Cisco NCS 1014 Network Convergence System User Guide

Contents

Cisco NCS 1014 Network Convergence System

Cisco NCS 1014 Chassis Overview

The Cisco NCS 1014 chassis is an advanced multihaul optical platform supporting transponders and line system cards. It is a 2RU chassis that delivers a universal transponder solution which provides excellent performance for metro, long-haul and submarine applications.

Cisco NCS 1014 chassis has the following modules:

- Removable controller
- Removable Backup Solid State Drive (SSD)
- Two replaceable power supply units (PSU)
- Three replaceable fan trays
- Four line card slots

In R7.11.1, Cisco NCS 1014 chassis supports the following line cards:

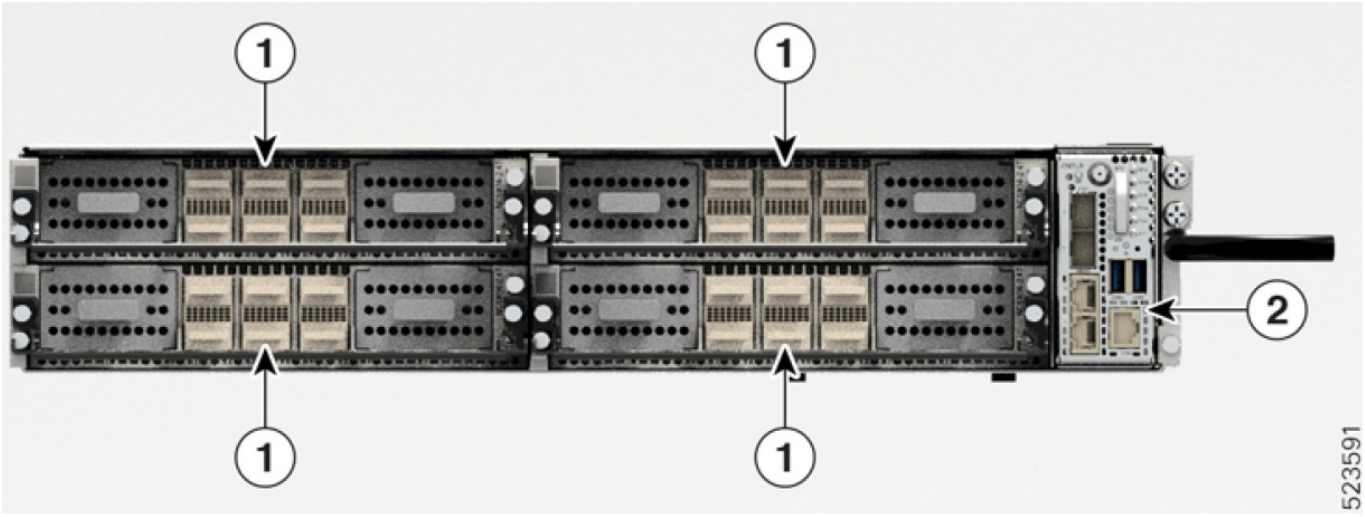
- 2.4T Line Card—2.4T DWDM Transponder Card
- NCS 1000 16-port Colorless Mux/Demux Optical Line Card—16-port Colorless Mux/Demux Optical Line Card
- 1.2T Line Card—1.2T DWDM Transponder Card

Cisco NCS 1014 chassis supports more power for each line card. The chassis has two improved, field-replaceable AC and DC power supply units that support up to 2.5 kW per system and 580 W per each line card slot.
For more information about the Cisco NCS 1014 chassis, see Cisco NCS 1014 datasheet.

Note “2.4T” refers to the NCS1K14-2.4T-K9 C-band line card, “CCMD-16-C” refers to the NCS1K14-CCMD-16-C C-band optical line card, and “CCMD-16-L” refers to the NCS1K14-CCMD-16-L optical line card.

The controller is on the front side. The SSD, PSUs, and the fan trays are on the rear side of the chassis. You can insert the line cards in to the four slots as shown in the following figure.

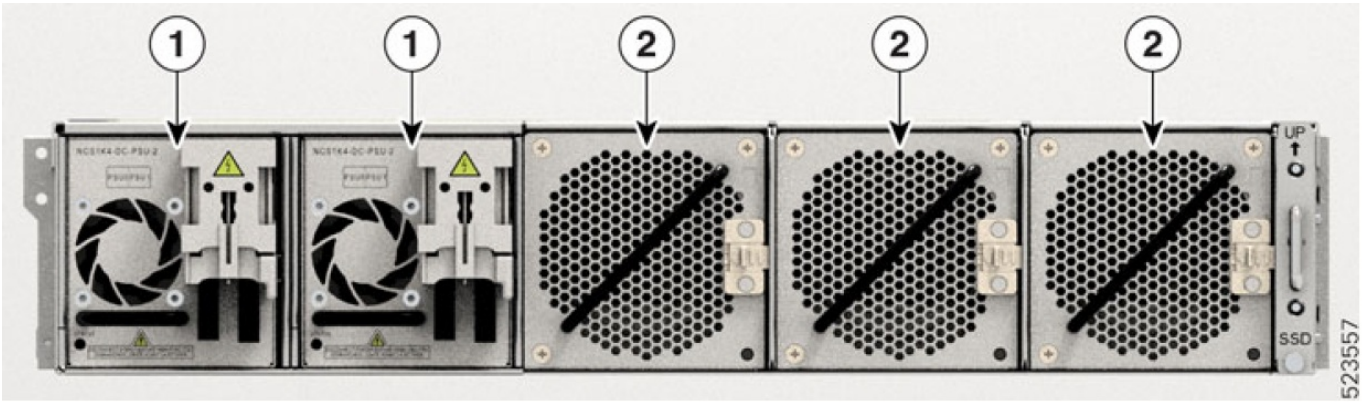
Figure 1: NCS 1014 Front View



Callout	Modules
1	Line Cards
2	Controller

The slots for the SSD, PSUs, and fan trays are indicated in the following figure.

Figure 2: NCS 1014 Rear View



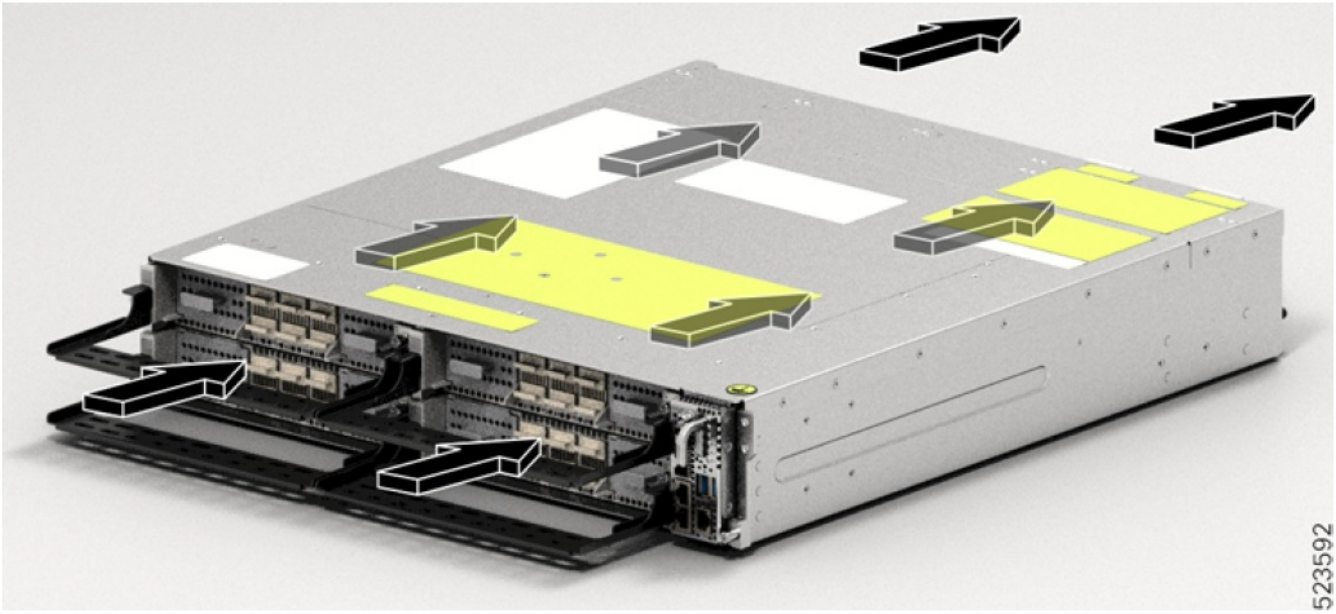
Callout	Modules
1	Power Supply Units (Slots 0 and 1)
2	Fan Trays (Slots 0,1,2)

You must install AC or DC PSUs as the power supply modules. The chassis does not allow mixed PSU configuration.

Airflow in the Cisco NCS 1014 Chassis

The Cisco NCS 1014 chassis 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. The fan trays are responsible to cool down the line cards. Ensure that no object obstructs or impedes the airflow as it can lead to reduced airflow in the system, causing components to operate at a higher temperature.

Figure 3: Airflow Through the Cisco NCS 1014 Chassis



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

Figure 4: Class 1M Laser Product Label

Cooling System
The Cisco NCS 1014 cooling system actively regulates the chassis temperature using the three field-replaceable fan trays and the built-in fans within the PSU units. This system implements two different airflow paths:

- **Line Cards Cooling**

  The three fan trays enable cooling for the line cards. The software monitors the chassis temperature and adjusts the fan speed according to the temperature range.
- **Controller Card Cooling**

  The controller card receives cooling from the internal fans within the two PSU units. If any critical alarms raise, the software can override the PSU FAN speed settings.

Cisco NCS 1014 Line Cards

The Cisco NCS 1014 chassis supports the following line cards:

2.4T Line Card
2.4T DWDM line card is a coherent optics Transponder/Muxponder for the Cisco NCS 1014 chassis. This line card delivers 400GE, 100GE, and OTU4 client traffic over two trunks from 400G to 1.2T each. The NCS1K14-2.4T-K9 line card is a single-slot unit that supports both C- and L-band traffic at trunk ports.
Future software upgrades would allow encryption functionality with 256-bit key length (AES256)-based Layer-1 encryption for 100/400/800g client-side data.

Table 1: NCS1K14-2.4T-K9 Interfaces and Data Rates

Interfaces	Form Factor	Ports	Data Rates
Client	QSFP-DD56	1, 2, 3, 4, 5, 6	100, 200, 400G
	QSFP-DD112	2, 5, 6	100, 200, 400, 800G
Trunk	Coherent Interface Module 8 (CIM8)	0, 7	1.2T in each port

Note The 800G data rate ports 2, 5, 6 is yet to be supported at a future release.

Figure 5: 2.4T Line Card

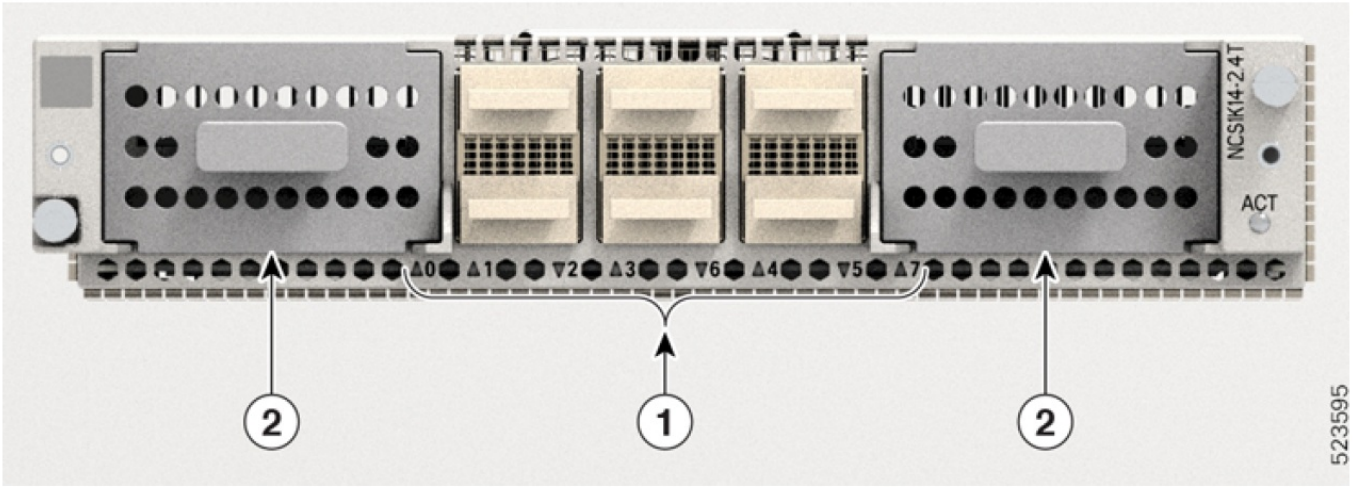


Table 2: 2.4T Line Card Interfaces

Callout	Interface
1	Client port
2	Trunk port

Table 3: Client-to-Trunk Port Mapping

Trunk Port	Client Ports
0	1, 2, 3
7	4, 5, 6

NCS 1000 16-port Colorless Mux/Demux Optical Line Card

NCS 1000 16-port Colorless Mux/Demux Optical Line Card is a multiplexing and demultiplexing unit with fixed gain EDFAs on both Add and Drop sections. The optical line card provides colorless functionality on the add/drop ports. It multiplexes any wavelength with the flexible options of baud rate and modulation format to the line side ROADM or amplifier units for transmission. It transmits and receives signals from optical line terminal (OLT) units. In the Cisco NCS 1014 chassis, the optical line card occupies one or more slots. The PSU powers the line card over the backplane.

The optical line card has:

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

There are two variants of the optical line card:

NCS1K14-CCMD-16-C
The NCS1K14-CCMD-16-C line card is a C-band, 16-port Colorless Direct attach optical line card with EDFA. It can host up to 16 channels. It supports any signal distribution between 191250 and 196200 GHz, for example, the 64 channels grid with 75-GHz spacing.
The following table summarizes the central frequency of the first and the last channel of this specific grid.

Table 4: C-Band Channel Wavelength Plan

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

NCS1K14-CCMD-16-L
The NCS1K14-CCMD-16-L line card is an L-band, 16-port Colorless Direct attach optical line card with EDFA. It can host up to 16 channels. It supports any signal distribution between 186025 and 191000 GHz, for example, the 64 channels grid with 75-GHz spacing.
The following table summarizes the central frequency of the first and the last channel of this specific grid.

Table 5: L-Band Channel Wavelength Plan

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

Figure 6: NCS1K14-CCMD-16 Line Card

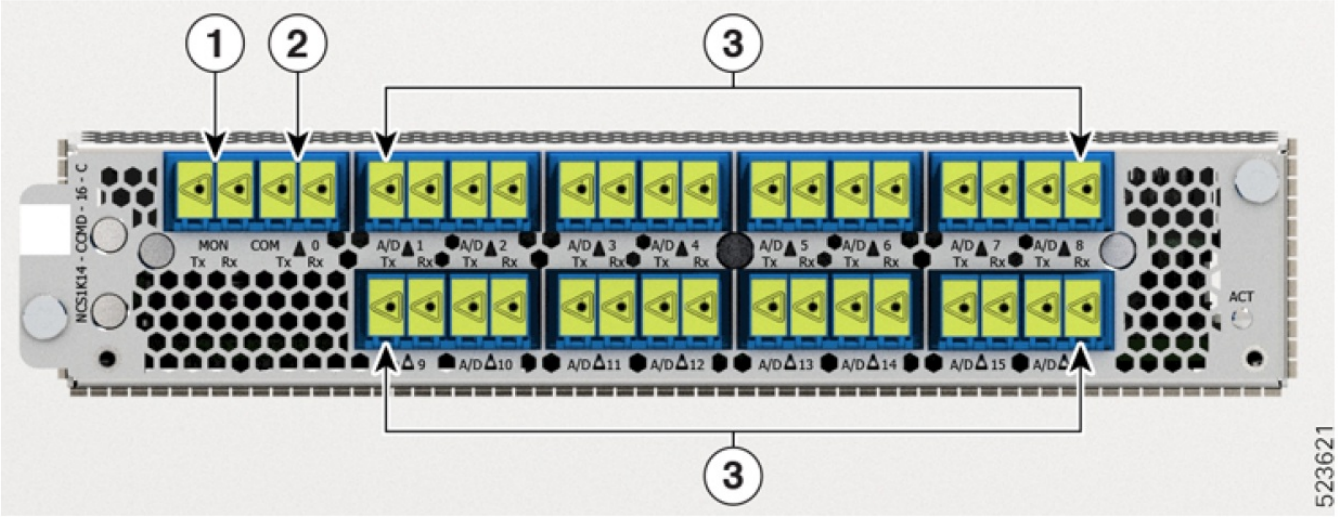


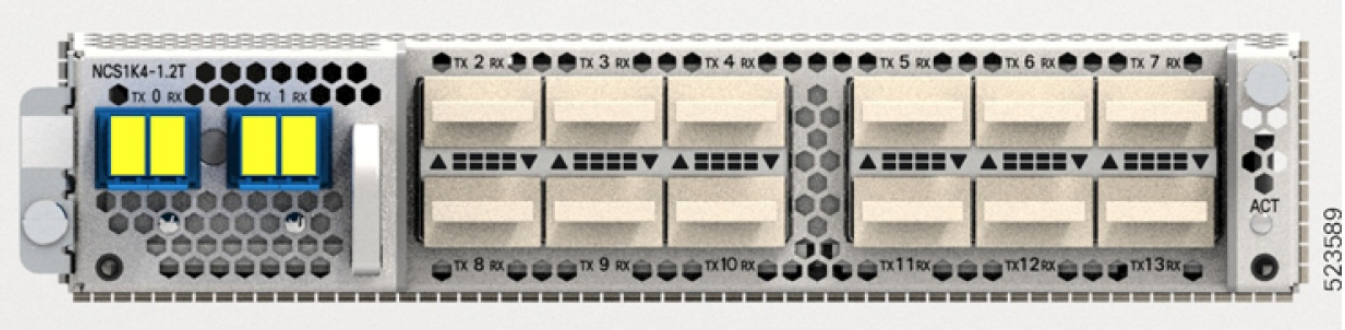
Table 6: Line Card Interface and Connector Assignment

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

1.2T Line Card

The 1.2T 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 Cisco NCS 1004 datasheet.
The 1.2T DWDM line card is a transponder has 12 client ports to deliver 100GE and OTU4 client traffic. This line card has two trunks that operate at any rate between 100G and 600G in 50G increments. It uses Advanced Encryption Standard with a 256-bit key length (AES256)-based Layer-1 encryption to encrypt client-side data for 100GE and OTU4. The NCS1K4-1.2T-K9 line card is a single-slot unit that supports C-band traffic.

Figure 7: 1.2T DWDM Line Card



Cisco NCS 1014 Modules

The Cisco NCS 1014 chassis supports the following modules:

Removable SSD
Table 7: Feature History

Feature Name	Release Information	Description
Removable NCS1K14-SSD Solid-State Disk (SSD)	Cisco IOS XR Release 7.10.1	The removable **NCS1K14-SSD** is the redundant SSD in th e NCS 1014 chassis. At 2.5” in size, this SSD has 480 GB storage space to store running software and its configurati on. This SSD acts as a backup storage to quickly recover t he Cisco NCS 1014 chassis after an RP corruption or repl acement.

The NCS1K14-SSD is the redundant chassis-based SSD in NCS 1014. It is field-replaceable and is accessible from the rear of the Cisco NCS 1014 chassis. This chassis SSD acts as the backup software storage in case the SSD inside the CPU fails. It has 480 GB storage space to store the running software and configuration. This backup storage enables Cisco NCS 1014 to quickly recover to functional state if either route processor (RP) corruption or replacement occurs.
The chassis SSD is 2.5 inch (63.5 mm) and is removable.

Fan Trays

The Cisco NCS 1014 chassis has three field-replaceable fan trays (FAN0, FAN1, and FAN2). Each fan tray (NCS1K14-FAN) has two counterrotating fans—the Inlet FAN and the Outlet FAN. Each FAN has its own power rail with inrush controller to increase reliability. These counterrotating fans ensure the following benefits:

- Higher back-pressure with respect to a single fan in each tray
- Higher reliability: In case a single FAN fails, the system can run with 5/6th of the total FANs.
- No need of tray gates: In case a single FAN fails, the other FAN in the same tray prevents the inversion of airflow.

The fan trays are responsible to cool down the line cards. The Cisco NCS 1014 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 no object obstructs or impedes the airflow as it can lead to reduced airflow in the system, causing components to operate at a higher temperature.

Note The Cisco NCS 1004 fans and the Cisco NCS 1014 fans look identical. However, the Cisco NCS 1014 chassis does not support the Cisco NCS 1004 fans physically.

Figure 9: Perspective View of Fan Tray

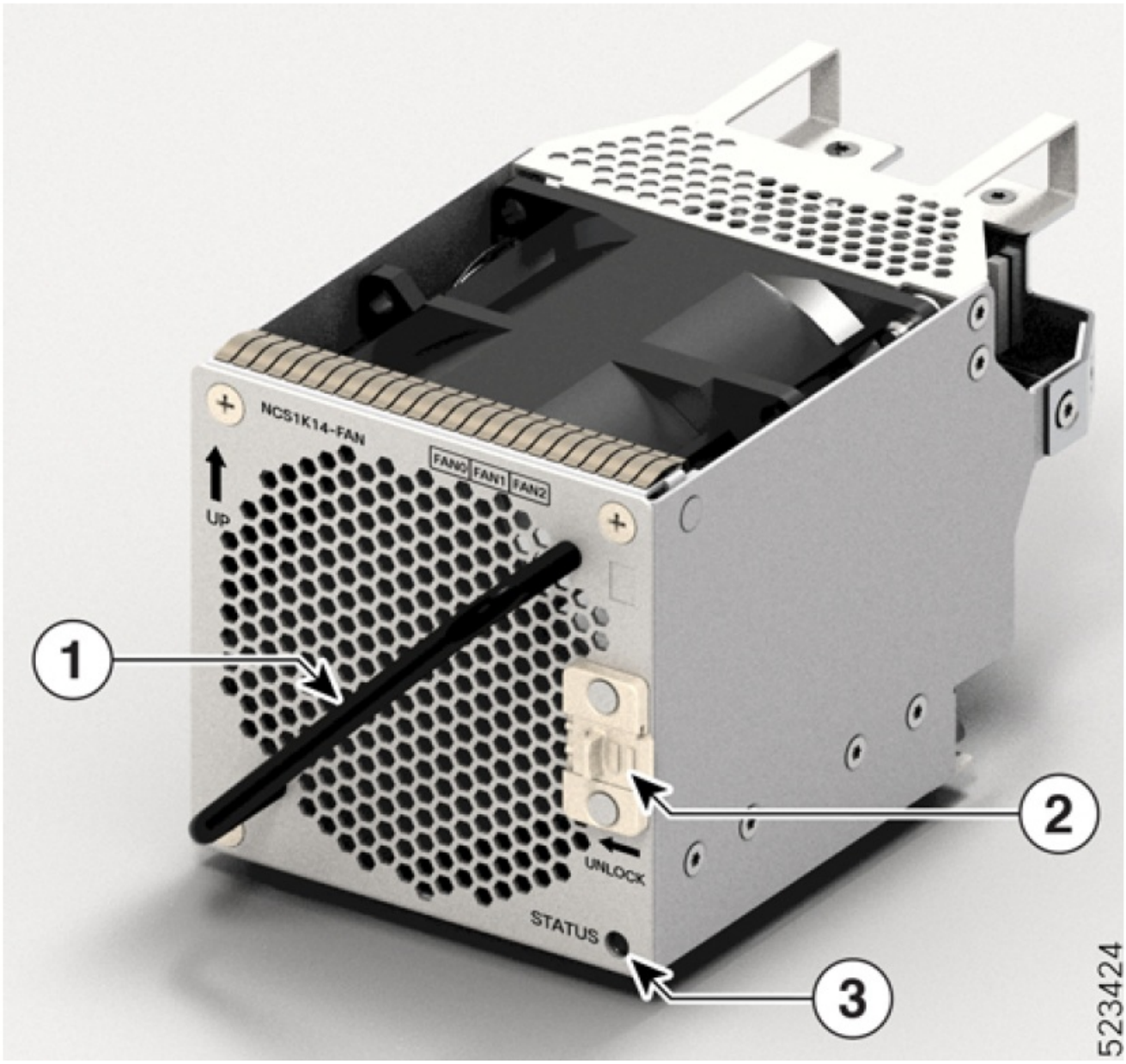


Table 8: Fan Tray Components

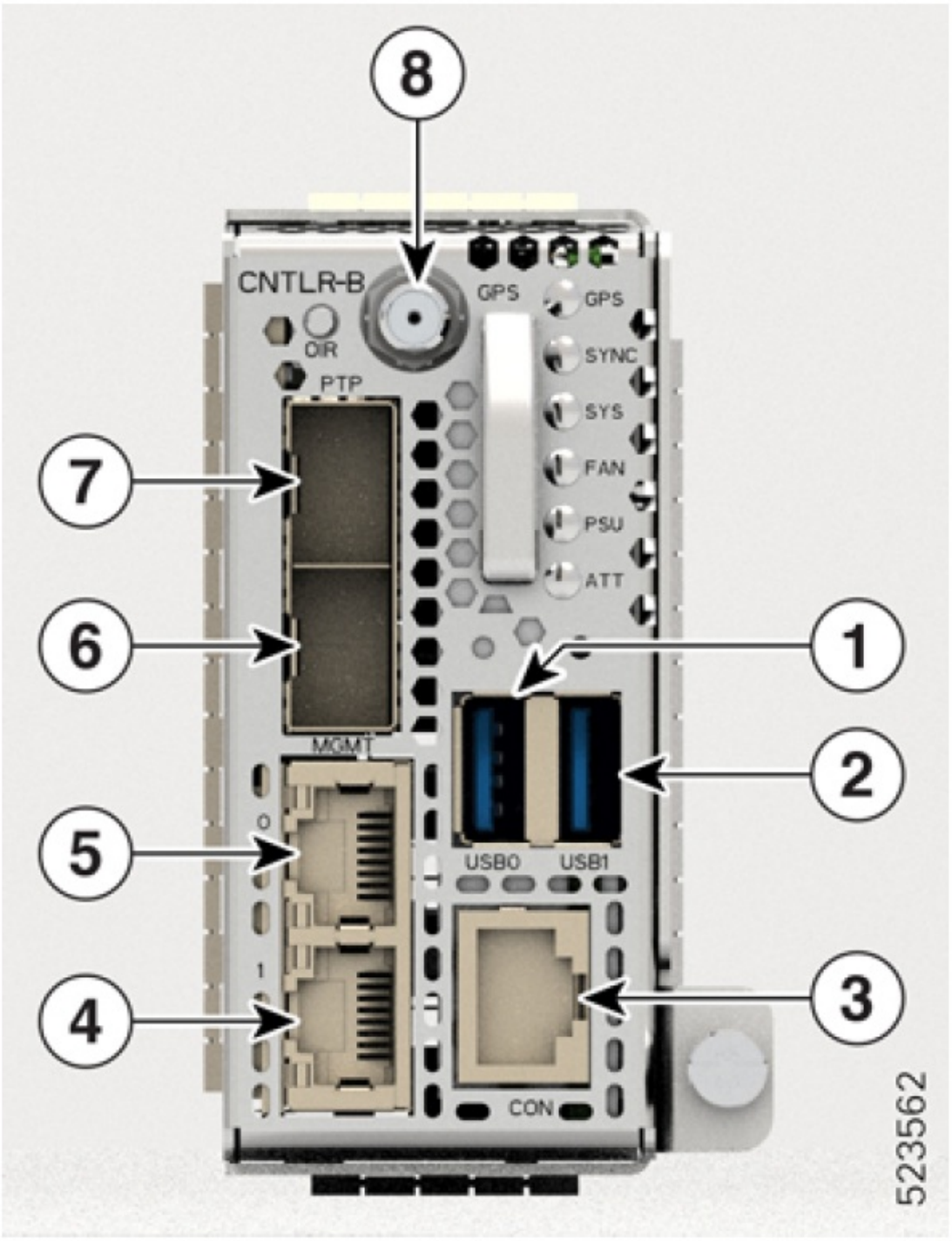
Callout	Component
1	Cross handle
2	Side lever lock
3	Status LED

Controller Cards

The Cisco NCS 1014 chassis supports the following controller cards:

NCS1K14-CNTLR-B-K9
The NCS1K14-CNTLR-B-K9 controller card supports a default of 9600-baud rate on the RS-232 console port. The controller card has two USB 2.0, two 10/100/1000 Ethernet, one RS-232 console and two 1GE SFP ports. The SFP port of the controller card supports 1GE payload for PTP. It also has an OIR button and six status LEDs. The controller card provides encryption, remote console connection, PTP and SyncE timing, and GPS.

Figure 10: NCS1K14-CNTLR-B-K9 Controller Card



NCS1K14-CNTLR-K9

The NCS1K14-CNTLR-K9 controller card supports a default of 115200-baud rate on the RS-232 console port. The controller card has two USB 2.0, two 10/100/1000 Ethernet, one RS-232 console and two 1GE SFP ports. The SFP port of the controller card supports 1GE payload for PTP. It also has an OIR button and six status LEDs. The controller card provides encryption, remote console connection, PTP and SyncE timing, and GPS.

Figure 11: NCS1K14-CNTLR-K9 Controller Card

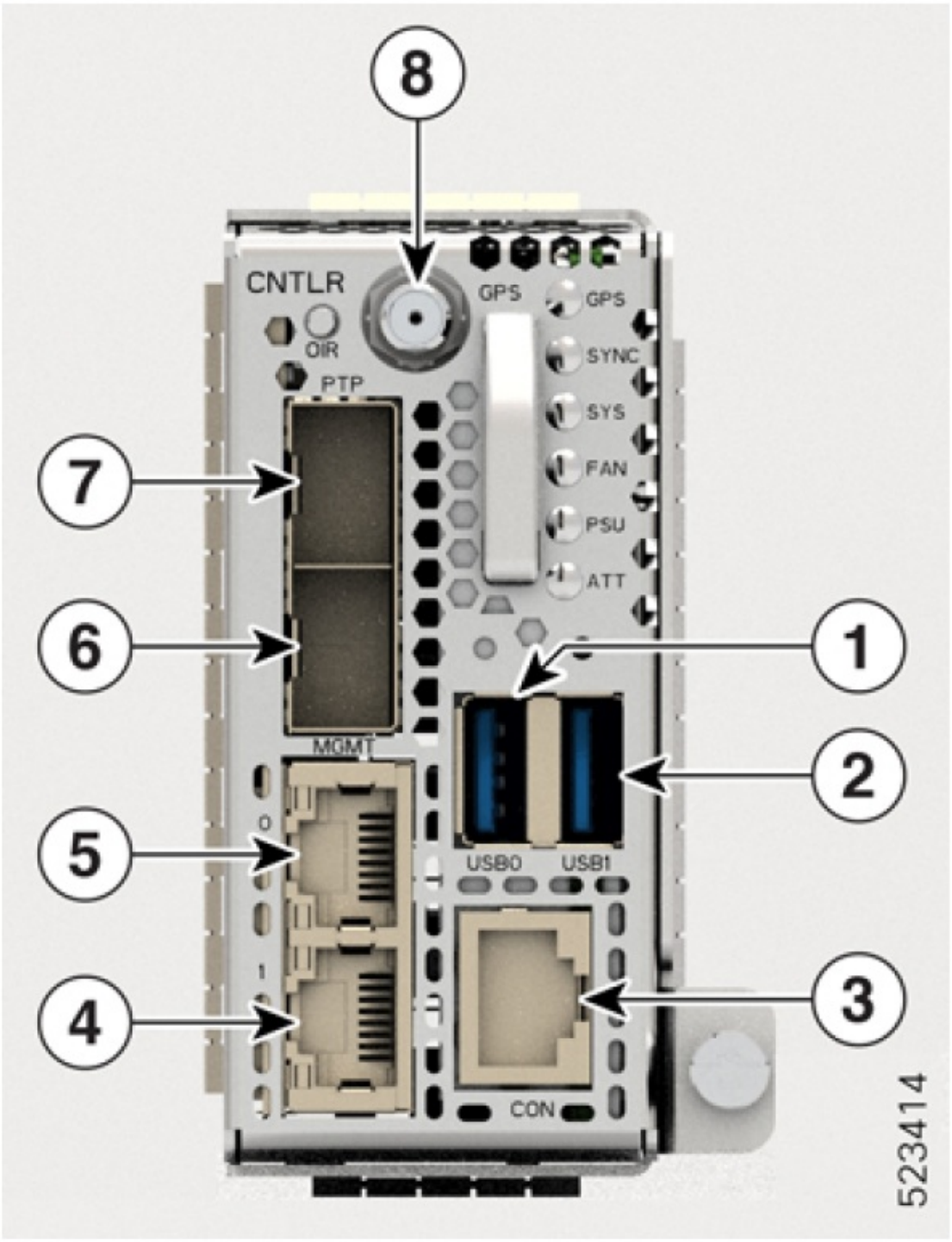


Table 9: Controller Card Interfaces

Callout	Interface	Description
1, 2	USB 0 and 1	External USB port. USB 2.0 type A, 1.8A max @12V provides support to external passive optical modules (2x) The USB ports have following functions: • Essential—boot the image through pen drive. • Optional—copy files to and from local devices.
3	CON	Console interface (1x)
4, 5	MGMT 0 and 1	10/100/1000 RJ-45 Ethernet management ports (2x)
7, 6	PTP 0 and 1	SFP for 1GE optical PTP ports (1588-nm PTP and SyncE) (2x)
8	GPS	Coaxial connector for GPS antenna RF input (with 5 V antenna power, if necessary) (1x)

Power Supply

The Cisco NCS 1014 chassis has two slots for 2.5-kW AC and DC 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. Cisco NCS 1014 chassis also supports 2.1-kW AC PSUs.
2.5-kW 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—2500 W upto 40°C for 1 PSU; 2500 W upto 55°C for 2 PSUs (for a short duration, as specified by Telcordia GR-63-Core).
- AC low voltage range input—1500 W upto 40°C for 1 PSU; 1500 W upto 55°C for 2 PSUs (for a short duration, as specified by Telcordia GR-63-Core).
- DC power supply—2500 W upto 40°C for 1 PSU; 2500 W upto 55°C for 2 PSUs (for a short duration, as specified by Telcordia GR-63-Core).

For DC-DC (2500 W @12 Vout)

• Input Voltage Rating = –48 Vdc / –60 Vdc
• Max. Input current @ –48 Vdc = 60 A
• Input Voltage range = –40.5… –72 Vdc (operating)
• Input turn ON Voltage = –42 Vdc max
• Recommended FUSE rating = 100 A max. per feed

For the AC-DC (2500 W (HL) / 1500 W (LL) @12 Vout)

• Input Low Line (LL) Nominal voltage = 120 Vac
• Input High Line (HL) Nominal voltage = 200–230 Vac
• Max Input current @100 Vac = 15 A
• Max Input current @200 Vac = 12 A
• Input frequency rating = 50/ 60 Hz
• Input LL voltage range = 90–140 Vac
• Input HL voltage range = 180–264 Vac
• Input frequency range = 47–63 Hz (nominal 50/60Hz)
• Min Input turn ON voltage = 85 Vac / 175 Vac (LL/ HL)
• Max Input turn ON voltage = 90 Vac / 180 Vac (LL/ HL)
• Recommended FUSE (HL) = 16 A
• Recommended FUSE (LL) = 20 A

2.1-kW 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°C for 1 PSU; 2100 W upto 55°C for 2 PSUs (for a short duration, as specified by Telcordia GR-63-Core).
- AC low voltage range input—1300 W upto 40°C for 1 PSU; 1300 W upto 55°C for 2 PSUs (for a short duration, as specified by Telcordia GR-63-Core).
- DC power supply—2100 W upto 40°C for 1 PSU; 2100 W upto 55°C for 2 PSUs (for a short duration, as specified by Telcordia GR-63-Core).

For DC-DC (2000 W @12 Vout)

- Input Voltage Rating = –48 Vdc / –60 Vdc
- Max. Input current @48 Vdc = 44 A
- Input Voltage range = 40.5–72 Vdc (operating)
- Input turn ON Voltage = –42 Vdc max
- Recommended FUSE rating = 60 A max. per feed

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

• Input Low Line (LL) Nominal voltage = 100–127 Vac
• Input High Line (HL) Nominal voltage = 200–240 Vac
• Max Input current @100 Vac = 15 A
• Max Input current @200 Vac = 12 A
• Input frequency rating = 50/ 60 Hz
• Input LL voltage range = 90–140 Vac
• Input HL voltage range = 180–264 Vac
• Input frequency range = 47–63 Hz (nominal 50/60 Hz)
• Input turn ON voltage = 80 Vac / 175 Vac (LL/ HL)
• Recommended FUSE (HL) = 16 A
• Recommended FUSE (LL) = 20 A

Power Supply Units (PSUs)
Cisco NCS 1014 chassis has two redundant, field-replaceable Power Supply Units (PSUs) at the rear side. Each PSUs support up to 2.5 kW per system.
The PSUs have internal fans to regulate the temperature inside the PSUs. The FANs in the PSU receive power from the main PSU or the standby PSU. The PSUs are available in reverse air flow (RAF) direction meaning the air flow direction is from the output connector to the input connector.

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

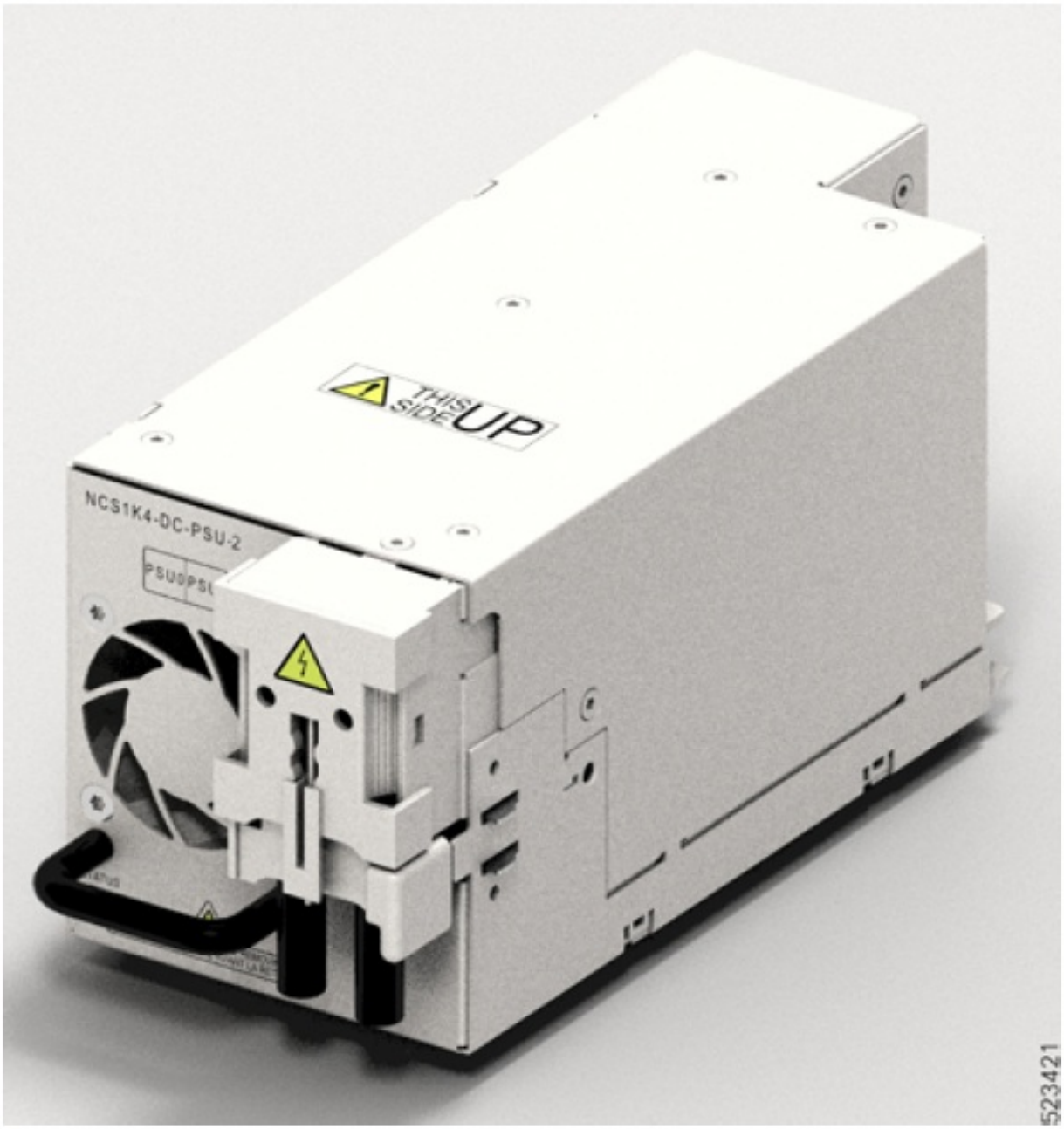
Cisco NCS 1014 chassis supports the following PSUs:

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

Figure 12: NCS1K4-AC-PSU-2

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

Figure 13: NCS1K4-DC-PSU-2



- NCS1K4-AC-PSU

  NCS1K4-AC-PSU is an 2.1-kW AC to DC, power-factor-corrected (PFC) power supply that converts standard AC power into a main output of 12V DC.
- NCS1K4-DC-PSU

  NCS1K4-DC-PSU is a 2.1-kW DC to DC, PFC power supply with 12V DC (main) and 12V DC (standby) output.

Supported Pluggables

The Cisco NCS 1014 2.4T line card supports the following pluggables:
Client pluggable:

• QDD-400G-FR4-S
• QDD-400G-AOCxM
• QDD-400G-DR4-S
• QDD-4X100G-LR-S

For more information on the 400G client pluggables, see Cisco 400G QSFP-DD Cable and Transceiver Modules Data Sheet.

Trunk pluggables:

- CIM8-C-K9=
- CIM8-L-K9=

The 1.2T line card supports the following pluggables:

- QSFP-100G-SR4-S
- QSFP-100G-CWDM4-S
- QSFP-100G-SM-SR
- QSFP-100G-AOC-1M
- QSFP-100G-AOC-3M
- QSFP-100G-AOC-10M
- QSFP-100G-LR4-S
- QSFP-100G-CU1M
- QSFP-100G-CU2M
- QSFP-100G-CU3M
- QSFP-100G-CU5M
- QSFP-100G-DR-S
- QSFP-100G-FR-S
- QSFP-100G-LR-S
- ONS-QSFP28-LR4
- QSFP-40/100-SRBD
- QSFP-100G-ER4L-S

Documents / Resources

	Cisco NCS 1014 Network Convergence System [pdf] User Guide NCS 1014 Network Convergence System, NCS 1014, Network Convergence System, Convergence System, System

References

- User Manual