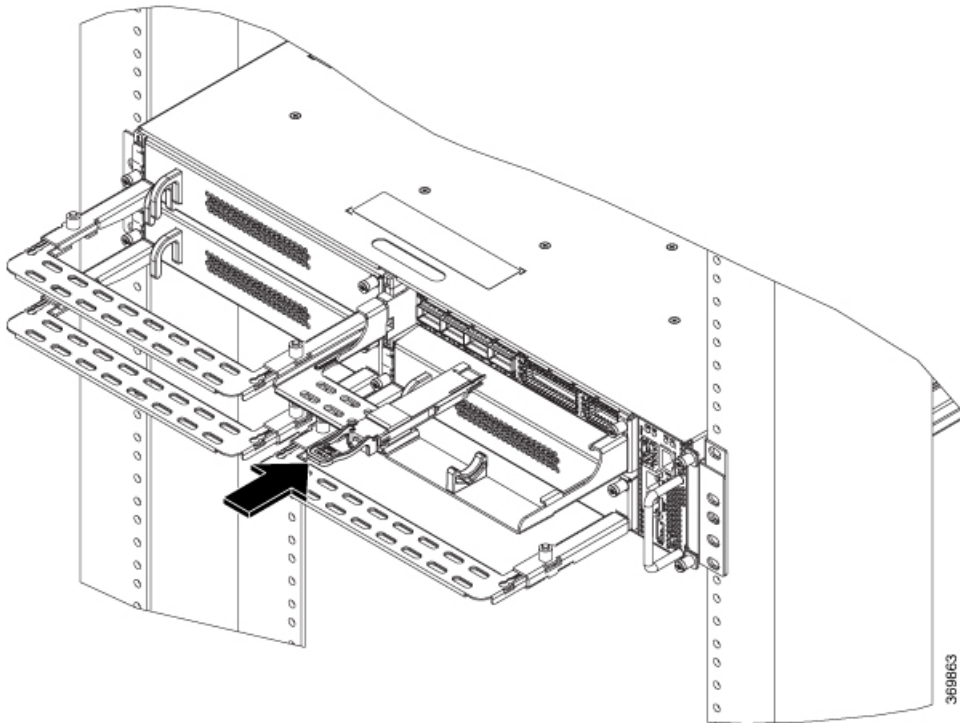
Caution   The pull tabs of the pluggables must always face down for top rows; the pull tabs of the pluggables must always face up for bottom rows.

Figure 54: Inserting QSFP-28 Pluggable (OTN-XP Line Card)
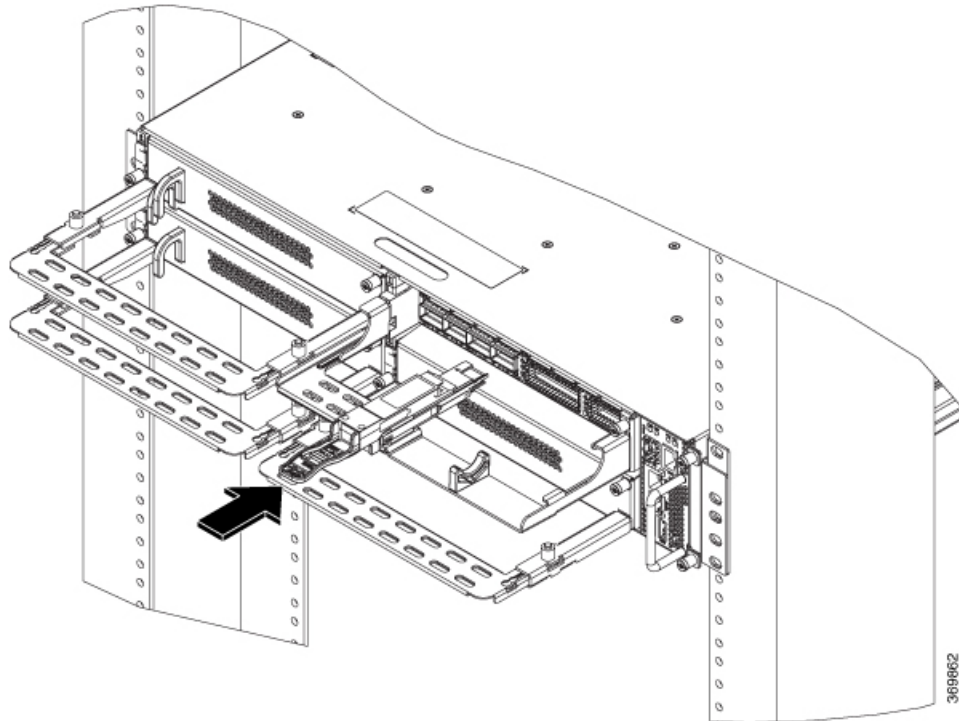
Do not forcibly push the pluggable into the slot, this might damage the pluggable and/or the slot.

Figure 55: Inserting QSFP-DD Pluggable (QXP-K9 Line Card)
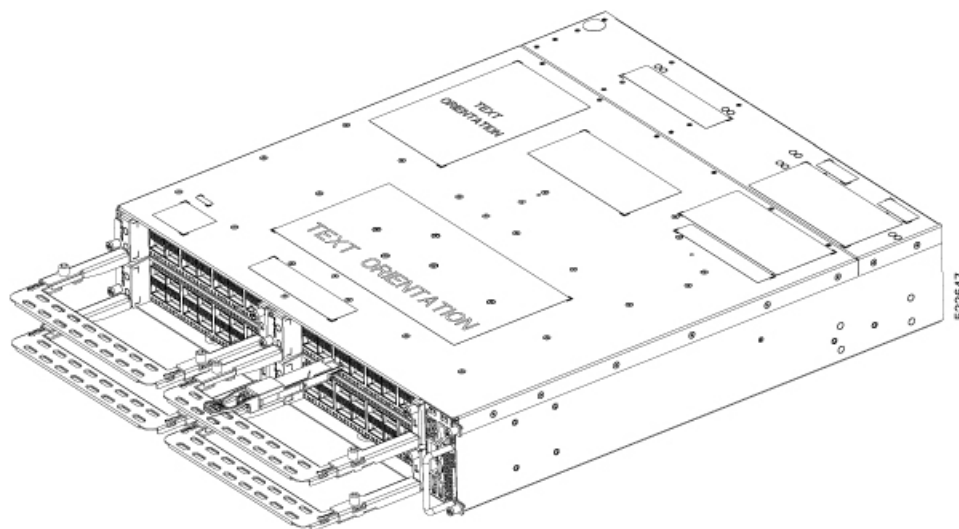
Note   Use the push tool to push the QSFP-DD, QSFP-28, and CFP2 pluggables into position as shown below.

Figure 56: Using the Push Tool to Push the Pluggables
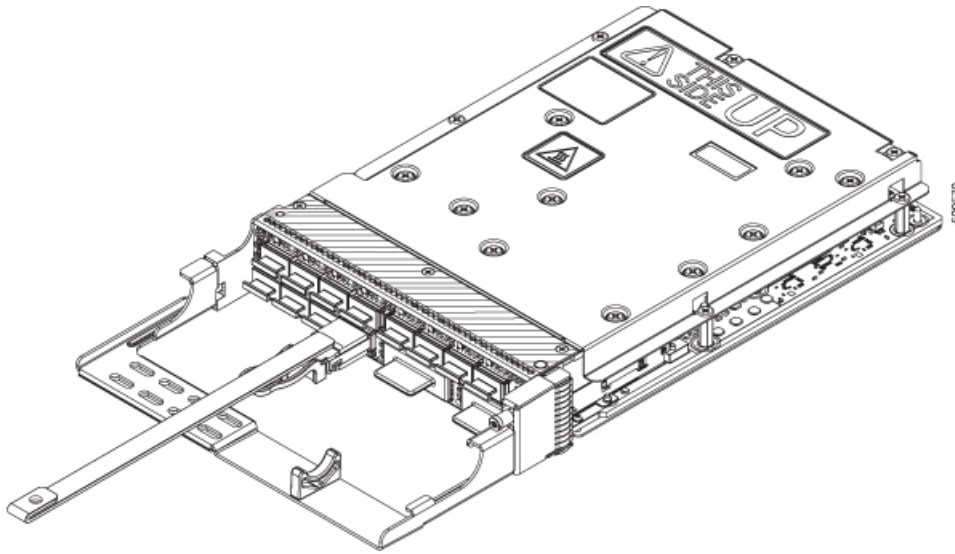
Step 3   Route the cables emerging from the pluggables using the fiber management bracket as shown in the following figure.

Figure 57: Fiber Management Bracket with fibers from Pluggables (1.2T, 1.2TL, 2-QDD-C, and QXP-K9 Line Cards)
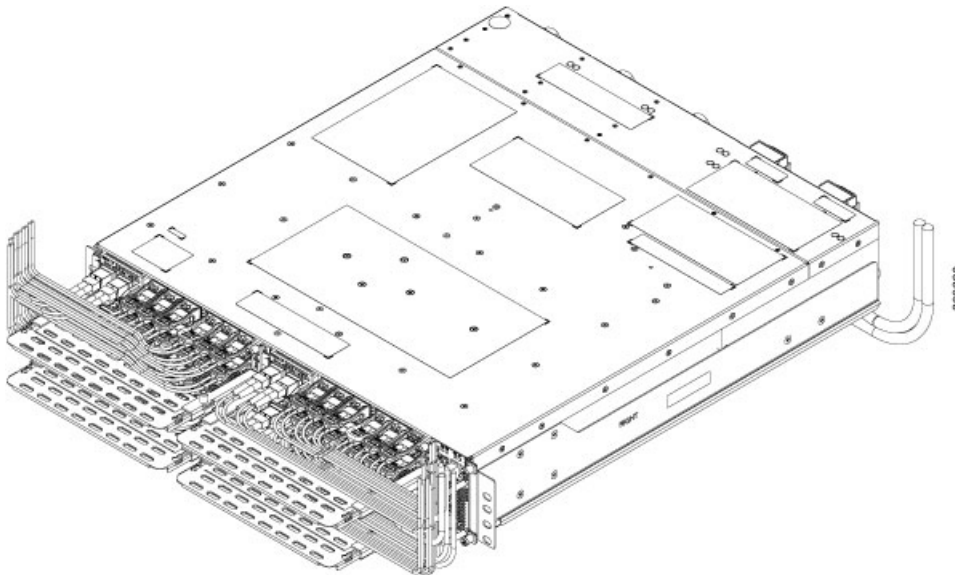
Figure 58: Fiber Management Bracket for the OTN-XP Line Card
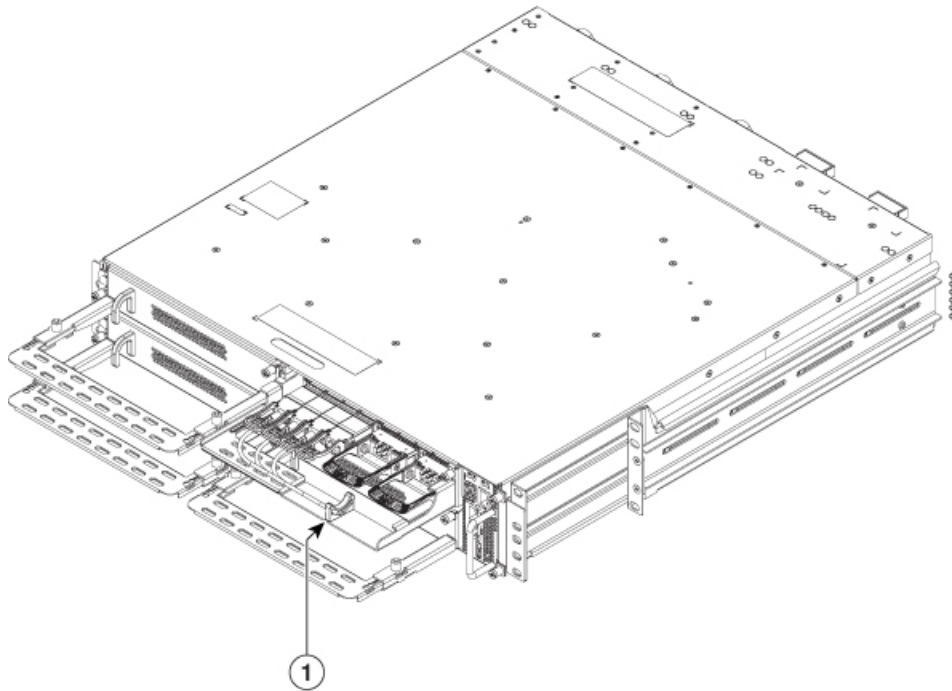
1	Fibers from pluggables resting on the cable support bracket

Guidelines for managing the fibers and cables:

- Use velcro tapes to tie the fibers to the fiber management bracket.

- Fibers from the left line cards should exit from the left and fibers from the right line cards should exit from the right.

- Fibers and cables from the controller should exit from the right. Maintain sufficient slack to extract the controller during OIR.

- Cables from the PSU should exit from the left (when viewed from the rear side).

- Ground cable should exit from the right (when viewed from the rear side).

- For ETSI racks, route the power and the ground cables in the 50 mm space below the chassis, to maintain a chassis footprint of 600 mm.

- Rest the fibers exiting from the pluggables on the cable support bracket. Pass a velcro tape in the gap provided in the cable support bracket to tie the fibers. Ensure that there are no velcro tapes near the CFP2 ports, as this may hinder the insertion and removal of the CFP2 pluggables.

Note	The OTN-XP line card supports only the latest optics of QSFP-100G-SR4-S (CPN 10-3142-03 or higher). Older version of optics is not supported.

Air Filter

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

The Cisco NCS 1004 air filter has the following components:

- Two air filter side brackets

- One air filter frame

- One air filter

All the three components need to be ordered for first-time installation. The combined PID for all these three components is NCS1K4-FLTR-ASL. The PID for the air filter unit is NCS1K4-FLTR. After first installation of the air filter unit, only the air filter needs to be replaced. The air filter side brackets and the frame can be reused.

First inspection of the air filter must be performed six months after the first installation of the air filter. Air filters must be inspected every three months after the initial six month inspection and replaced if found to be dirty. Cleaned air filters cannot be reused. Replace with a new air filter. It is recommended to have spare air filters in stock.

Note   Air filter does not meet the ETSI 600 mm footprint.

Install Air Filter

This task has details about installing the air filter. It is recommended to include the air filter installation as part of the chassis installation.

Precautions while installing air filters

- Ensure that the pull tabs of the pluggables do not get damaged during installation.

- Ensure that the velcro of the fiber management bracket does not interfere with the air filter.

- To remove a chassis, placed in the middle, in a stacked configuration, the air filters of the chassis above and below also need to be removed to avoid accidental scratches on the surface of the chassis.

- Ensure that the cables from the controller exit from the right; maintain sufficient slack to enable easy removal and insertion of the controller during OIR.

Step 1   After the chassis is inserted in the rack, fix the air filter side brackets on either side of the chassis. Check for the arrow indications on the side of the brackets. Using the Philps screws on either side, bind the chassis and the air filter side brackets to the rack. Tighten the Phillips screws (48-101524-01) using a number-2 Phillips screwdriver, to a torque value of 4.65 N-m.

Note In case the air filter is being installed after the chassis installation is completed, then unscrew and remove the four screws (on either side) that bind the chassis to the rack. After fixing the air filter side brackets, only three screws are used on either side, to bind the chassis and air filter side brackets to the rack.

Figure 59: Installing the Air Filter Frame and Side Brackets
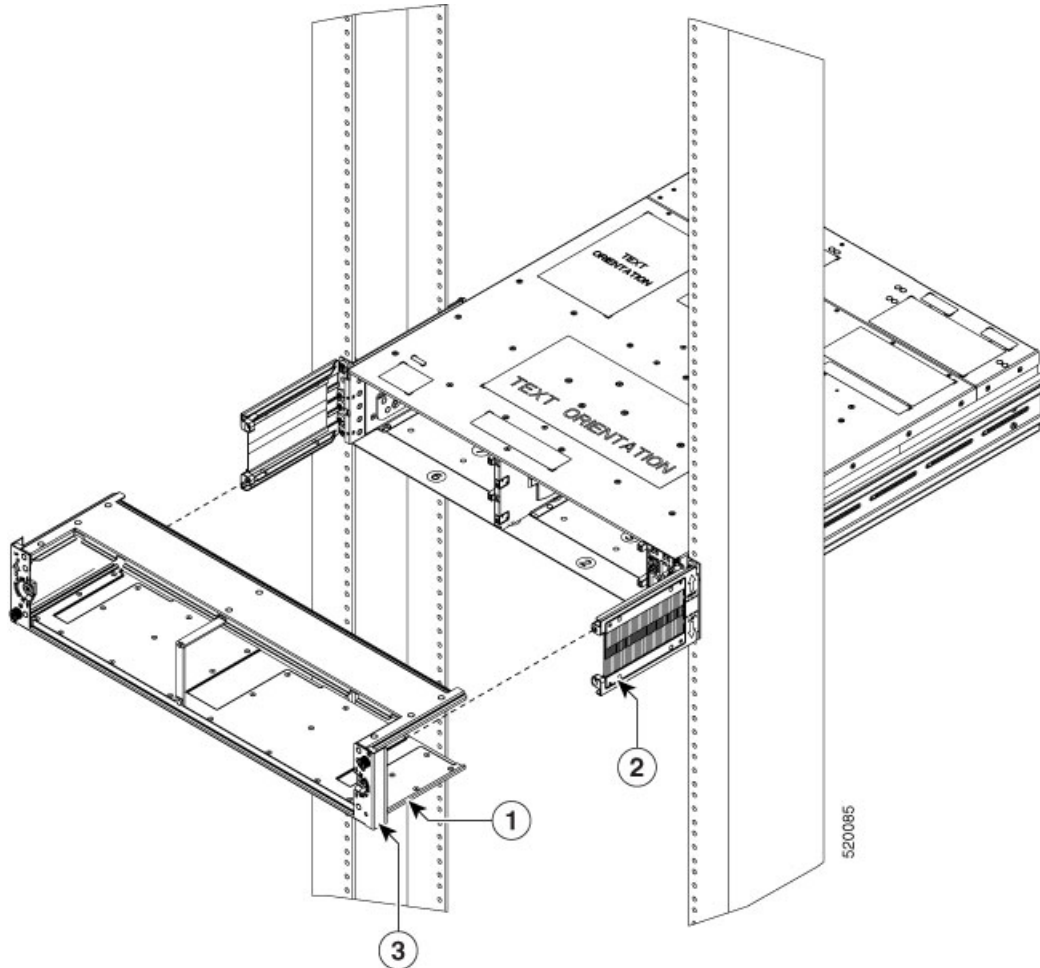
1	Air Filter Frame
2	Air Filter Side Brackets
3	Spare Serial Number label. We recommend that you place the spare label in this location.

Caution Ensure that the air filter frame is tagged to a specific chassis and not mixed with other chassis.

Caution Before placing the spare label on the air filter frame, verify that the serial number on the spare label matches with the serial number on top of the chassis. If the serial numbers do not match, there might be inconsistencies in inventory management.

Figure 60: Installing the Air Filter
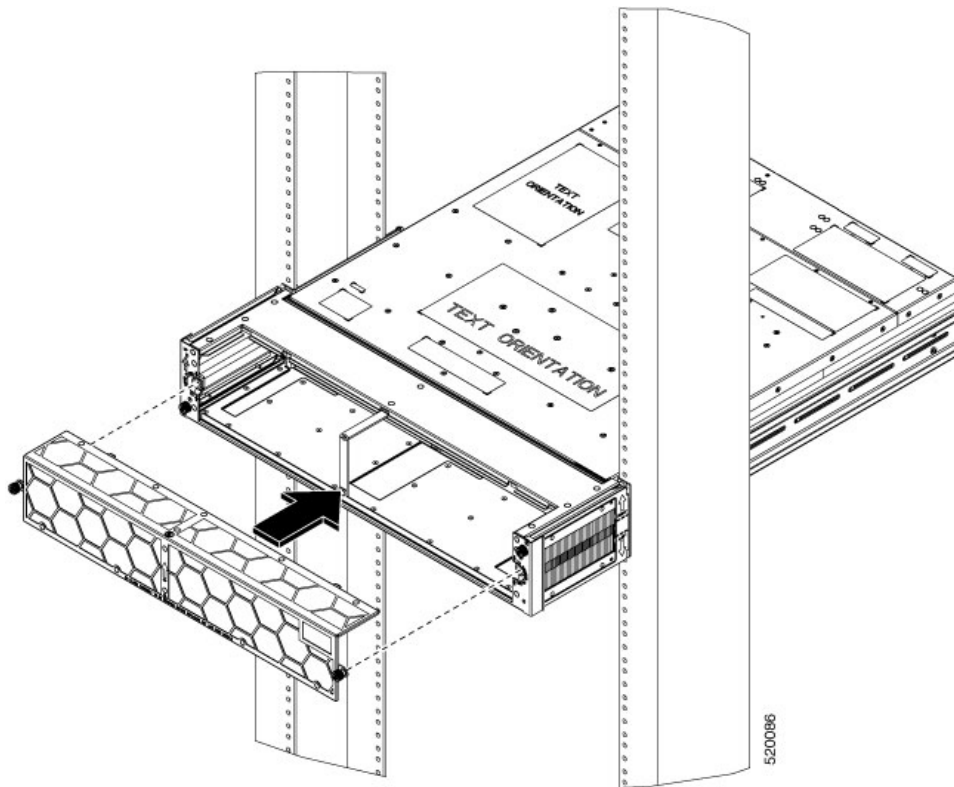
Step 2 Slide the air filter frame in to the air filter side brackets.

Step 3 Using a T15 Torx screwdriver, tighten the screw on either side (placed diagonally) to a torque value of 0.65 N-m.

Step 4 Orient the air filter correctly. The arrow must point upwards.

Step 5 Push the air filter onto the frame and adjust so that it engages with the edges of the frame.

Step 6 Using a T15 Torx screwdriver, tighten the screw on either side of the air filter, to a torque value of 0.65 N-m.

CHAPTER 6

Remove and Replace Cisco NCS 1004 Modules

This chapter describes the procedures to replace Cisco NCS 1004 modules.

⚠

Caution   All the modular slots in the NCS 1004 chassis should always be populated with respective modules (line-cards, controller, PSU & fan units). Empty line card slots to be populated with filler modules, which are shipped with the chassis. The replacement or upgrade of the modules (Online Insertion or Removal, OIR) to be performed only when the ambient temperature is below 30-degree C. The OIR of modules should be completed 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.

Remove and Replace a Line Card

⚠

Caution   The removvl and replacement procedure for line card or filler module to be performed only when the ambient temperature is below 30-degree C and should be completed within five minutes to prevent overheating of the chassis components.

Step 1   Extract the Line card from the chassis.

Step 2   Remove the line card and replace it with another line card. For the detailed line card installation procedure, see Install Line Card.

Remove and Replace Power Supply Unit

This task has information about removing and replacing the power supply units.

Before you begin

Remove the connections to the power supply:

- Disconnect power from the breaker before disconnecting power from the power supply unit.

- Remove the cable retainers and the power cables, in case of an AC power supply unit.

- Remove the protection covers, fasteners and lugs, in case of a DC power supply.

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

Figure 61: Locking Latch on the DC PSU
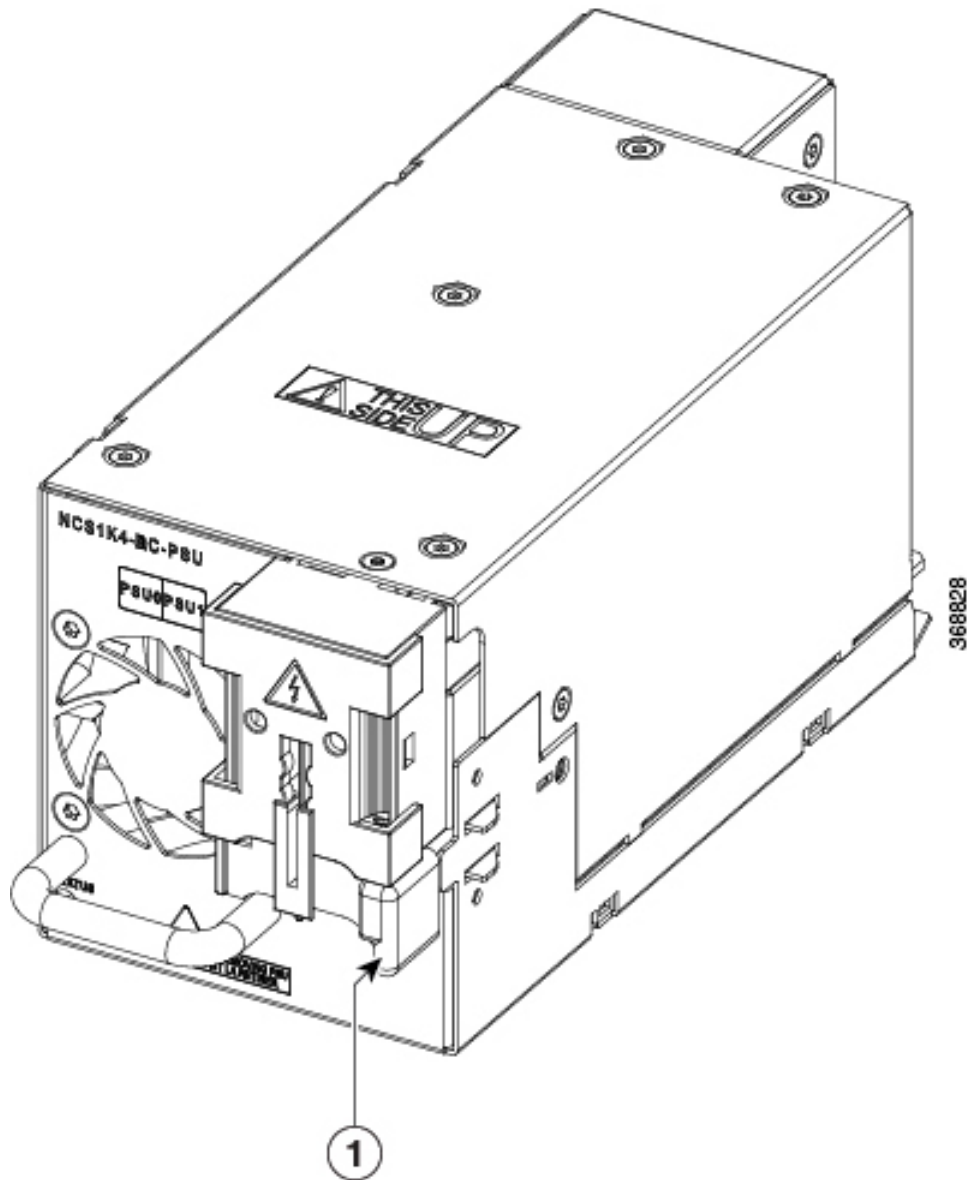
1	Locking latch

Figure 62: Locking Latch on the AC PSU
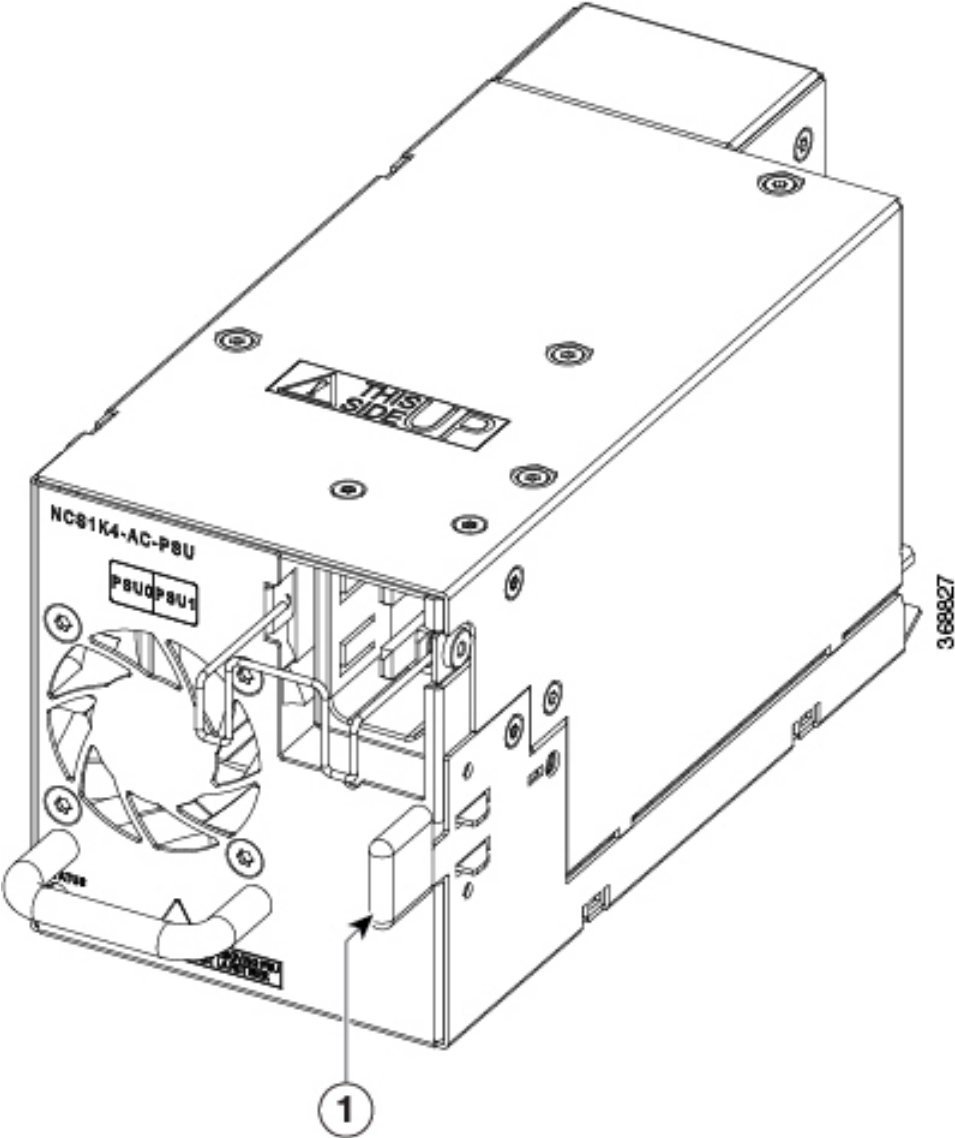
1	Locking latch

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

Figure 63: Removing the Power Supply Unit
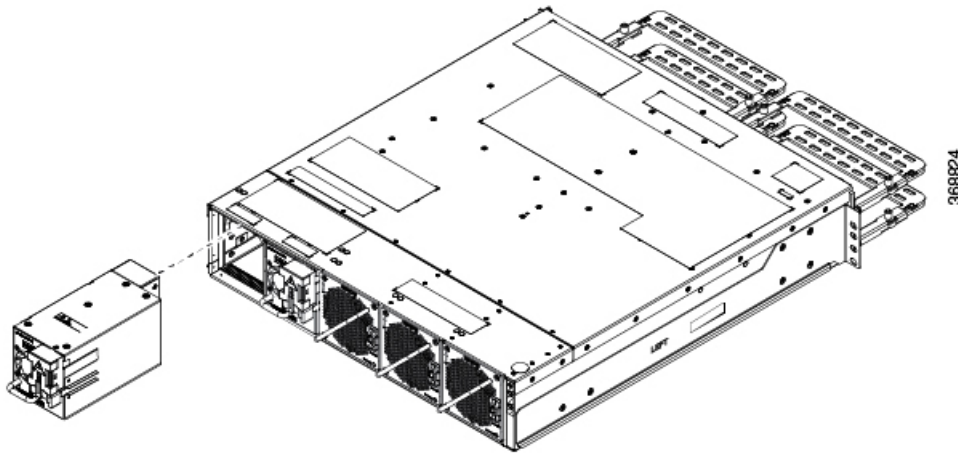
For replacing the PSU, see Power Supply.

Remove and Replace Controller

This procedure has details about removing and replacing the controller.

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

Step 2   Using the handle with one hand, and supporting the controller with the other, gently remove the controller from the slot.

Figure 64: Removing the Controller
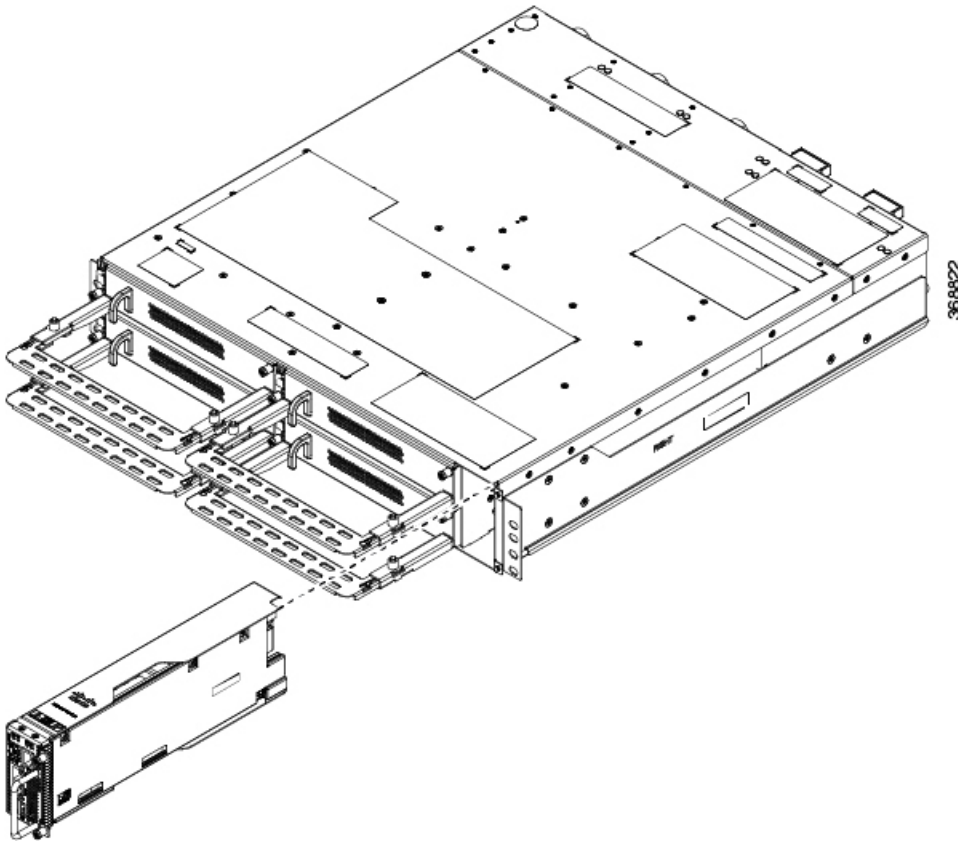
What to do next

For replacing the controller, see Install Controller .

Remove and Replace Fan Unit

This task has information about removing and replacing the fan unit.

⚠️

Caution   OIR duration for the fan tray unit at 30-degree C ambient temperature, is five minutes.

Step 1   Push and hold the spring-loaded lever towards the left with your thumb (unlock position).

Figure 65: Spring-loaded Lever in Holding or Unlock Position
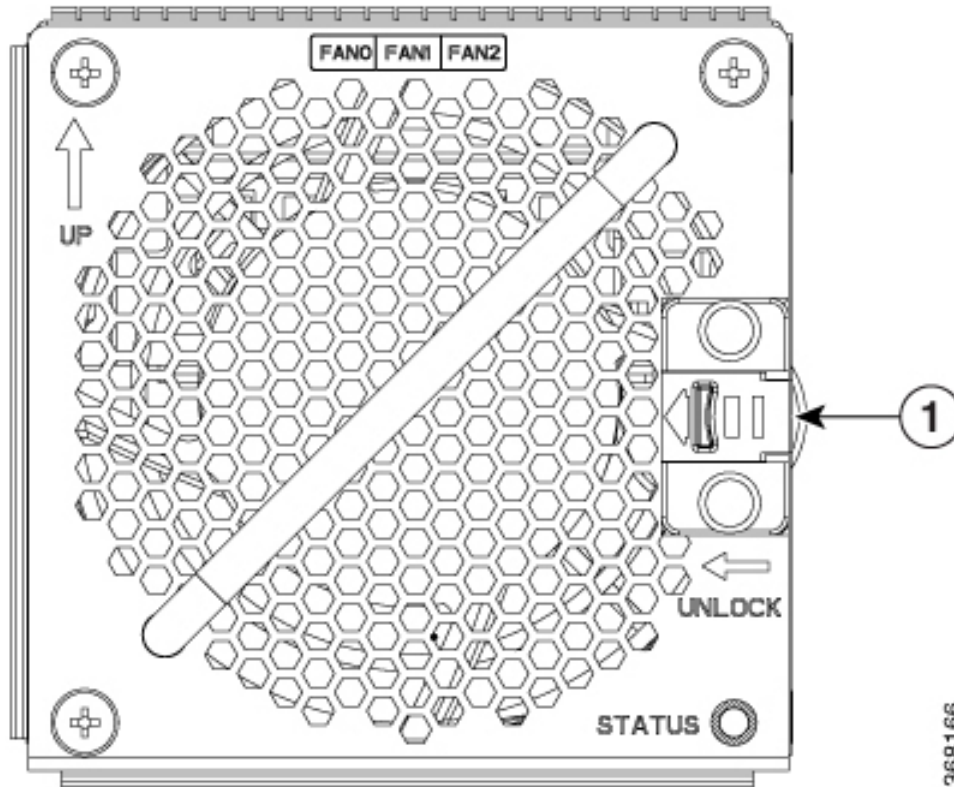
1	Sping-loaded lever

Step 2   Use the handle on the fan unit to pull the fan unit out of the chassis, while supporting it with the other hand.

Figure 66: Removing the Fan Unit
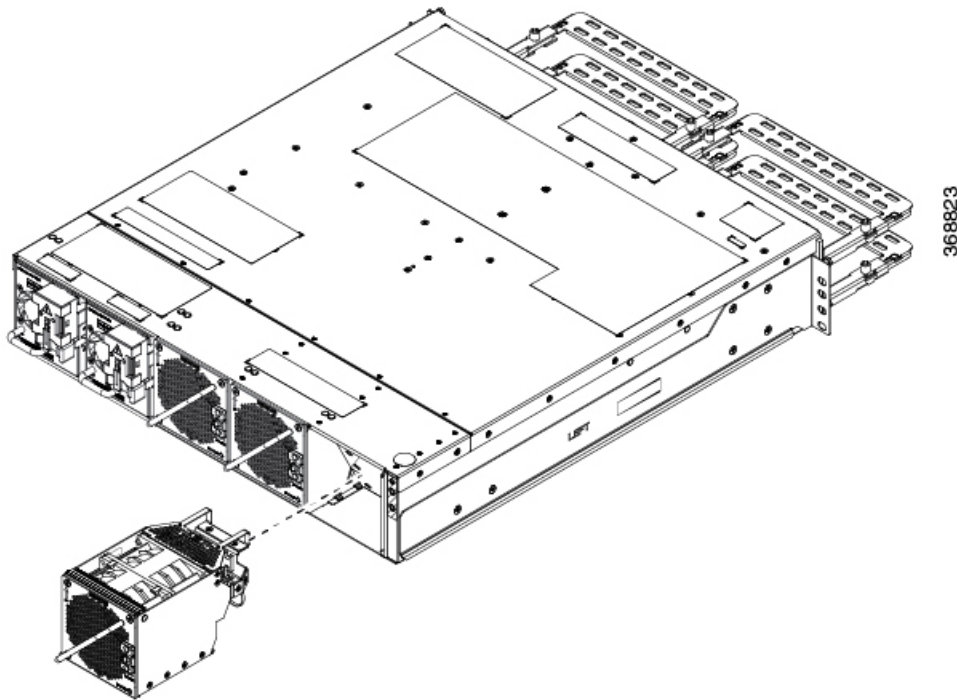
What to do next

For replacing the fan unit, see Install Fan Unit.

Wipe Data in Disk Using Secure Erase

When NCS 1004 becomes faulty, contact TAC to open a Return Material Authorization (RMA) request. Before opening a RMA request, the user can securely erase data in NCS 1004 disks using the Secure Erase feature.

Warning Use this procedure only during RMA.

Before you begin

The NCS 1004 unit that is planned for RMA must be taken out of the data center and the network. The user must access NCS 1004 only using the console port.

Step 1 When NCS 1004 boots (power cycle), the following message appears.

```
Version 2.19.1266. Copyright (C) 2019 American Megatrends, Inc.
BIOS Date: 07/09/2019 14:44:28 Ver: 0ACHI420
```

```
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.

The list of SSDs that support Secure Erase is displayed. D:13 is CPU SSD and D:14 is Chassis SSD.

Step 4   Select the SSD from which you want to erase data using the arrow keys.

Step 5   Select **Yes** in the Confirmation screens.

The system proceeds to securely erase data in the selected SDD after these confirmations.

C H A P T E R **7**

LEDs

This section provides details of the LEDs in the controller unit and line card.

Line Card LEDs

The LEDs of the 1.2T line card, and 1.2TL line card and OTN-XP line card are discussed here.

Table 9: Feature History

Feature Name	Release Information	Description
Attention LED	Cisco IOS XR Release 7.7.1	The attention LED is available on all ports of the NCS 1004 line cards. This LED can be selectively turned on for a specific QSFP port or simultaneously on all of the QSFP ports using the **hw-module location** command. When turned on, the LED flashes yellow. This LED flashing functionality helps field engineers quickly identify a specific port on the line card for troubleshooting, especially in a cluttered environment.

LEDs of 1.2T, 1.2TL, and 2-QDD-C Line Cards

The front view of the 1.2T line card is as below.

Figure 67: Front View of the 1.2T Line Card
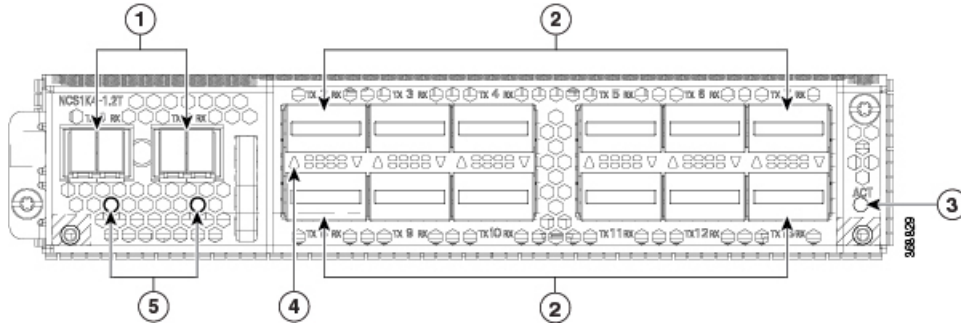
The front view of the 1.2TL line card is as below.

Figure 68: Front View of the 1.2TL Line Card
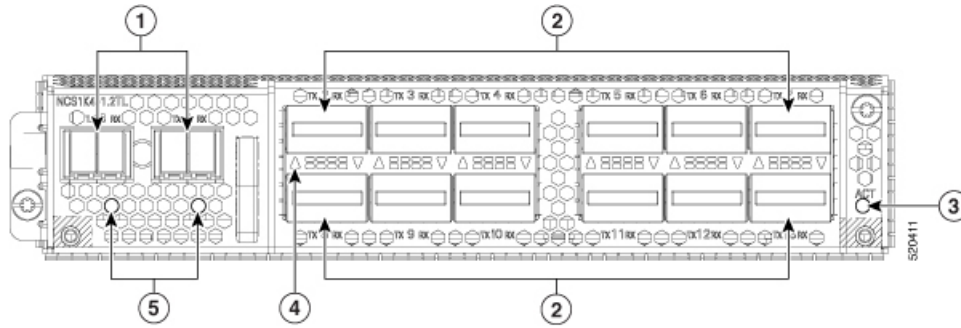
The front view of the 2-QDD-C line card is as below.

Figure 69: Front View of the 2-QDD-C Line Card
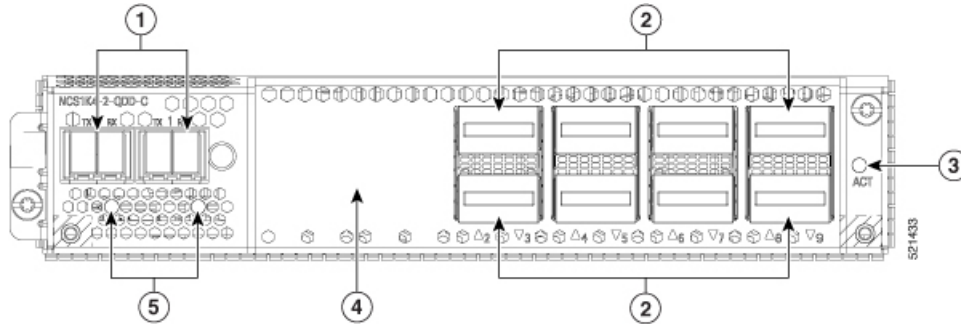
1	Trunk ports (0 and 1)
2	12 QSFP ports (2 to 13). Each QSFP port has Attention LED.
3	ACT LED

4	QSFP port LEDs
	The LEDs for the QSFPs are embedded in the card cage. The *triangles* shown upwards or downwards (in 1.2T and 1.2TL line cards) indicate the status of the corresponding QSFP.
5	Trunk port LEDs

Table 10: Status of the Line Card LEDs

| LED	Colour	Status
Attention LED	Yellow Flashing	Used by the field engineers to identify a specific port in the line card. This is used for troubleshooting purposes. • Use the **hw-module location** *location***attention-led all-ports** command to turn on this LED on all the ports of the line card. • Use the **hw-module location** *location***attention-led** *port-number* command to turn on this LED on a specific port of the line card. • Use the **show controllers optics** *rack/slot/instance/port*	**in LED** command to display the LED status of ports.
ACT LED	Amber (solid)	The line card is booting. This colour appears as soon as the line card is inserted in to the chassis.
	Flashing Red	The line card is in the booting phase.
	Green	The line card is up and operational (not associated to the traffic status).

LED	Colour	Status
QSFP port LEDs and Trunk LEDs	Off	The port has not been provisioned.
	Red	Major alarm that could lead to a traffic-impacting situation.
	Green	Indicates that the module is operational and has no alarm.
	Amber (solid)	Indicates a minor alarm (such as low Rx or Tx power), which could lead to a traffic impacting situation.
	Amber (flashing)	This is used for troubleshooting, to identify the faulty port of a line card. Use the **controller optics** command in the configuration mode to point to a faulty port in the line card. The port is configured in maintenance mode or the attention LED is enabled for this port. **Note** Attention LED is not supported on ACT LED.

LEDs of OTN-XP Line Card

The front view of the OTN-XP line card is as below.

Figure 70: Front View of the OTN-XP Line Card
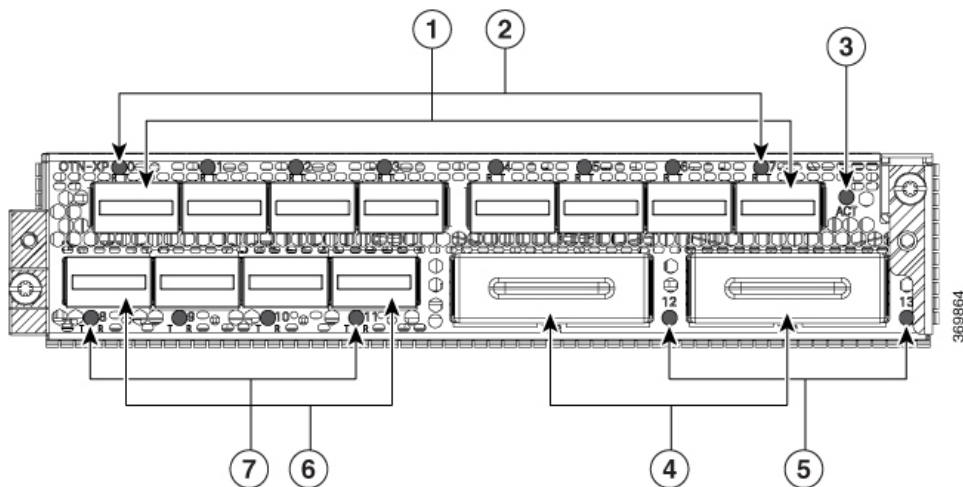
1	Eight QSFP-28 ports (0 to 7)
	Ports 1 and 5 are client ports for 100G TXP.
2	Corresponding LEDs for the eight QSFP-28 ports. Each QSFP-28 port has Attention LED.
3	ACT LED
4	Two CFP2 ports (12 and 13)
	Both are trunk ports.
5	Corresponding LEDs for the two CFP2 ports
6	Four QSFP-DD ports (8 to 11)
	QSFP-DD trunk ports are ports 9 and 11.
7	Corresponding LEDs for the four QSFP-DD ports.

Table 11: Status of the OTN-XP Line Card LEDs

LED	Colour	Status
Attention LED	Red	The corresponding port is shut down.
	Green	The corresponding port is working.
	Yellow Flashing	Used by the field engineers to identify a specific port in the line card. This is used for troubleshooting purposes.
		• Use the **hw-module location** *location* **attention-led all-ports** command to enable this LED on all the ports of the line card.
		• Use the **hw-module location** *location* **attention-led** *port-number* command to enable this LED on a specific port of the line card.
		• Use the **show controllers optics** *rack/slot/instance/port*	**in LED** command to display the LED status of ports.

LED	Colour	Status
ACT LED	Flashing Red	The line card is booting. This colour appears as soon as the line card is inserted in to the chassis.
	Amber (solid)	Indicates that the line card is in the booting phase.
	Green	Indicates that the line card is up and operational (not associated to the traffic status).
QSFP and CFP2 port LEDs	Off	This indicates that the port has not been provisioned.
	Red	Indicates a major alarm, which could be a traffic impacting situation.
	Green	Indicates that the module is operational and has no alarm.
	Amber (solid)	Indicates a minor alarm (such as low Rx or Tx power), which could lead to a traffic impacting situation.
	Amber (flashing)	This is used for troubleshooting, to identify the faulty port in the line card. Use the **controller optics** command in the configuration mode to point to a faulty port in the line card.

LEDs of QXP-K9 Line Card

The front view of the QXP-K9 line card is as below.

Figure 71: Front View of the QXP-K9 Line Card
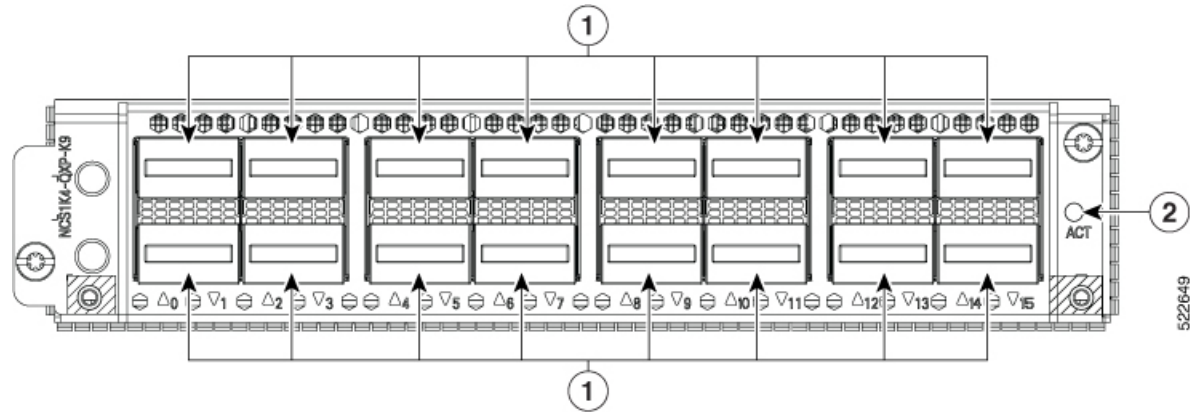
| 1 | 16 QSFP-DD ports (0 to 15) |
| 2 | ACT LED |

Table 12: Status of the QXP-K9 Line Card LEDs

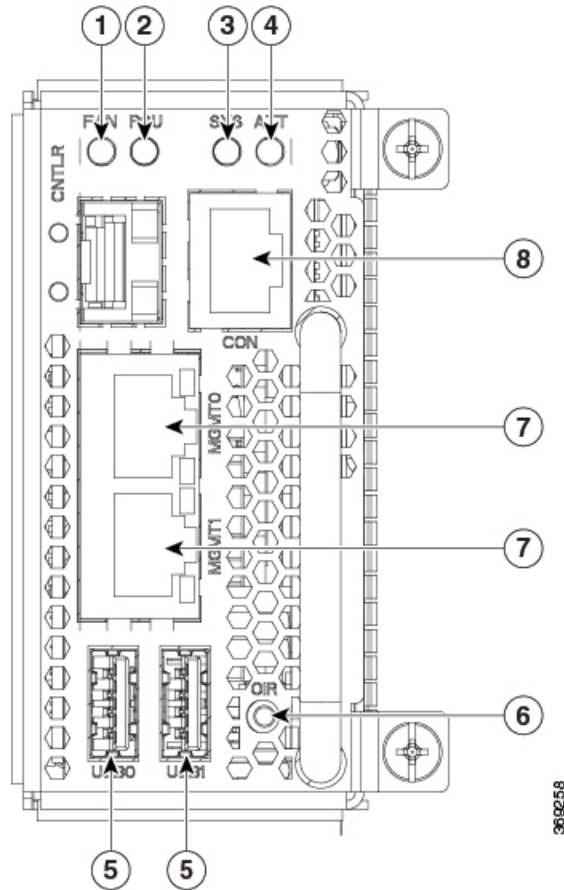| LED	Colour	Status
ACT LED	Flashing Red	The line card is booting. This colour appears as soon as the line card is inserted in to the chassis.
	Amber (solid)	Indicates that the line card is in the booting phase.
	Green	Indicates that the line card is up and operational (not associated to the traffic status).

LED	Colour	Status
QSFP-DD port LEDs	Off	This indicates that the port has not been provisioned.
	Red	Indicates a major alarm, which could be a traffic impacting situation.
	Green	Indicates that the module is operational and has no alarm.
	Amber (solid)	Indicates a minor alarm (such as low Rx or Tx power), which could lead to a traffic impacting situation.
	Amber (flashing)	This is used for troubleshooting, to identify the faulty port of a line card. Use the **controller optics** command in the configuration mode to point to a faulty port in the line card.

Controller LEDs

The controller unit has four LEDs to indicate the system status and the status of the components.

Figure 72: Front View of the Controller

1	Fan Unit Status
2	Power Supply Unit Status
3	System Status
4	Attention LED
5	USB Ports (0 and 1)
6	OIR Button
7	Management Ports (0 and 1)
8	Console Port

Table 13: Status of the Controller LEDs

LED	Colour	Status
FAN LED	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	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.
SYS LED (during controller boot up)	Red	Indicates that the controller unit is powering ON.
	Red (flashing slowly)	Indicates BIOS loading.
	Yellow (flashing slowly)	Indicates OS loading.
	Red (flashing fast)	Indicates secure boot failure. Replace the controller unit.
	Yellow (flashing fast)	Indicates that the controller unit is not seated properly.
SYS LED (controller is operational)	Red	Indicates a major or critical alarm.
	Yellow	Indicates a minor alarm.
	Green	The module is operational and has no active alarms.
Attention LED	Blue (flashing)	Applicable during OIR procedures. Indicates that the system is cooling down.
	Blue	Used to identify a specific chassis in a rack or room. This is used for troubleshooting purposes. Use the **hw-module attention led location** command to turn on this LED.

Power Supply Unit LED

The following table has details of the PSU LED:

Table 14: Status of the PSU LED

LED	Colour	Status
PSU LED	Off (no colour)	Indicates no input to the PSU and the 12V from the other PSU (parallel unit) is not available.
	Amber (solid)	Indicates a critical fault on the PSU or that the PSU is in OFF condition. This occurs when there is no input to the PSU, 12V from the other PSU (parallel unit) is available.
	Green(blinking)	Indicates that the PSU is disabled. This occurs when input is present but the PSU is disabled by the system (the Enable pin is in OFF position).
	Amber (blinking)	Indicates a minor fault on the PSU. The minor fault could be - fan fault or 12V over-current warning or temperature warning.
	Green (solid)	Indicates that the PSU is working fine and that the Vout (output voltage) is in regulation.

Fan Unit LED

The following table has details of the fan unit LED:

Table 15: Status of the Fan Unit LED

LED	Colour	Status
FAN LED	Off (no colour)	Indicates that the fan unit is not inserted properly or chassis is powered off.
	Red (solid)	Indicates a fault in the fan unit. This occurs when the fan speed is out of range or the fan unit is inserted but not powered on.
	Green (solid)	Indicates that the fan unit is working fine.

Fan Unit LED