

Cisco NCS 1014 Overview

This chapter provides an overview for the Cisco NCS 1014 chassis, its modules and line cards.

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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 slots for the following modules:

- Removable controller
- Removable backup solid state drive (SSD)
- Two replaceable power supply units (PSU)
- Three replaceable fan modules
- Four line cards

The Cisco NCS 1014 chassis supports the following line cards.

Table 1: Supported Line Cards

Line Card	Description	Release
NCS1K14-2.4T-K9	2.4T DWDM Transponder Card	Cisco IOS XR Release 7.11.1
NCS1K14-CCMD-16-C	16-port Colorless Mux/Demux Card, C-band	Cisco IOS XR Release 7.11.1
NCS1K14-CCMD-16-L	16-port Colorless Mux/Demux Card, L-band	Cisco IOS XR Release 7.11.1

Line Card	Description	Release
NCS1K4-1.2T-K9	1.2T DWDM Transponder Card	Cisco IOS XR Release 7.11.1
NCS1K14-2.4T-X-K9	2.4TX DWDM Transponder Card	Cisco IOS XR Release 24.1.1
NCS1K4-QXP-K9	3.2T DWDM Transponder Card	Cisco IOS XR Release 24.1.1
NCS1K4-1.2T-L-K9	1.2T DWDM Transponder Card - Licensed	Cisco IOS XR Release 24.4.1
NCS1K14-EDFA2	EDFA Terminal with Equalization Card	Cisco IOS XR Release 25.1.1
NCS1K4-2-QDD-C-K9 Line Card, on page 23	2-QDD-C DWDM line card	Cisco IOS XR Release 25.2.1
NCS1K14-2.4T-A-K9	2.4TA DWDM Transponder Card	Cisco IOS XR Release 26.1.1

The Cisco NCS 1014 chassis supports the following line cards.

Table 2: Supported Passive Devices

Passive Devices	Description	Release
NCS1K-MD-32O-CE	32-channel Odd Mux/Demux Patch Panel, C-band Enhanced	Cisco IOS XR Release 25.1.1
NCS1K-MD-32E-CE	32-channel Even Mux/Demux Patch Panel, C-band Enhanced	Cisco IOS XR Release 25.1.1

The Cisco NCS 1014 chassis has two slots for field-replaceable AC and DC PSUs that support up to 2.5 kW per system and 580 W per line card slot.

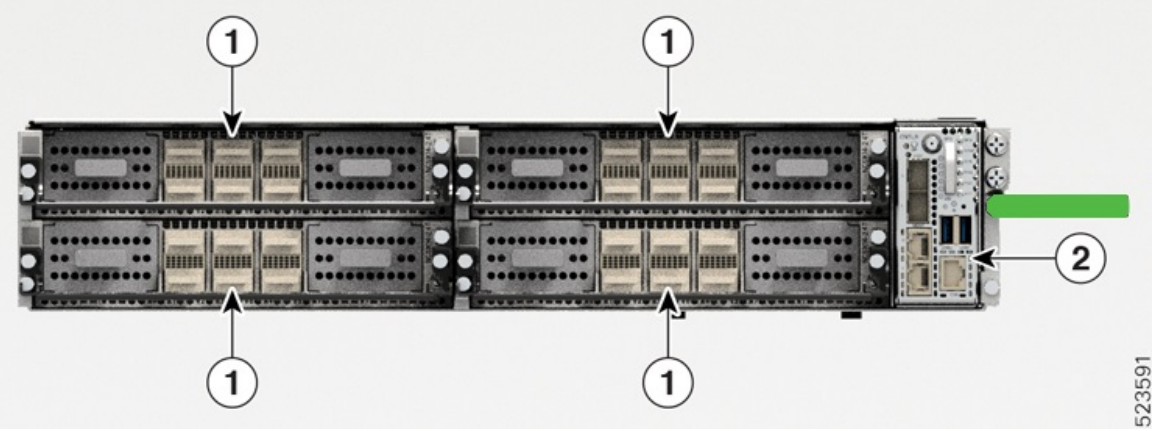
For more information about the Cisco NCS 1014 chassis, see Cisco NCS 1014 datasheet.

Note

- "2.4T" refers to the NCS1K14-2.4T-K9 line card.
- "CCMD-16-C" refers to the NCS1K14-CCMD-16-C C-band optical line card.
- "CCMD-16-L" refers to the NCS1K14-CCMD-16-L optical line card.
- "1.2T" refers to the NCS1K4-1.2T-K9 line card.
- "2.4TX" refers to the NCS1K14-2.4T-X-K9 line card.
- "QXP-K9" refers to the NCS1K4-QXP-K9 line card.

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

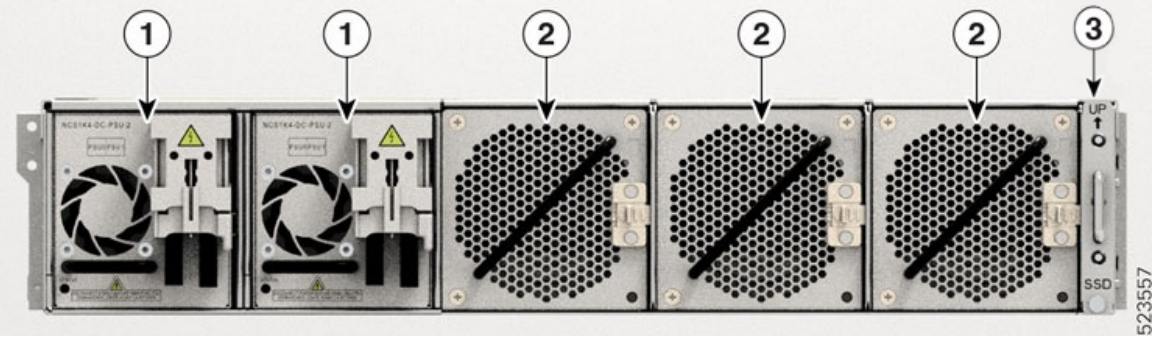
Figure 1: NCS 1014 Front View



Callout	Modules
1	Line Cards
2	Controller

The following figure shows the PSUs, fan modules, and SSD installed in the chassis.

Figure 2: NCS 1014 Rear View



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

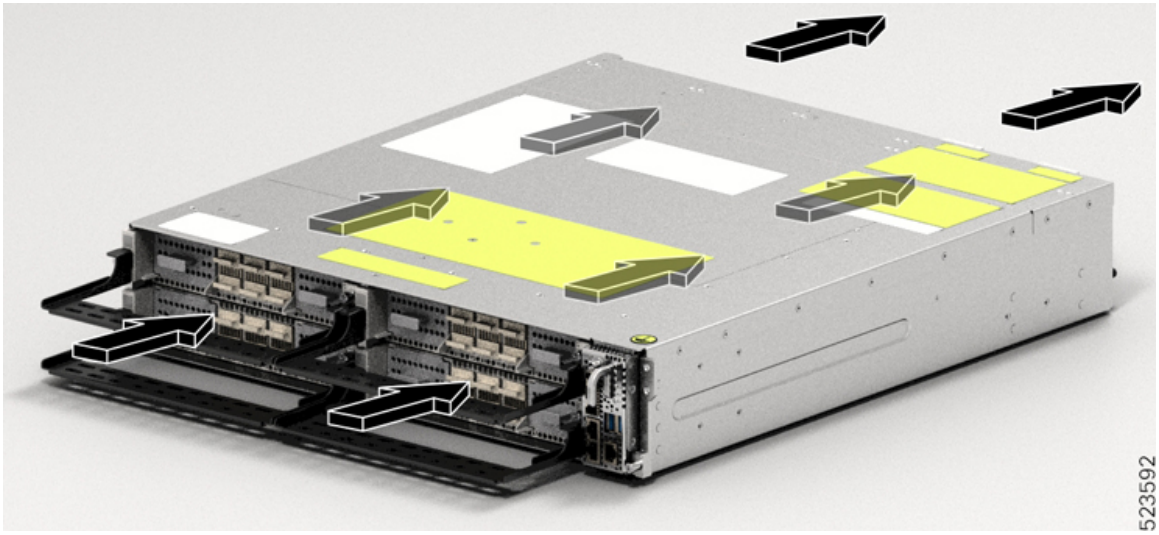
You must install AC or DC PSUs as the power supply modules. The chassis does not allow mixed PSU configuration.

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 modules 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.

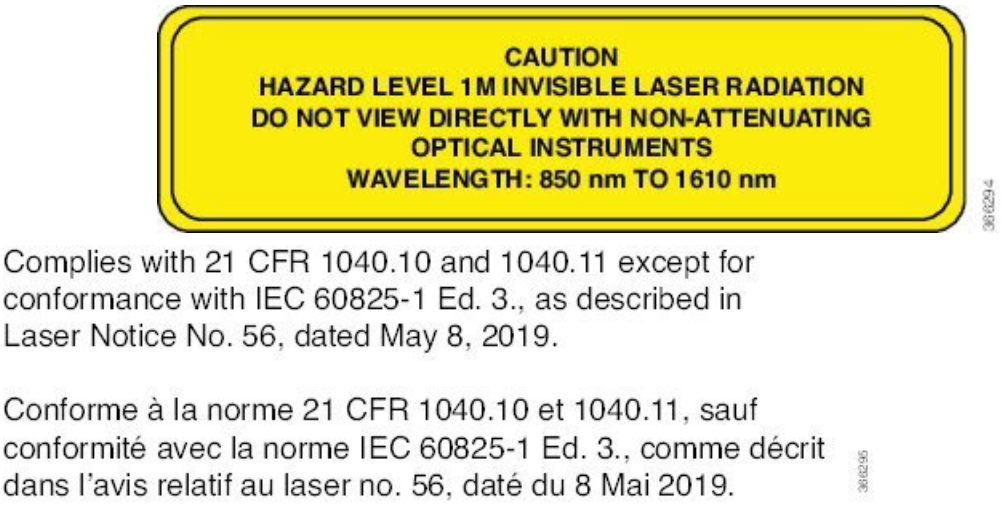
Figure 3: Airflow Through the Cisco NCS 1014 Chassis



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 cooling in two different airflow paths:

- **Line Cards Cooling**

The three fan modules enable cooling for the line cards. The software monitors the chassis temperature and adjusts the fan speed according to the ambient temperature range.

- **Controller Card Cooling**

  The internal fans within the two PSUs cool the controller card. If any critical alarms arise due to controller temperature, the software overrides the PSU fan speed.

Note For normal operating conditions, the software does not control the PSU fans.

During the power cycle, each fan runs at maximum rotations per minute. After the chassis boots up, the fans return to their normal speed according to the ambient temperature.

Cooling profiles of the NCS 1014 chassis

Beginning with Release 25.2.1, the NCS 1014 chassis supports the programmable NCS1K14-FAN-P fan module, which runs two cooling profiles. The programmable fan changes its cooling profile depending on the installed line cards and pluggable modules. By default, the programmable fan uses the low-power, low-cooling profile.

Cooling profiles work only when you fill all fan slots with programmable fan modules.

The cooling profiles of the fans change based on the status of the NCS 1014 chassis. During controller Online Insertion and Removal (OIR), line card OIR, fan OIR, or fan failure, the fans run at maximum cooling profile speed.

Note During the INFRA POWER CYCLE, the system runs the fans at maximum speed for the low-cooling profile. Therefore, perform the INFRA POWER CYCLE only when the ambient temperature is less than or equal to 40°C. Perform line card or fan OIR, line card or fan replacement, or any software or FPD upgrade only at an inlet temperature less than or equal to 40°C. Use **show environment***0/Rack* to check inlet temperature.

From Release 26.3.1, a new high performance fan module NCS1K14-FAN-2 is introduced. This fan module is programmable with three adjustable cooling profiles, high, low, and medium. This dynamic cooling support is designed for the NCS 1014 and NCS 1014-2 chassis that supports high-power line cards like the OXP2-K9.

Legacy fans support a static cooling profile, while programmable fans support a dynamic cooling profile. The NCS 1014 offers three profiles: low cooling, high cooling, and legacy cooling. The inlet temperature sensors, SA_TEMP_CHASSIS_INLET0 and SA_TEMP_CHASSIS_INLET1, determine when to increase or decrease fan speed. For more information on fan RPM for each cooling profile, refer Fan modules, on page 28.

Programmable fans installed in pre-Release 25.2.1

If you install the programmable fans in a release earlier than 25.2.1, where they are not supported, the fan units do not appear in the **show inventory** output. The system raises the *Fan tray absent* alarm even though the fans continue to run in the chassis. It is recommended not to install the programmable fan units in the chassis running earlier releases.

Mixed fan configuration

A mixed fan configuration involves installing both legacy and programmable fan units together.

If both legacy and programmable fans are installed in the NCS 1014 fan slots during live traffic or card configuration, the system raises the *CONFIG MISMATCH* alarm. To clear the alarm, equip the fan slots with either the legacy or programmable fans. The mixed fan configuration is allowed only for a limited time during a fan upgrade. In this configuration, the legacy fan runs at 14,500 rpm and the programmable fan runs at 17,000 rpm.

Programmable fan speed implementation on NCS 1014 line cards

Table 3: Feature History

Feature Name	Release Description	Feature Description
NCS1K14-FAN-P Enhanced Fan Profile Support	Cisco IOS XR Release 25.2.1	The NCS1K14-FAN-P provides enhanced fan profile management for the NCS 1014 platform, enabling improved power efficiency and flexibility for various use cases. The system automatically adjusts the fan profile based on the line cards inserted in the chassis. For example, • if one or more transponder cards are detected, the fans automatically maintain a high-power fan profile. • if only a combination of NCS1K14-EDFA2, NCS1K14-CCMD-16-x, or filler cards is present, the fans automatically maintain a low-power fan profile. This dynamic fan profile enables optimal power consumption for Metro Open Line System (MOLS) 2.0 and NCS1K14-CCMD-16-x configurations.

Fan cooling profiles provide appropriate cooling for the NCS 1014 chassis based on the installed line cards. This dynamic cooling profile enables optimal power consumption for MOLS 2.0 and NCS1K14-CCMD-16-x configurations.

Table 4: Cooling profiles of programmable fans on different configurations

The fans maintain	For configuration on
low-cooling profile	MOL2.0, optical and OLS line cards. • NCS1K14-EDFA2 • NCS1K14-CCMD-16-C • NCS1K14-CCMD-16-L

The fans maintain	For configuration on
medium-cooling profile	transponders line cards. • NCS1K14-2.4T-K9 • NCS1K14-2.4T-X-K9 • NCS1K4-1.2T-K9 • NCS1K4-1.2T-L-K9 • NCS1K4-2-QDD-C-K9
high-cooling profile	NCS1K14-OXP2-K9

Table 5: Cooling profiles of programmable fans on different configurations

The fans maintain	For configuration on
low-cooling profile	MOL2.0, optical and OLS line cards. • NCS1K14-EDFA2 • NCS1K14-CCMD-16-C • NCS1K14-CCMD-16-L
medium-cooling profile	transponders line cards. • NCS1K14-2.4T-K9 • NCS1K14-2.4T-X-K9 • NCS1K4-1.2T-K9 • NCS1K4-1.2T-L-K9 • NCS1K4-2-QDD-C-K9
high-cooling profile	NCS1K14-OXP2-K9

Programmable fan speed implementation on NCS 1014 for coherent pluggables

Table 6: Feature History

Feature Name	Release Description	Feature Description
NCS1K14-FAN-P Smart Fan Implementation for Pluggable modules	Cisco IOS XR Release 25.2.1	The NCS1K14-FAN-P enhanced fan profile support is extended to pluggable modules on the transponder line cards. 1. CIM8 C- and L-band pluggable on NCS1K14-2.4T-K9 and NCS1K14-2.4T-X-K9 cards 2. Bright ZRP pluggable on the NCS1K4-QXP-K9 card with regen (regeneration) and without regen configurations.

The enhanced fan cooling profiles also apply to pluggable modules on the transponder line cards.

Table 7: Coherent pluggables with smart fan speeds

smart fan speed works for	in line cards
CIM8 C- and L-band pluggable modules • CIM8-C-K9 • CIM8-CE-K9 • CIM8-LE-K9	NCS1K14-2.4T-K9 and NCS1K14-2.4T-X-K9
Bright ZRP pluggable module with regen (regeneration) and without regen configurations • DP04QSDD-HK9 • DP04QSDD-LK9 • DP04QSDD-HE0 • DP04QSDD-HE0-A1	NCS1K4-QXP-K9

Cisco NCS 1014-2 chassis

The Cisco NCS 1014-2 chassis is a variant of the NCS 1014 chassis. It has been specifically designed for the NCS1K14-OXP2-K9 card, which is a double-slot line card. It features a new fan tray (NCS1K14-FAN-2=) that has modified grid for more airflow.

Table 8: Feature History

Feature Name	Release Information	Feature Description
NCS1014-2= chassis	Cisco IOS XR Release 26.3.1	The Cisco NCS 1014-2 chassis is a variant of the NCS 1014 chassis, designed specifically to support the NCS1K14-OXP2-K9 double-slot line card in optical network environments. It features a new fan tray with improved air flow, and a removable divider that enables it to be configured either to support two double-slot line cards or four single-slot line cards, providing flexible deployment options. This design flexibility streamlines installation and enhances compatibility with optical line cards, facilitating efficient integration and improved performance to meet evolving optical network requirements.

Chassis configurations:

- With a removable divider and four single-slot filler cards and separately ordered OXP2-K9 card: This is an Assemble-to-Order (ATO) configuration that can serve as a replacement for the standard NCS 1014 chassis or support the OXP2-K9 card. You can order the OXP2-K9 card separately and use it with the chassis after removing the divider.
- Without a divider and with an OXP2-K9 card and a dual-width filler (NCS1K14-BLANK-2): This setup acts as an exclusive chassis for the OXP2-K9 card.
- Without a divider and two OXP2-K9 cards: This setup acts as an exclusive chassis for the OXP2-K9 card.

Figure 5: Front view of the NCS 1014-2 chassis with one OXP2-K9 card

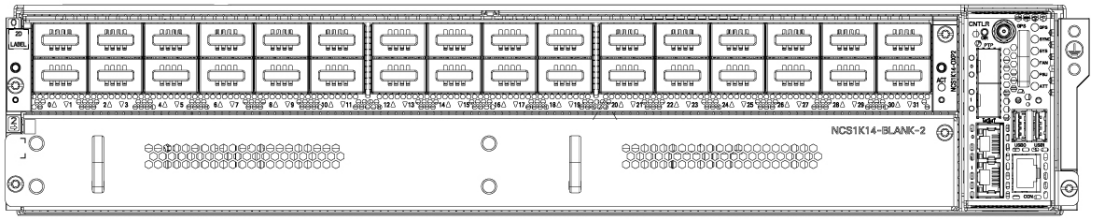
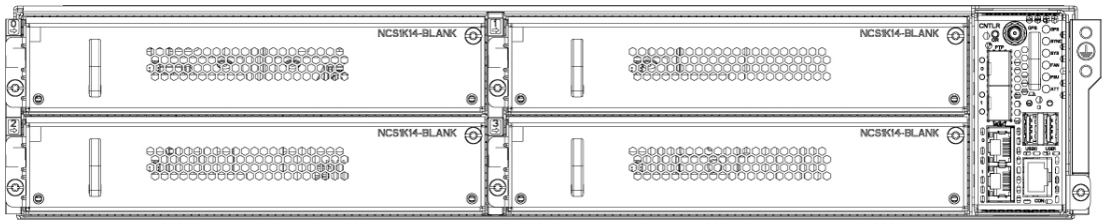


Figure 6: Perspective view of the NCS 1014-2 chassis with four single slot fillers and removable divider



Limitations

- If a spare NCS 1014-2 chassis arrives with the divider installed but needs to be used for dual-slot line cards, the divider can be removed in the field for this configuration. Once the divider is removed, it

cannot be reinserted into the chassis. Attempting to reinstall it may compromise the safety and quality of the chassis.

- After the chassis has been customized for dual-slot line card use, it cannot be upgraded again to support four single-slot line cards.
- The 2.5kW PSUs in the NCS 1014-2 chassis support a maximum of 24 TXPs (12 TXPs per OXP2-K9 card) when two OXP2-K9 cards are installed, and up to 16 TXPs when a single OXP2-K9 card is installed.

Cisco NCS 1014 Line Cards

The Cisco NCS 1014 chassis supports the following line cards:

2.4T Line Card

The 2.4T line card is a coherent optics Transponder and Muxponder for the Cisco NCS 1014 chassis. It is a single-slot card that supports C-band traffic at trunk ports. This line card delivers 400GE, 100GE, and OTU4 client traffic over two trunk ports operating at speeds ranging from 400G to 1.2T each.

Note In Release 7.11.1, the 2.4T line card supports only 400, 600, 800, and 1000G trunk payloads.

In the 2.4T card, the client and trunk ports support the pluggable form factor and data rates as shown in the following table.

Table 9: 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 In Release 7.11.1, the ports 2, 5, and 6 support only up to 400GE data rates.

For more information about the 2.4T card, see datasheet.

The 2.4T card has two trunk ports and six client ports as shown in the following figure.

Figure 7: 2.4T Line Card Front View

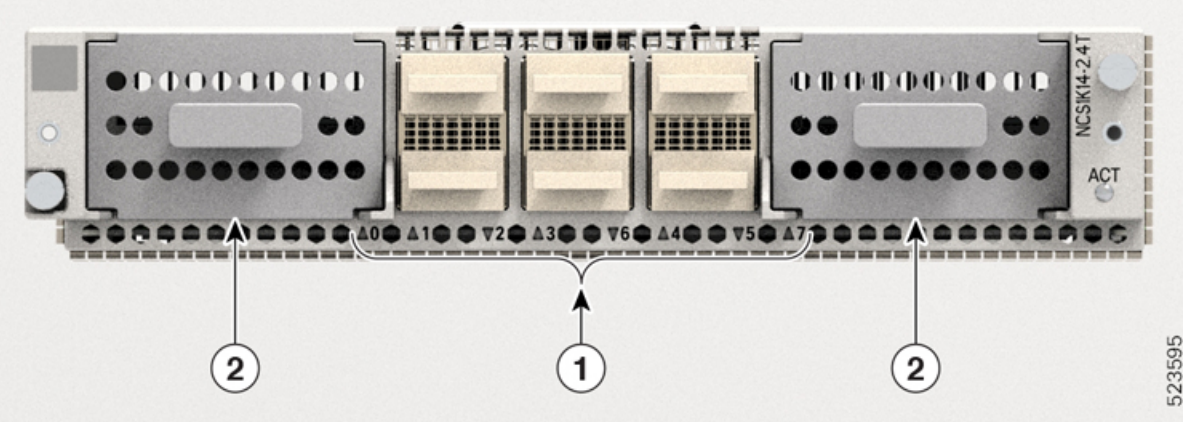


Table 10: 2.4T Line Card Interfaces

Callout	Interface
1	Client port
2	Trunk port

The following figure shows the mapping between the client and trunk ports.

Figure 8: 2.4T Card Client and Trunk Mapping

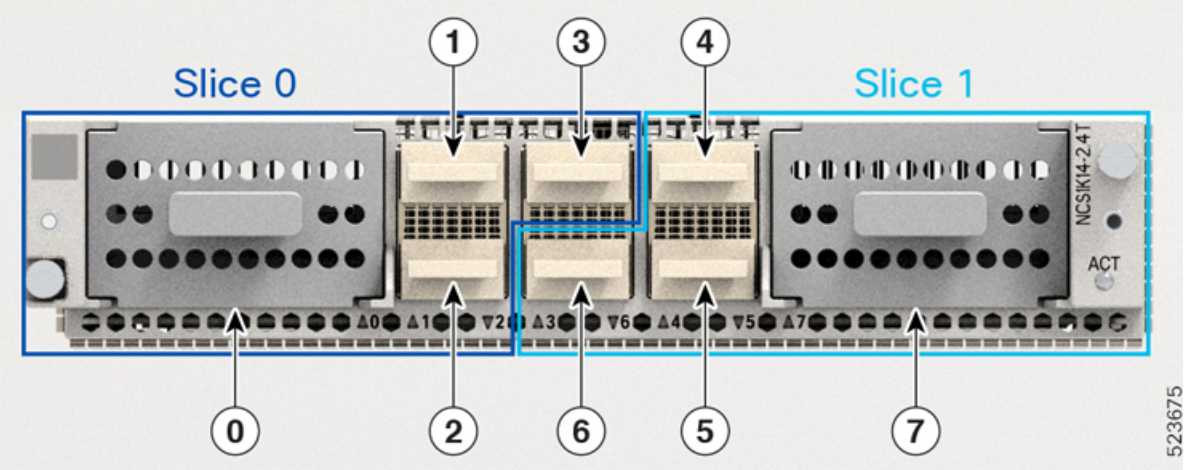


Table 11: Client-to-Trunk Port Mapping

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

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

The 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, you can install the optical line card in one or more cardslots.

The optical line card has:

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

There are two variants of the optical line card:

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

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

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

  Table 12: C-Band Channel Wavelength Plan

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

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

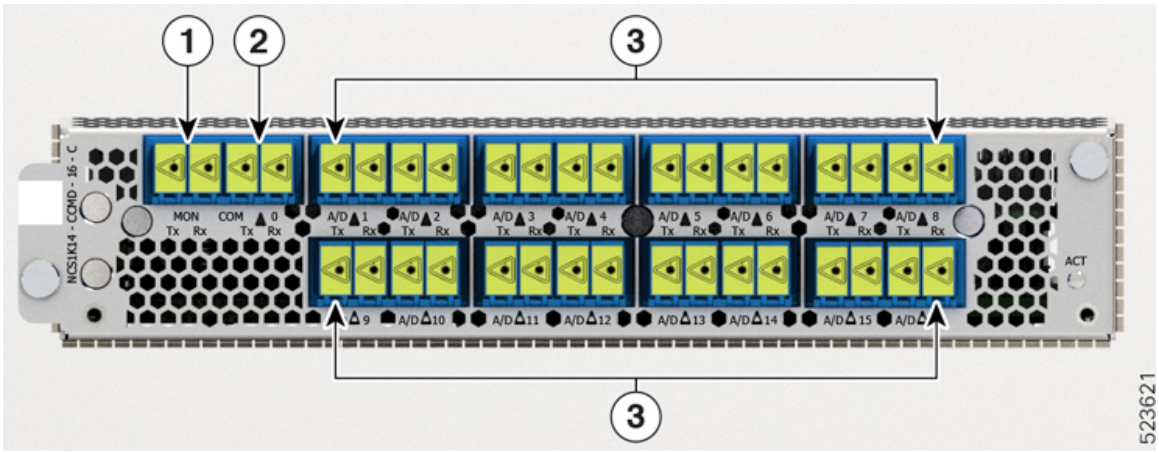
  The NCS1K14-CCMD-16-L line card is an L-band, 16-port Colorless Direct attach optical line card with EDFA. It can host up to 16 channels. It supports any signal distribution between 186025 and 191000 GHz, for example, the 64 channels grid with 75-GHz spacing.

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

  Table 13: L-Band Channel Wavelength Plan

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

Figure 9: NCS1K14-CCMD-16 Line Card Front View



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

Table 14: Line Card Interface and Connector Assignment

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

1.2T Line Card

Table 15: Feature History

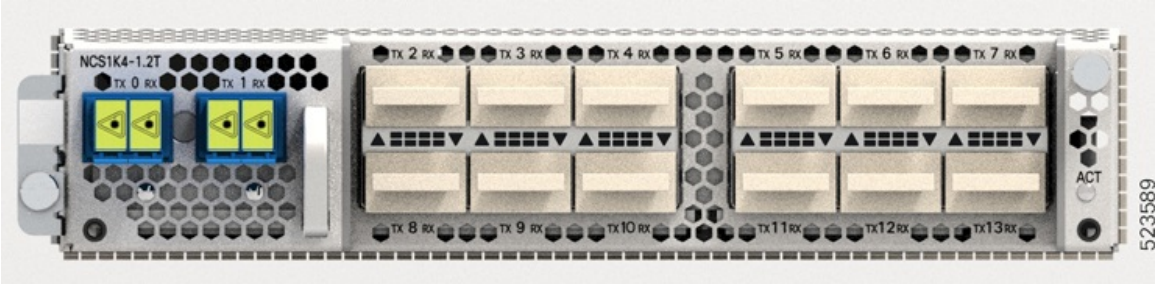
Feature Name	Release Information	Feature Description
NCS1K4-1.2T-L-K9 Line Card Support	Cisco IOS XR Release 24.4.1	The NCS 1014 chassis now supports the **NCS1K4-1.2T-L-K9** line card. This card is the licensed version of the NCS 1004 1.2T line card and offers a "pay as you grow" model. This card provides 4x 100G of unencrypted client capacity on day one. The licensed version of the card allows you to • purchase 100G incremental licenses to expand up to 12x 100G capacity for each card. • set line rates from 100 to 600G. • deploy long haul and subsea licenses in NCS 1014.

The 1.2T DWDM line card can provide up to 12 OTU4 or three 400G client ports.

The 1.2T DWDM line card is a transponder that 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.

Note From Release 24.4.1, the NCS 1014 chassis supports the NCS1K4-1.2T-L-K9 line card. This card is the licensed version of the 1.2T line card.

Figure 10: 1.2T DWDM Line Card Front View



For more information about the 1.2T card, see datasheet and card LEDs.

2.4TX line cards

Table 16: Feature History

Feature Name	Release Information	Feature Description
NCS1K14-2.4T-X-K9 Line Card	Cisco IOS XR Release 24.1.1	The new **NCS1K14-2.4T-X-K9 line card** is a single-slot Transponder and Muxponder card that delivers up to 1.2T C-band traffic at each trunk port. It has six QDD client ports that support 400GE and 4x100GE traffic on each port. This card provides two trunk ports that support 1.2T traffic on each port. The **mxponder-slice** and **muxponder** keywords in the **hw-module** command enable this card to operate in the following modes. • **Muxponder slice mode:**The card virtually splits into two slices in this mode. It is possible to configure both trunks to carry different data rates. The supported trunk rates are 400G, 500G, 600G, 800G, 1000G, and 1200G. • **Muxponder mode:**The card acts as one unit in this mode, configuring both trunks to the same data rate. The supported trunk rates are 600G and 1000G. Additionally, the capacity of a specific shared client port is consumed by two trunk ports.

The 2.4TX line card is a coherent optics Transponder and Muxponder for the Cisco NCS 1014 chassis. It is a single-slot card that supports C-band traffic at trunk ports. This card delivers 400GE and100GE client traffic over two trunk ports operating at speeds ranging from 400G to 1.2T each.

This card operates in two card modes:

- **Muxponder mode:**the client traffic splits between the two trunk ports for 600G and 1000G payloads on port 2 and 3 respectively. In this mode, both trunk ports always carry the same data rate
- **Muxponder slice mode:**both trunk ports act independently, carrying different data rates in each trunk

Note In Release 24.1.1, the 2.4TX line card supports only 400, 500, 600, 800, 1000, and 1200G trunk payloads.

For more information about the 2.4TX card, see datasheet.

In the 2.4TX card, the client and trunk ports support the pluggable form factor and data rates as shown in this table.

Table 17: NCS1K14-2.4T-X-K9 interfaces and data rates

Interfaces	Form factor	Ports	Data rates
Client	QSFP-DD56	1, 2, 3, 4, 5, 6	400G
	QSFP-DD112	2, 5	400, 800G

Interfaces	Form factor	Ports	Data rates
Trunk	Coherent Interface Module 8 (CIM8)	0, 7	up to 1.2T in each port

Note In Release 24.1.1, the ports 2 and 5 support only up to 400G data rates.

The 2.4TX card has two trunk ports and six client ports as shown in the this figure.

Figure 11: 2.4TX line card front view

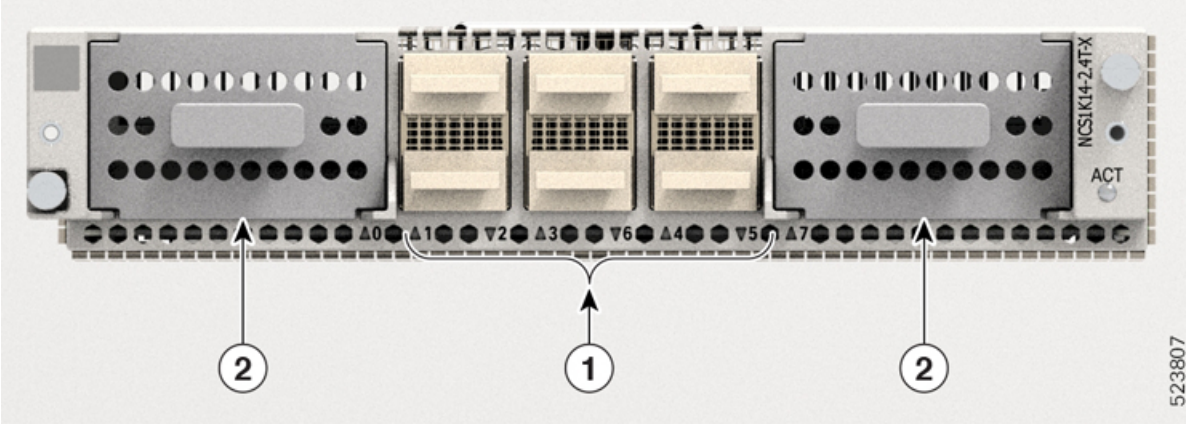


Table 18: 2.4TX line card interfaces

Callout	Interface
1	Client port
2	Trunk port

This figure shows the mapping between the client and trunk ports.

Figure 12: 2.4TX card client and trunk mapping

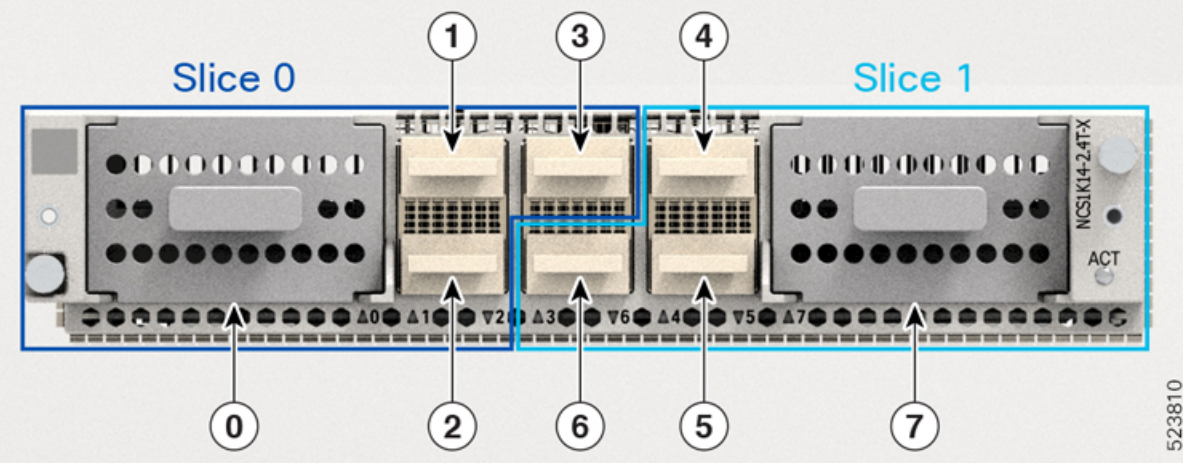


Table 19: Client-to-Trunk port mapping

Trunk port	Client ports
0	1, 2, 3
7	4, 5, 6

Note This client-to-trunk port mapping is only applicable for the mxponder-slice mode.

QXP-K9 Line Card

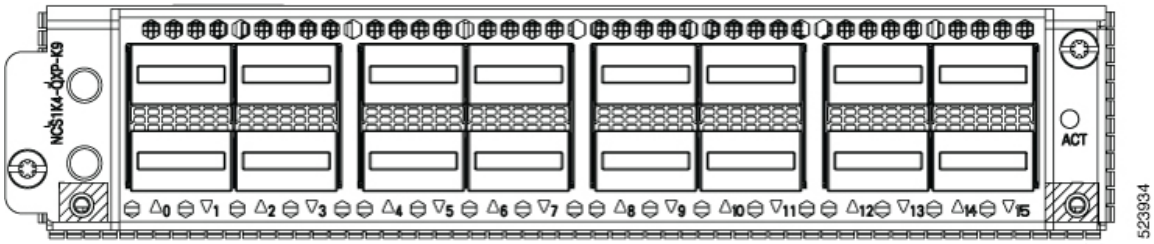
The QXP-K9 line card is a high-density QSFP-DD transponder that has eight client ports (QSFP-DD) and eight trunk ports (QSFP-DD ZR+). It is a single-slot card that supports 3.2T traffic through its eight QSFP-DD trunk ports. Each trunk port operates at speed up to 400G in a 50G increment. Each client port supports 400GE, 4x100GE, and 100GE without FEC client rates.

Table 20: QXP-K9 Interfaces

Interfaces	Form Factor	Ports
Client	QSFP-DD	1, 3, 5, 7, 9, 11, 13, 15
Trunk	QSFP-DD	0, 2, 4, 6, 8, 10, 12, 14

The QXP-K9 card has eight trunk ports and eight client ports as shown in the following figure.

Figure 13: QXP-K9 Line Card Front View



For more details of the QXP-K9 card, see the data sheet.

2.4TA Line Card

Table 21: Feature History

Feature Name	Release Information	Feature Description
NCS1K14-2.4T-A-K9 NCS1K14-2.4T-AL-K9 Line Card	Cisco IOS XR Release 26.1.1	The **NCS1K14-2.4T-A-K9** and **NCS1K14-2.4TAL-K9** line cards are introduced as 2.4T DWDM coherent optics transponder and muxponder solutions for the NCS 1014 chassis. These line cards carry 100GE, 400GE and 800GE client traffic and enable networks to use C- and L-band frequencies for wider coverage.

The 2.4TA line card is a coherent optics Transponder and Muxponder for the Cisco NCS 1014 chassis. It is a single-slot card that supports C-band traffic at trunk ports. This line card delivers 400GE, 100GE, and 800G client traffic over two trunk ports operating at speeds ranging from 400G to 1.2T each.

Note In Release 26.1.1, the 2.4TA line card supports only 400, 600, 800, and 1000G trunk payloads.

In the 2.4TA card, the client and trunk ports support the pluggable form factor and data rates as shown in the following table.

Table 22: NCS1K14-2.4TA-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, 400, 800G
Trunk	Coherent Interface Module 8 (CIM8)	0, 7	1.2T in each port

Note In Release 26.1.1, the ports 2, 5, and 6 support only up to 400GE data rates.

For more information about the 2.4TA card, see datasheet.

The 2.4TA card has two trunk ports and six client ports as shown in the following figure.

Figure 14: 2.4TA Line Card Front View

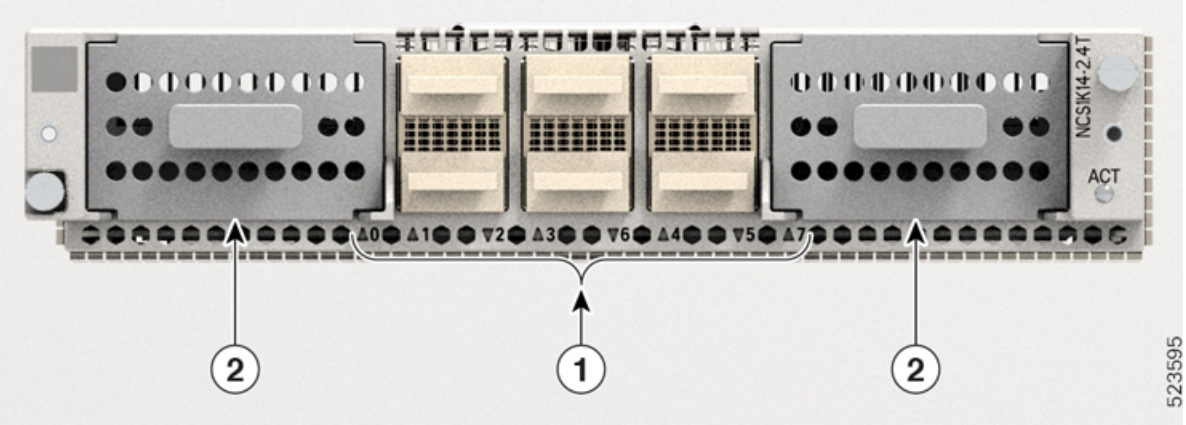


Table 23: 2.4TA Line Card Interfaces

Callout	Interface
1	Client port
2	Trunk port

This figure shows the mapping between the client and trunk ports.

Figure 15: 2.4TA Card Client and Trunk Mapping

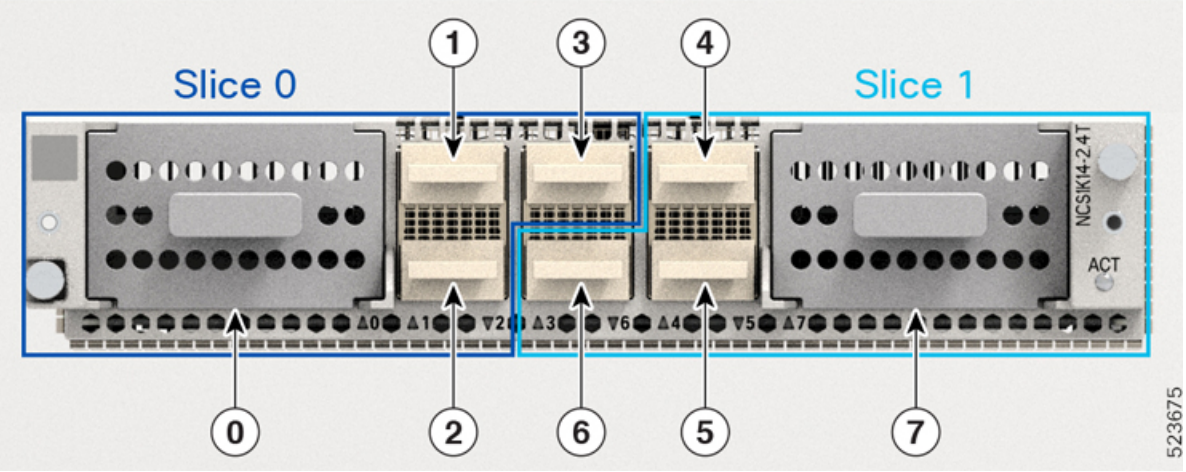


Table 24: Client-to-Trunk Port Mapping

Trunk Port	Client Ports
0	1, 2, 3

Trunk Port	Client Ports
7	4, 5, 6

NCS1K14-EDFA2 Optical Amplifier Line Card

Table 25: Feature History

Feature Name	Release Information	Feature Description
NCS1K14-EDFA2 Line Card	Cisco IOS XR Release 25.1.1	NCS1K14-EDFA2 line card is an optical amplifier for the NCS1014 Chassis. It functions as a DWDM optical terminal and includes a C-band bidirectional amplifier with channel power control capabilities. This line card has a pair of booster amplifiers and a preamplifier. It operates in a frequency range from 191.200 to 196.175 THz. This card supports Optical Supervisory Channel (OSC), Coherent probe and Optical Time Domain Reflectometer (OTDR) functionalities.

Note EDFA2 refers to the NCS1K14-EDFA2 optical amplifier line card.

The EDFA2 line card is an optical amplifier for the NCS1014 chassis. It functions as a DWDM optical terminal and includes a C-band bidirectional amplifier with channel power control capabilities. This card supports Optical Supervisory Channel (OSC), Coherent probe, and Optical Time Domain Reflectometer (OTDR) functionalities. It operates in a frequency range of 4.975 THz from 191.200 to 196.175 THz.

EDFA2 line card has a pair of booster amplifiers and a preamplifier.

- The true variable gain preamplifier provides two different gain ranges:
  - Gain range 1: 0dB - 28dB
  - Gain range 2: 20dB - 39dB
- The two booster amplifiers are:
  - A fixed gain booster amplifier (BST1). It can switch between 8dB and 20dB gain setpoints with 0dB tilt. These setpoints can be finely tuned at +/-3dB.
  - A true variable gain booster amplifier (BST2), whose gain spans from 12 to 27 dB.

EDFA2 line card sections

The EDFA2 line card has:

- a monodirectional transmitter section (from COM-RX port to LINE-TX port) that:

- allows amplification with two switchable fixed gains and one true variable gain,
- equalizes or blocks the different C-band optical spectrum sections,
- regulates the signal power at the LINE-TX port,
- combines the OSC and the OTDR signals together with the C-band traffic, and
- assesses channel presence and gain regulation and per channel power monitoring of signals transmitted through the LINE-TX port.

- a monodirectional receiver section (from LINE-RX port to COM-TX port) that:
  - separates the OSC and the OTDR signals from the C-band traffic,
  - provides two programmable gain ranges,
  - regulates the signal power at the COM-TX port, and
  - assesses channel presence and gain regulation and per channel power monitoring of signals transmitted through the COM-TX port.

- a service section that includes:
  - the OSC termination ports (OSC-TX/RX) to regulate the transmitted and received OSC channel power,
  - an OTDR port to redirect the OTDR signal towards the two LINE ports, and
  - the optical safety signals termination ports (CHECK-2 and CHECK-3).

EDFA2 Interfaces

Figure 16: NCS1K14-EDFA2 optical amplifier line card

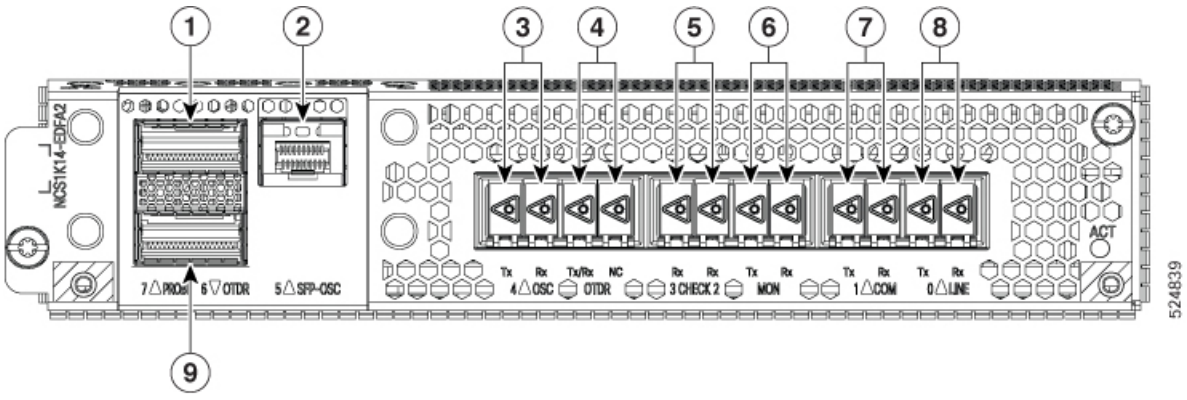


Table 26: EDFA2 line card interfaces

Callout	Connector label	Connector type	Port name
1	PROBE	QSFP-DD	Coherent probe 7
2	SFP-OSC	SFP28	OSC port 5

Callout	Connector label	Connector type	Port name
3	OSC	LC	OSC TX 4
			OSC RX 4
4	OTDR	LC	OTDR TX/RX
			OTDR NC
5	CHECK	LC	CHECK RX 2
			CHECK RX 3
6	MON	LC	MON TX
			MON RX
7	COM	LC	COM TX 1
			COM RX 1
8	LINE	LC	LINE TX 0
			LINE RX 0
9	OTDR	QSFP-DD	OTDR port 6

The card comprises 12 LC optical ports, two QSFP-DD ports for OTDR and coherent probe testing, one SFP port for OSC.

Table 27: Optical interfaces of EDFA2

Signal	Connector label	Port numbers	Operating frequency range [THz (nm)]	Note
LINE-TX/RX	**LINE TXLINE RX**	0	198.8 – 191.2 (1508–1568)	Combines C-band optical signals, coherent probe test channel, OSC channel, and OTDR signal
COM-TX/RX	**COM TX** **COM RX**	1	196.175 – 191.2 (1528.2 –1568)	Combines C-band optical signals and coherent probe channel
MON-TX/RX	**MON TX MON RX**	NA	198.8 – 191.2 (1508–1568)	Duplicates the LINE-TX/RX signals at ~20dB below the actual power levels. Both MON ports are output ports.
CHECK-2	**CHECK-RX**	2	196.175 – 191.2 (1528.2 –1568)	Optical safety termination ports. Both ports are input ports.
CHECK-3	**CHECK-RX**	3		
OTDR	**OTDR**	NA	197.45 (1518.32)	Bandwidth ± 3nm
OSC-TX/RX	**OSC TX** **OSC RX**	4	198.5 (1510.3)	Bandwidth ± 1.9nm

NCS1K4-2-QDD-C-K9 Line Card

Table 28: Feature History

Feature Name	Release Information	Description
NCS1K4-2-QDD-C-K9 C-Band Line Card	Cisco IOS XR Release 25.2.1	NCS 1014 now supports the NCS1K4-2-QDD-C-K9 C-Band line card. This card features eight client ports (QSFP28 and QSFP-DD) and two software-configurable DWDM dual sub-channel module trunk ports. Each trunk port supports line rates of 200, 300, and 400 Gbps with precise control over modulation format, baud rate, and forward error correction. Additionally, the line card supports both module and slice configurations, enhancing network flexibility and performance.

Note 2-QDD-C DWDM line card refers to NCS1K4-2-QDD-C-K9 C-band line card in this document.

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 Cisco NCS 1004 datasheet.

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 1.2T and 1.2T Licensed Line Cards LEDs1.2T, 1.2TL, and 2-QDD-C Line Cards LEDs section.

OXP2-K9 Line Card

Cisco NCS 1014 12.8T high-density OSFP multi-haul DWDM line card (NCS1K14-OXP2-K9, and NCS1K14-OXP2-L-K9) is a double-slot coherent optics transponder, muxponder, and regenerator line card for the NCS 1014 platform. Compatible with the NCS 1014-2 chassis, which supports dual-width line cards, OXP2-K9 line card provides advanced performance and flexibility for optical transport networks. For more information, refer to the datasheet.

The card supports16 slices with one-to-one mapping between client ports and trunk ports. Each trunk port accommodates OSFP variants of 800G Bright, supporting ZR and ZR+ options.

Features include:

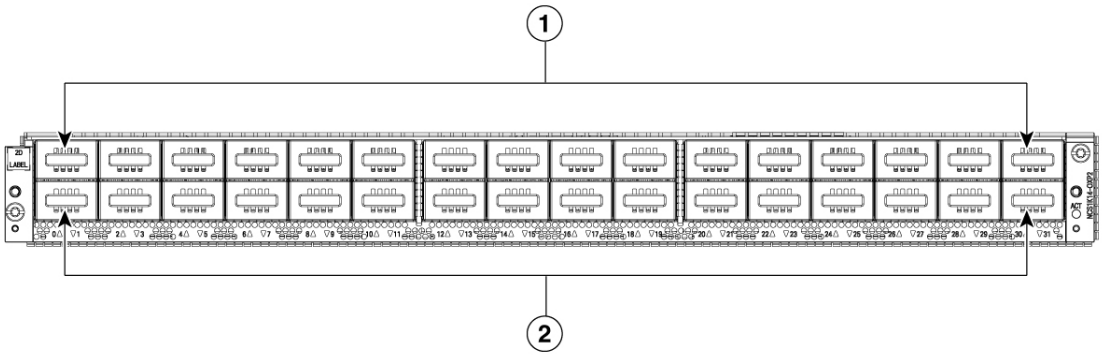
- 16 OSFP client ports support 100 Gbps, 400 Gbps, and 800 Gbps class payloads.
- In Release 26.3.1, only 800 Gbps payload is supported.
- 16 OSFP trunk ports offer tunable line rates from 400 Gbps to 800 Gbps, providing flexible modulation formats and baud rates.
- The system provides 16 slices with one-to-one mapping between client ports and trunk ports.
- Each trunk port accommodates OSFP variants of 800G Bright, supporting ZR and ZR+.

This design enables high-performance DWDM coherent optical transport and versatile connectivity options for advanced deployments.

Table 29: Feature History

Feature Name	Release Information	Feature Description
NCS1K14-OXP2-K9 and NCS1K14-OXP2-L-K9 line cards	Cisco IOS XR Release 26.3.1	The NCS1K14-OXP2-K9 line card and its licensed version, NCS1K14-OXP2-L-K9, are double-slot modules designed to enhance optical processing within the Cisco NCS 1014-2 chassis. They support up to 12.8T C-band traffic. These line cards feature 16 OSPF client ports capable of handling 400GE, 800GE, and 4x100GE traffic on each port, and include 16 OSPF trunk ports that support 800G traffic. In this Release, client ports support only the 800GE payload. Optimized for high-capacity deployments, they offer superior flexibility, improved operational efficiency, and robust performance for demanding optical network environments. The new NCS1K14-OXP2-K9 line card supports these pluggables: • OSFP-800G-VR8 • OSFP-800G-DR8 • DP08SFP8-ZRB-A2

Figure 17: Front View of the OXP2-K9 card



1	Trunk ports
2	Client ports

Table 30: OXP2-K9 line card interfaces

Interfaces	Form Factor	Ports
Client	OSFP	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31 (all ports in the bottom row)
Trunk	OSFP	0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30 (all ports in the upper row)

Cisco NCS 1014 Modules

The Cisco NCS 1014 chassis supports the following modules:

Removable SSD

Table 31: 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 the NCS 1014 chassis. At 2.5” in size, this SSD has 480 GB storage space to store running software and its configuration. This SSD acts as a backup storage to quickly recover the Cisco NCS 1014 chassis after an RP corruption or replacement.

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.

Figure 18: Removable Chassis SSD

Fan modules

Table 32: Feature History

Feature Name	Release Information	Feature Description
NCS1K14-FAN-2 programmable fan support	Cisco IOS XR Release 26.3.1	The new NCS1K14-FAN-2 programmable fan tray features a grid with wider gaps, enhancing airflow and providing improved cooling for high-power line cards like the OXP2-K9. This dynamic cooling support is designed for the NCS 1014 and NCS 1014-2 chassis. The programmable fans adjust their cooling profiles based on the status of the NCS 1014 chassis, the installed line cards, and the pluggable modules. The cooling profiles of the programmable fans are: • Low cooling • Medium cooling • High cooling

Table 33: Feature History

Feature Name	Release Information	Feature Description
NCS1K14-FAN-P Programmable Fan Support	Cisco IOS XR Release 25.2.1	The NCS1K14-FAN-P programmable fans provide dynamic cooling support to the NCS 1014 chassis. The programmable fans change cooling profiles based on the status of the NCS 1014 chassis, installed line cards, and pluggable modules. The cooling profiles of the programmable fans are: • Low cooling • High cooling The programmable fans run at a low cooling profile, consuming approximately 1 kW of power.

Fan modules are field-replaceable components in the Cisco NCS 1014 chassis that:

- maintains front-to-rear airflow to cool down the line cards, and
- is available in both legacy and programmable versions to support adaptive cooling, and
- occupies three fan slots at the rear of chassis to host the fan modules: FAN0, FAN1, and FAN2.

Redundant cooling design of the fan modules

Each fan module (**NCS1K14-FAN**, **NCS1K14-FAN-P**,and **NCS1K14-FAN-2**) has two counterrotating fans: an inlet fan and an outlet fan. Each fan has its own power rail with inrush controller to increase reliability. These counterrotating fans provide these benefits:

- Higher back-pressure than a single fan in each module
- Continued operation with five out of six fans if a single fan fails
- Prevention of airflow inversion by the remaining fan in the same module if a fan fails

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

The legacy and programmable fans have the same form factor and look identical. The programmable fan displays the PID "NCS1K14-FAN-P" above the cross handle, and the letter "P" on an orange square appears on the side of the cross handle.

From Release 25.2.1, the NCS1K14-FAN-P fan module is a cooling option for the NCS 1014 chassis and its line cards. The NCS1K14-FAN-P is a programmable fan that provides dynamic cooling profiles for the chassis to save power. The default cooling profile is the lower cooling profile, which consumes approximately 1 kW of power.

From Release 26.3.1, the NCS1K14-FAN-2 fan module is introduced. It is a programmable fan module that features a grid with wider gaps to enhance airflow and provide improved cooling for high-power line cards such as the OXP2-K9. This dynamic cooling support is designed for the NCS 1014 and NCS 1014-2 chassis. The programmable fan has three cooling profiles: low, medium, and high.

You can check the speed of the running fan using the **show environment fan** command.

Table 34: Comparison of legacy and programmable fan modules

Fan attributes	NCS1K14-FAN-2	NCS1K14-FAN-P	NCS1K14-FAN
cooling profiles	supports dynamic cooling profile	supports dynamic cooling profile	supports legacy static cooling profile
inlet fan RPM	• low cooling: 3810 to 12698 rpm • medium cooling: 5397 to 17000 rpm • high cooling: 7231 to 15000 rpm	• low cooling: 3810 to 12698 rpm • high cooling: 5397 to 17000 rpm	legacy cooling: 5482 to 17000 rpm
outlet fan RPM	• low cooling: 3694 to 11313 rpm • medium cooling: 5054 to 15000 rpm • high cooling: 7231 to 15000 rpm	• low cooling: 3694 to 11313 rpm • high cooling: 5054 to 15000 rpm	legacy cooling: 5045 to 15000 rpm

Components of the fan modules

Each fan module has:

- a cross handle for lifting,
- a status LED, and
- a side lock lever for securing the module in the chassis.

Figure 19: Perspective view of fan module

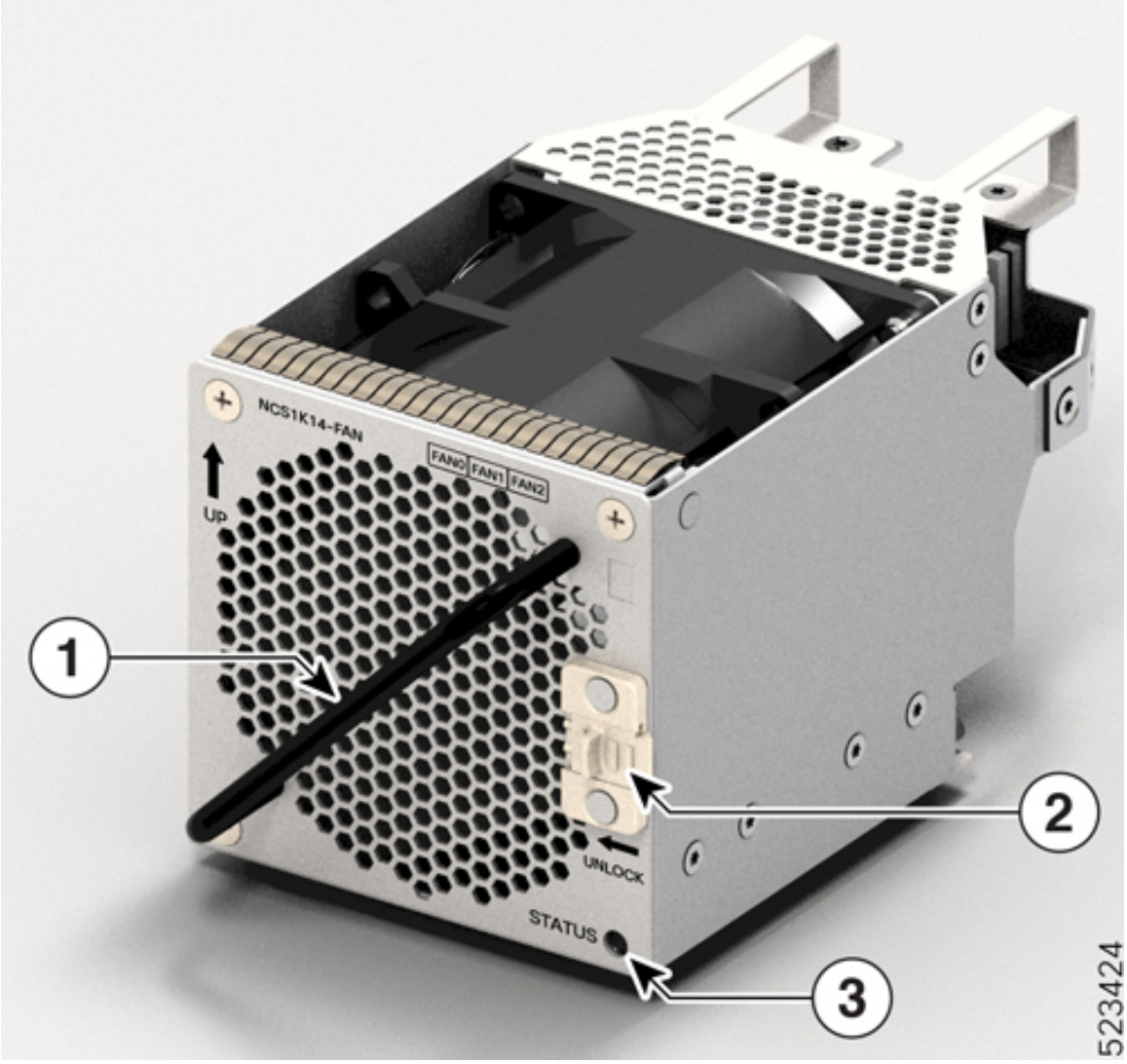
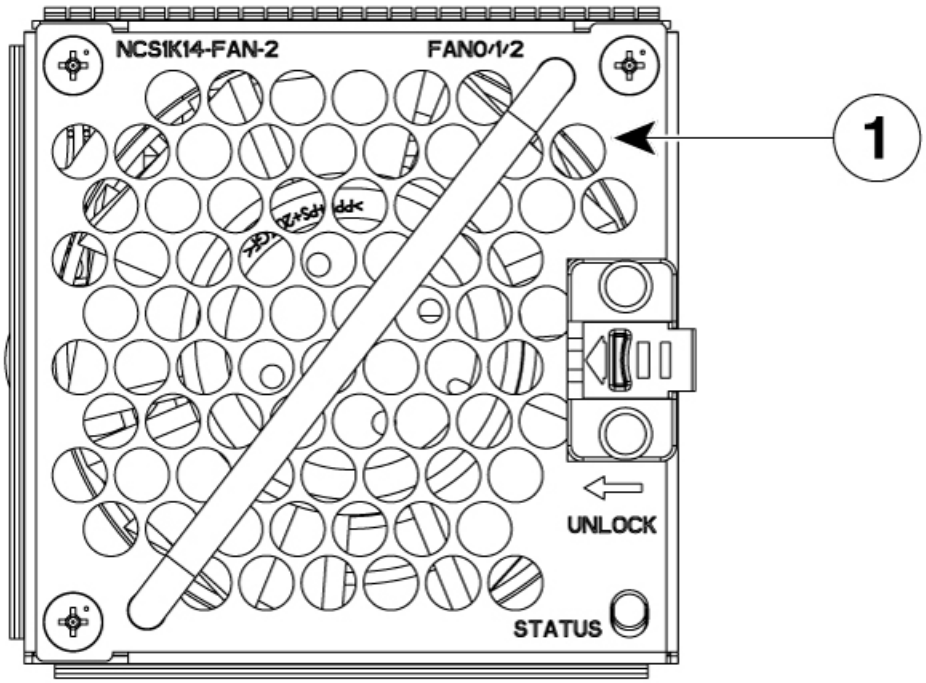


Table 35: Fan module components

Callout	Component
1	Cross handle

Callout	Component
2	Side lever lock
3	Status LED

Figure 20: Front view of NCS1K14-FAN-2



Callout	Component
1	Fan grid with wider gaps

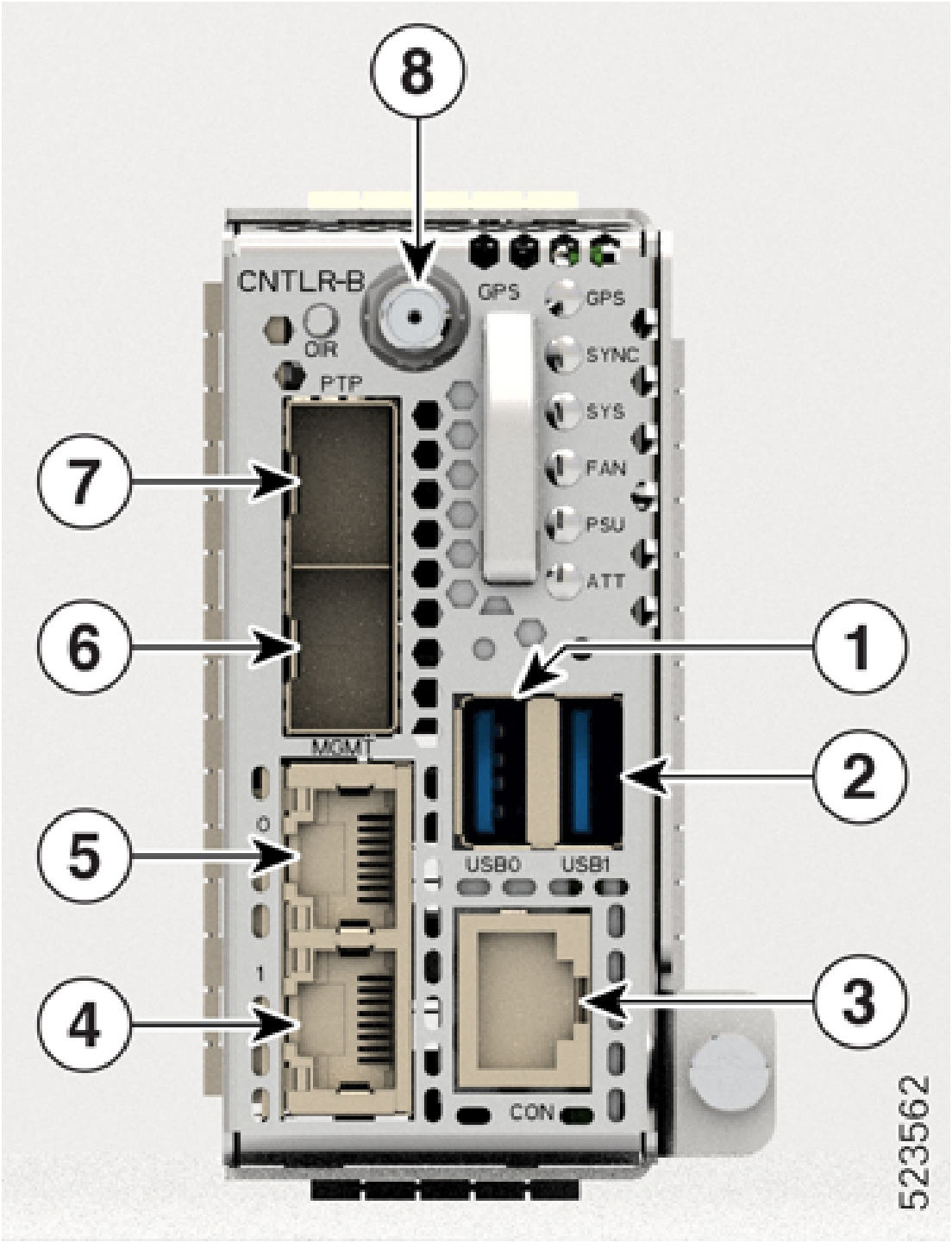
Controller Cards

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 21: 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 22: NCS1K14-CNTLR-K9 Controller Card

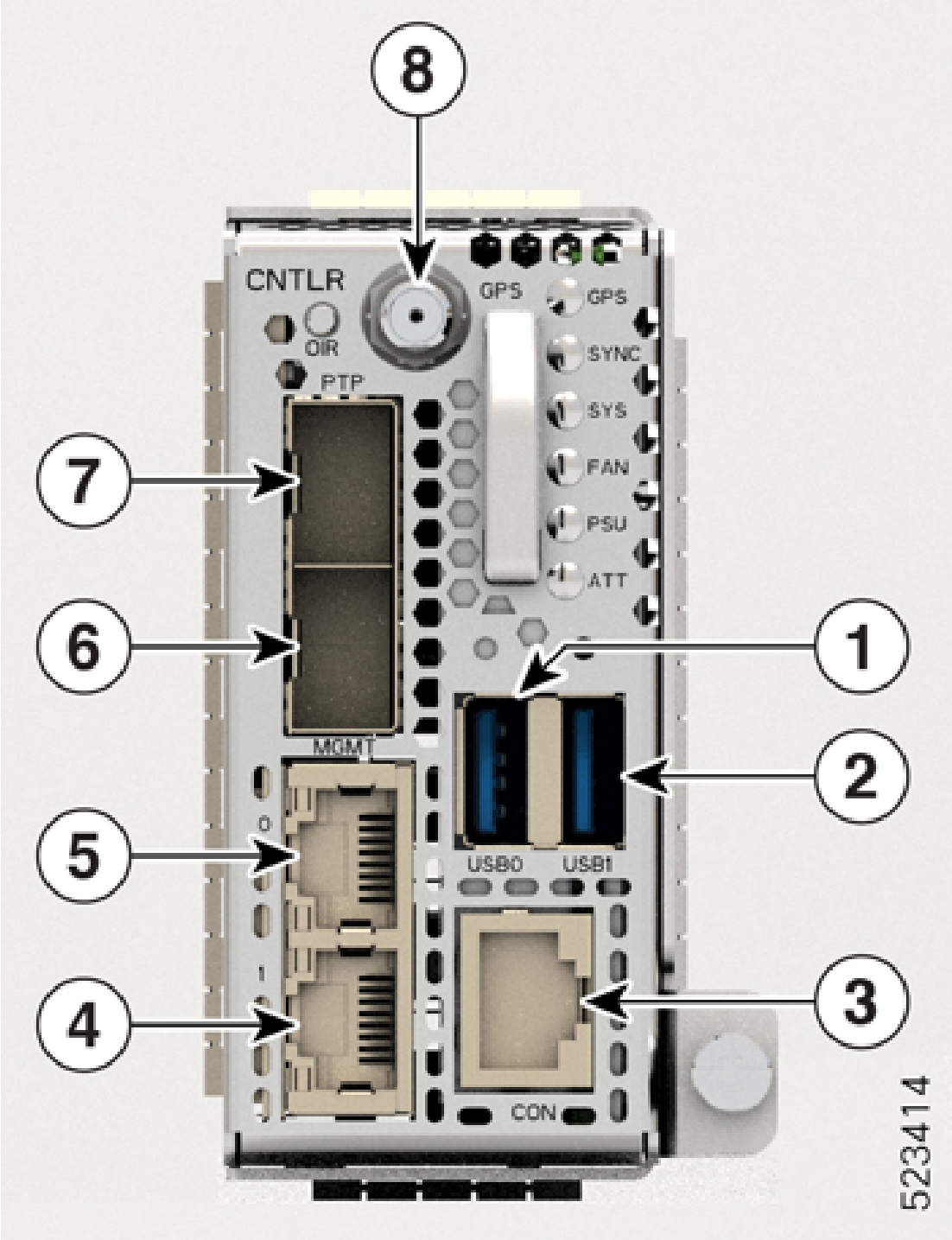


Table 36: Controller Card Interfaces

Callout	Interface	Description
1, 2	USB 0 and 1	External USB port. USB 2.0 type A, 1.8 A max at 12 V provides support to external passive optical modules (2x) The USB ports have following functions: • Essential—boot the image through pen drive (Only USB 2.0 sticks and pen drives are supported). • Optional—copy files to and from local devices (Only USB 2.0 sticks and pen drives are supported).
3	CON	Console interface (1x) **Note** Set the DTR (Data Terminal Ready) value to 1 to enable the CON interface.
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 2.5-kW DC PSUs and 3.2-kW AC PSUs. Both the PSUs must always remain installed in the chassis, except during replacement. When the chassis has only one PSU installed, the system raises the *Power Module Redundancy Lost* alarm. The Cisco NCS 1014 chassis also supports 2-kW AC and DC PSUs.

When two OXP2-K9 cards are deployed, a single power supply will not support them, resulting in no power supply redundancy.

Table 37: Feature History

Feature Name	Release	Description
NCS1K14-AC-PSU-3 support	Cisco IOS XR Release 26.3.1	The new AC PSU, NCS1K14-AC-PSU-3, introduced in this release, is a high power capacity power supply. It is designed to support high-power-consuming line cards such as the NCS1K14-OXP2-K9 line card and has a power rating of 3.2 kW. It is supported on both NCS 1014 and NCS 1014-2 chassis.

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

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

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

For DC-DC (2500 W at 12 Vout)

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

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

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

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

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

- AC high voltage range output power—2000 W up to 40℃ for 1 PSU; 2000 W up to 55℃ for 2 PSUs (for a short duration, as specified by Telcordia GR-63-Core).
- AC low voltage range output power—1300 W up to 40℃ for 1 PSU; 1300 W up to 55℃ for 2 PSUs (for a short duration, as specified by Telcordia GR-63-Core).
- DC power supply—2000 W output power up to 40℃ for 1 PSU; 2000 W up to 55℃ for 2 PSUs (for a short duration, as specified by Telcordia GR-63-Core).

Caution The NCS 1014 chassis must 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℃.

For DC-DC (2000 W at 12 Vout)

- Input Voltage Rating = –48 Vdc / –60 Vdc
- Maximum Input current at 48 Vdc = 44 A
- Input Voltage range = 40.5–72 Vdc (operating)
- Input turn ON Voltage = –42 Vdc maximum
- Recommended protective device rating = 60 A maximum per feed

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

- Input Low Line (LL) Nominal voltage = 100–127 V~
- Input High Line (HL) Nominal voltage = 200–240 V~
- Maximum Input current at 100 V~ = 15 A
- Maximum Input current at 200 V~ = 12 A
- Input frequency rating = 50/60 Hz
- Input LL voltage range = 90–140 V~
- Input HL voltage range = 180–264 V~
- Input frequency range = 47–63 Hz (nominal 50/60 Hz)
- Input turn ON voltage = 80 V~ / 175 V~ (LL/ HL)
- Recommended protective device (HL) = 16 A
- Recommended protective device (LL) = 20 A

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

Power Supply Units (PSUs)

Table 38: Feature History

Feature Name	Release	Description
NCS1K14-AC-PSU-3 support	Cisco IOS XR Release 26.3.1	The new AC PSU, NCS1K14-AC-PSU-3, introduced in this release, is a high power capacity power supply. It is designed to support high-power-consuming line cards such as the NCS1K14-OXP2-K9 line card and has a power rating of 3.2 kW. It is supported on both NCS 1014 and NCS 1014-2 chassis.

The redundant, field-replaceable PSUs power the Cisco NCS 1014 chassis. The chassis has slots for two PSUs at the rear side. Each PSU supports up to 2.5 kW per system.

From Release 26.3.1, a high-capacity power supply (NCS1K14-AC-PSU-3) is supported on both NCS 1014 and NCS 1014-2 chassis. It is designed to support high power-consuming line cards, such as the NCS1K14-OXP2-K9 line card, and has a power rating of 3.2 kW.

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

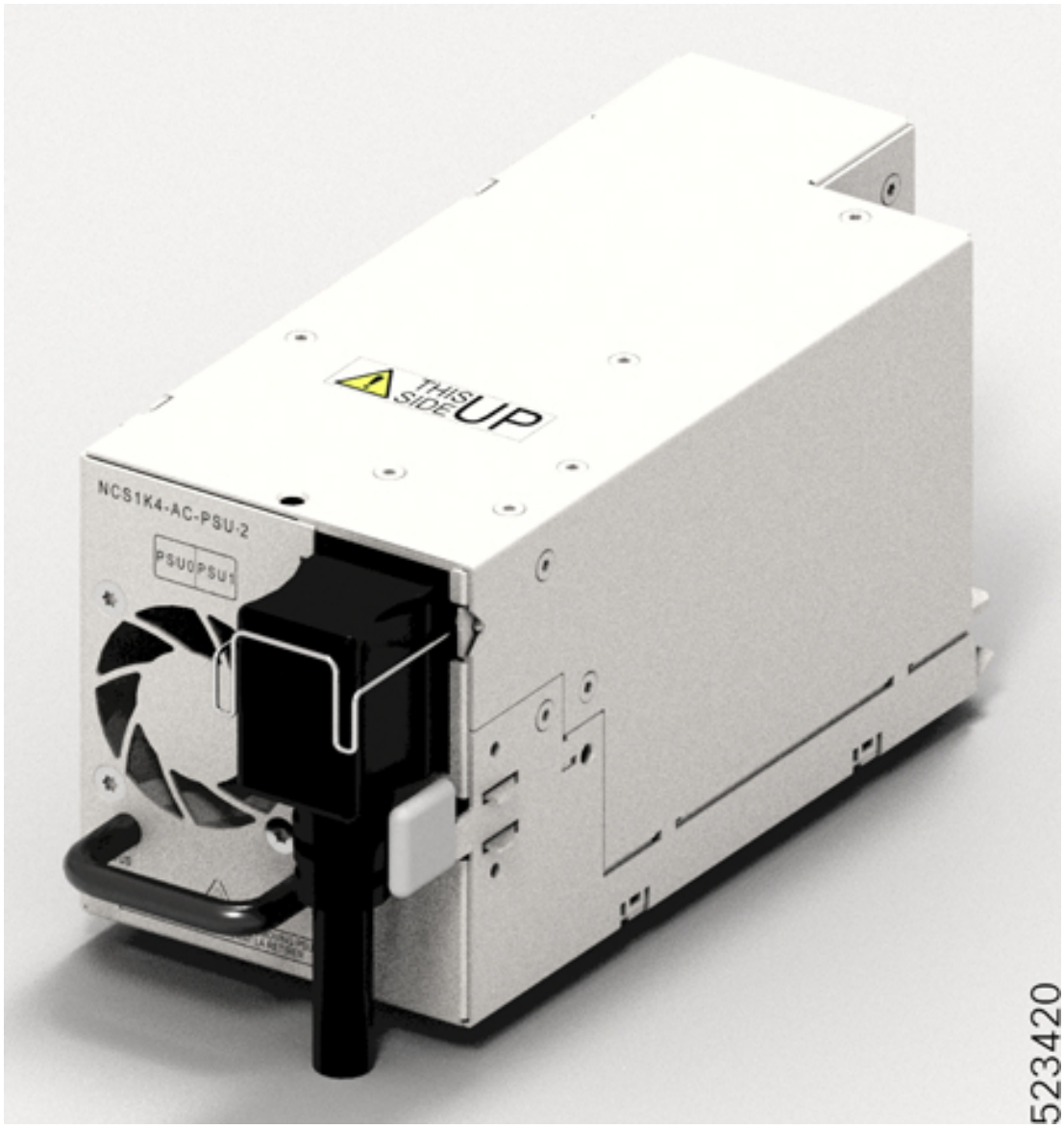
To ensure the necessary fan redundancy, the two PSUs implement a protection mechanism. When the mechanism detects a single PSU failure or if a PSU fails to power up, it triggers all the operational fans to run at maximum speed. This mechanism activates without intervention from the software.

The Cisco NCS 1014 chassis supports the following PSUs:

- **NCS1K4-AC-PSU-2**

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

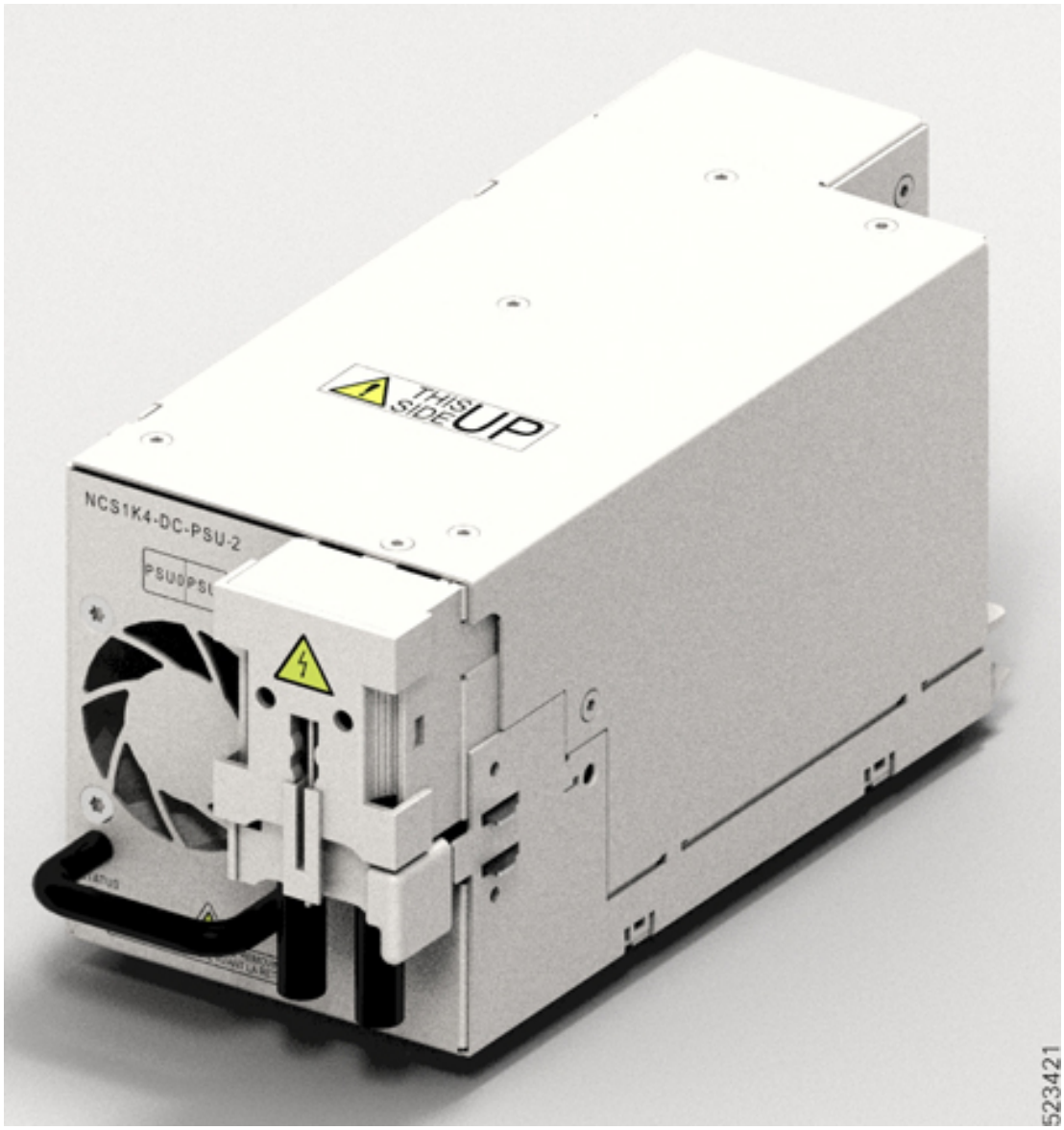
Figure 23: NCS1K4-AC-PSU-2



- **NCS1K4-DC-PSU-2**

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

Figure 24: NCS1K4-DC-PSU-2



- **NCS1K4-AC-PSU**

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

- **NCS1K4-DC-PSU**

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

- **NCS1K14-AC-PSU-3**

  NCS1K4-AC-PSU-3 is a 3.2-kW AC to DC, PFC power supply that converts standard AC power into an output of 12 VDC (main) and 12 VDC (standby) output.

Air Filter

The air filter removes dust from the air that the fan units draw into the chassis. If the air filters become damaged, dirty, or clogged with dust, you must replace them 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 1014 air filter has the following components:

- Two air filter side brackets
- One air filter frame
- One air filter

You must order all the three components for the first-time installation. After first-time installation of the air filter unit, replace only the air filter. You reuse the air filter side brackets and the frame.



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

Supported Pluggables

Table 39: Feature History

Feature Name	Release	Description
Pluggable support	Cisco IOS XR Release 26.3.1	The new pluggable ONS-QSFP-PSM2, introduced in this release, integrates protection switching module capability with channel power detection directly into a pluggable QSFP-DD form factor module. This pluggable is supported on: • QSFP-DD ports of NCS1K14-2.4T-K9 and NCS1K14-2.4T-X-K9 line cards • QSFP-DD ports of NCS1K4-QXP-K9 line card This module can be directly plugged into a TXP or router, eliminating the need for a separate line card. This integration allows for more streamlined and efficient channel and Mux/Path protection.

Feature Name	Release	Description
Pluggable support	Cisco IOS XR Release 26.3.1	The new NCS1K14-OXP2-K9 line card supports these pluggables: • OSFP-800G-VR8 • OSFP-800G-DR8 • DP08SFP8-ZRB-A2
Pluggable support	Cisco IOS XR Release 26.3.1	The NCS1K14-EDFA2 line card now supports these pluggables on the probe port: • DP04QSDD-E30-440 • DP04QSDD-E30-441 These pluggables enable 400G trunk rates with OFEC support. This support provides enhanced capabilities to monitor incoming traffic from the far end, ensuring greater network visibility and improved data reliability.
Pluggable support	Cisco IOS XR Release 26.2.1	The NCS1K14-EDFA2 line card now supports these pluggables on the probe port: • DP04QSDD-E30-440 • DP04QSDD-E30-441 These pluggables enable 400G trunk rates with OFEC support. This support provides enhanced capabilities to monitor incoming traffic from the far end, ensuring greater network visibility and improved data reliability.
Pluggable support	Cisco IOS XR Release 26.2.1	The NCS1K14-2.4T-K9, NCS1K14-2.4T-X-K9, and NCS1K14-2.4T-A-K9 line cards supports the QDD-8X100G-FR pluggable on the client port.
Pluggable support	Cisco IOS XR Release 26.2.1	The NCS1K4-QXP-K9 line card supports the DP04QSDD-HE0-A1 pluggable on the trunk port.
Pluggable support	Cisco IOS XR Release 25.4.1	The NCS1K14-EDFA2 line card now supports these pluggables: • DP04QSDD-E26-A1 • GLC-TE
Pluggable support	Cisco IOS XR Release 25.3.1	The NCS1K4-QXP-K9 line card now supports the new DP04QSDD-E26-A1 and DP04QSDD-ULH-A1 trunk pluggables. These trunk pluggables consume less power.

Feature Name	Release	Description
Pluggable support	Cisco IOS XR Release 25.2.1	The NCS1K4-QXP-K9 line card now supports the new ONS-QDD-OLS optical amplifier pluggable.
Pluggable support	Cisco IOS XR Release 25.1.1	The new NCS1K14-EDFA2 card supports: • ONS-QSFP-OTDR • DP01QSDD-ZT5-A1 • ONS-SC-PTP-1510
Pluggables Support	Cisco IOS XR Release 24.3.1	This client pluggable is supported on the QXP card: • QDD-400G-LR4-S This trunk pluggable is supported on the QXP card: • QDD-400G-ZR-S These client pluggables are supported on the 2.4TX card: • QDD-2X100-CWDM4-S • QDD-2X100-LR4-S These trunk pluggables are supported on the 2.4TX card: • CIM8-CE-K9= • CIM8-LE-K9=
Pluggables Support	Cisco IOS XR Release 24.2.11	The following pluggables are supported on the NCS1K14-2.4T-X-K9 card: • QDD-400G-LR4-S • QDD-4X100G-FR-S

2.4TA Line Card Pluggables

The 2.4TA line card supports the following pluggables:

Table 40: 2.4TA Line Card Pluggables

Client Pluggables	Trunk Pluggables
• QDD-400G-FR4-S • QDD-400G-AOCxM • QDD-400G-DR4-S • QDD-4X100G-LR-S • QDD-400G-LR4-S • QDD-4X100G-FR4-S • QDD-2X100-CWDM4-S • QDD-2X100-LR4-S • QDD-8X100G-FR • QDD-2X400G-FR4 • ONS-QSFP-PSM2 • ONS-QSFP28-LR4 • QSFP-100G-LR4-S • QSFP-100G-CWDM4-S	• CIM8-C-K9= • CIM8-CE-K9= • CIM8-LE-K9=

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

2.4TX Line Card Pluggables

The 2.4TX line card supports the following pluggables:

Table 41: 2.4TX Line Card Pluggables

Client Pluggables	Trunk Pluggables
• QDD-400G-FR4-S • QDD-400G-AOCxM • QDD-400G-DR4-S • QDD-4X100G-LR-S • QDD-400G-LR4-S • QDD-4X100G-FR4-S • QDD-2X100-CWDM4-S • QDD-2X100-LR4-S • QDD-8X100G-FR • QDD-2X400G-FR4 • ONS-QSFP-PSM2 • ONS-QSFP28-LR4 • QSFP-100G-LR4-S • QSFP-100G-CWDM4-S	• CIM8-C-K9= • CIM8-CE-K9= • CIM8-LE-K9=

2.4T Line Card Pluggables

The 2.4T line card supports the following pluggables:

Table 42: 2.4T Line Card Pluggables

Client Pluggables	Trunk Pluggables
• QDD-400G-FR4-S • QDD-400G-AOCxM • QDD-400G-DR4-S • QDD-4X100G-LR-S • QDD-400G-LR4-S • QDD-4X100G-FR4-S • QDD-2X100-CWDM4-S • QDD-2X100-LR4-S • QDD-8X100G-FR • QDD-2X400G-FR4 • ONS-QSFP-PSM2 • ONS-QSFP28-LR4 • QSFP-100G-LR4-S • QSFP-100G-CWDM4-S	• CIM8-C-K9= • CIM8-CE-K9= • CIM8-LE-K9=

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

1.2T Line Card Pluggables

The 1.2T line card supports the following pluggables:

- QSFP-100G-FR-S
- QSFP-40/100-SRBD
- QSFP-100G-ER4L-S
- QSFP-100G-DR-S
- QSFP-100G-SM-SR
- QSFP-100G-CWDM4-S=
- QSFP-100G-LR4-S=
- QSFP-100G-SR4-S
- ONS-QSFP28-LR4=
- QSFP-100G-AOC1M
- QSFP-100G-AOC3M

- QSFP-100G-AOC10M
- QSFP-100G-AOC20M
- QSFP-100G-AOC25M
- QSFP-100G-CU1M
- QSFP-100G-CU2M
- QSFP-100G-CU3M
- QSFP-100G-CU5M
- QSFP28-CWDM4
- QSFP28-LR4
- 100G QSFP28 CWDM4
- 100G QSFP28 LR4
- 100G QSFP LR4
- QSFP-100G-LR-S=
- QSFP-100G-ER4

QXP Line Card Pluggables

The QXP line card supports the following pluggables:

Table 43: QXP Line Card Pluggables

Client Pluggables	Trunk Pluggables
• QSFP-100G-FR-S • QSFP-100G-DR-S • QSFP-100G-CWDM4-S= • QSFP-100G-LR4-S= • QSFP-100G-SR4-S • ONS-QSFP28-LR4= • QDD-400G-FR4-S • QDD-400G-DR4-S • QSFP28-CWDM4 • QSFP28-LR4 • 100G QSFP28 CWDM4 • 100G QSFP28 LR4 • 100G QSFP LR4 • QSFP-100G-LR-S= • QDD-400-AOC15M • QDD-400G-ZRP-S • QDD-4X100G-LR-S • QDD-4X100G-FR-S	• DP04QSDD-HK9 • DP04QSDD-LK9 • DP04QSDD-HE0 • DP04QSDD-HE0-A1 • QDD-400G-ZR-S • QDD-400G-ZRP-S • DP01QSDD-LK9 • DP04QSDD-ULH-A1 • DP04QSDD-E26-A1 • ONS-QSFP-PSM2

EDFA2 Line Card Pluggables

The EDFA2 line card supports the pluggables:

- DP04QSDD-E26-A1
- GLC-TE
- ONS-QSFP-OTDR
- DP01QSDD-ZT5-A1
- ONS-SC-PTP-1510
- DP04QSDD-E30-440
- DP04QSDD-E30-441

NCS1K4-2-QDD-C-K9 Line Card Pluggables

The NCS1K4-2-QDD-C-K9 card provides six QSFP-DD client ports. These ports support 100GE, 400GE, and OTU4 traffic. Because QSFP-DD is backward compatible, the ports can also support standard QSFP28 optics for 100G services.

The NCS1K4-2-QDD-C-K9 line card supports the following pluggables:

PSM optics:

- ONS-QSFP-PSM2

400G Client Optics (QSFP-DD) and 100G Client Optics (QSFP-DD / QSFP28)

- QSFP-100G-DR-S
- QSFP-100G-SM-SR
- QSFP-100G-CWDM4-S=
- QSFP-100G-LR4-S=
- QSFP-100G-SR4-S
- ONS-QSFP28-LR4=
- QSFP-100G-AOC1M
- QSFP-100G-AOC3M
- QSFP-100G-AOC10M
- QDD-400G-FR4-S
- QDD-400G-DR4-S
- QSFP28-CWDM4
- QSFP-100G-LR-S=
- QDD-400-AOC15M
- QSFP28-PSM4
- ONS-QSFP-PSM2

OXP2-K9 Line Card Pluggables

The OXP2-K9 line card supports the following pluggables:

Table 44: OXP2-K9 Line Card Pluggables

Client Pluggables	Trunk Pluggables
• OSFP-800G-VR8 • OSFP-800G-DR8	• DP08SFP8-ZRB-A2