# Cisco NCS 1014 Overview

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

# 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 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 |
| NCS1K14-2.4-T-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 21 | 2-QDD-C DWDM line card | Cisco IOS XR Release 25.2.1 |

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.
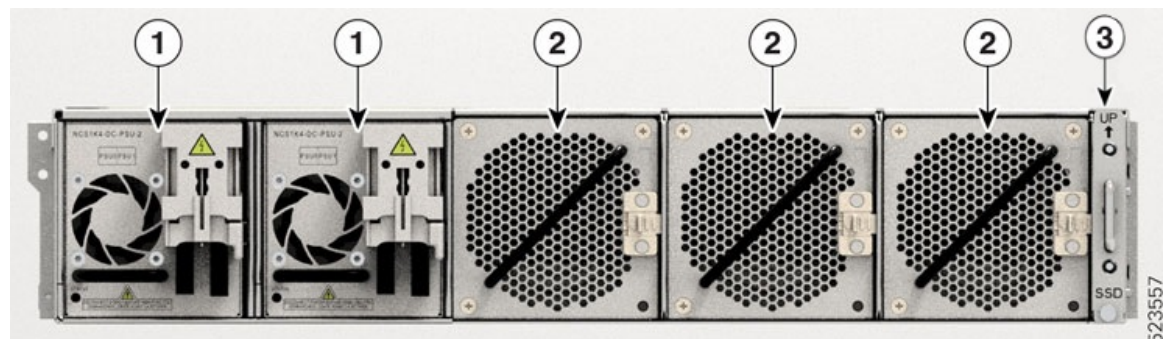
*Figure 1: NCS 1014 Front View*
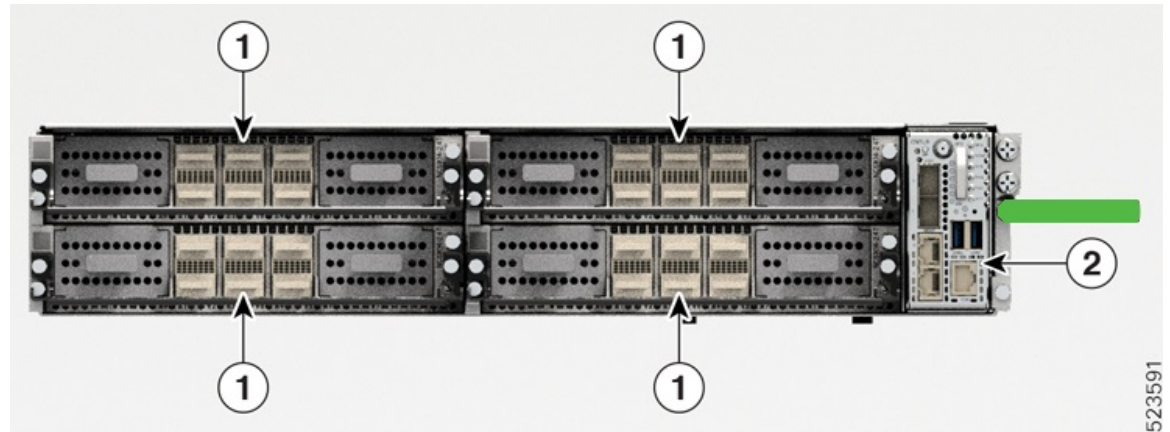


| Callout | Modules |
|---------|---------|
| 1 | Line Cards |
| 2 | Controller |

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
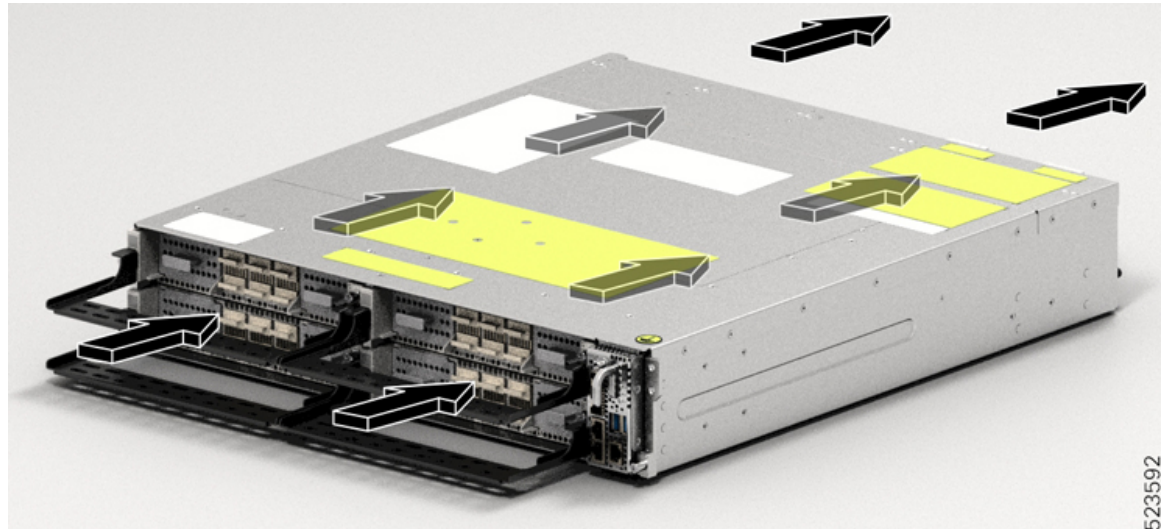


### Class 1M Laser Product Label

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

Figure 4: Class 1M Laser Product Label



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.

# 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.

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.<br>• NCS1K14-EDFA2<br>• NCS1K14-CCMD-16-C<br>• NCS1K14-CCMD-16-L |
| high-cooling profile | transponders line cards.<br>• NCS1K14-2.4T-K9<br>• NCS1K14-2.4T-X-K9<br>• NCS1K4-1.2T-K9<br>• NCS1K4-1.2T-L-K9<br>• NCS1K4-2-QDD-C-K9 |

**Programmable fan speed implementation on NCS 1014 for coherent pluggables**

*Table 5: 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.<br><br>1. CIM8 C- and L-band pluggable on NCS1K14-2.4T-K9 and NCS1K14-2.4T-X-K9 cards<br><br>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 6: Coherent pluggables with smart fan speeds*

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

# 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 7: 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.
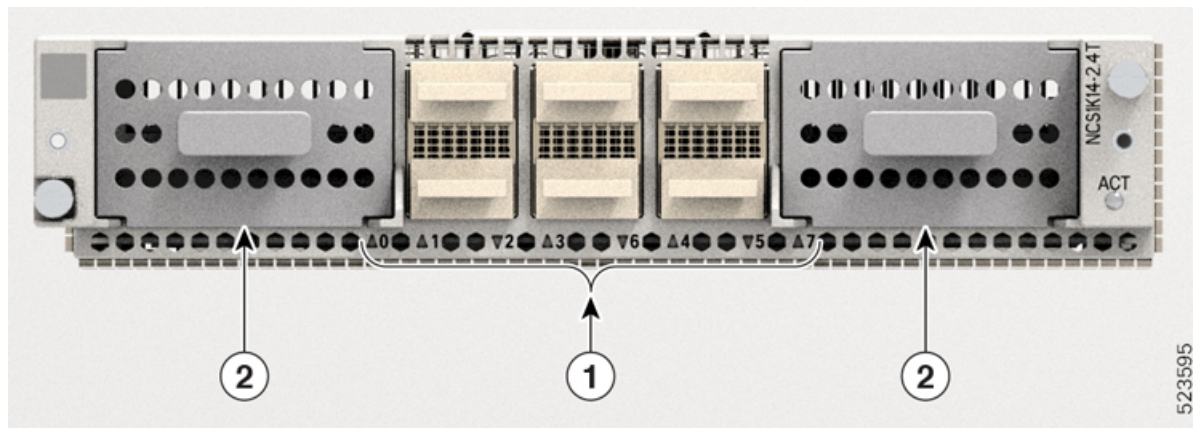
Figure 5: 2.4T Line Card Front View



Table 8: 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.
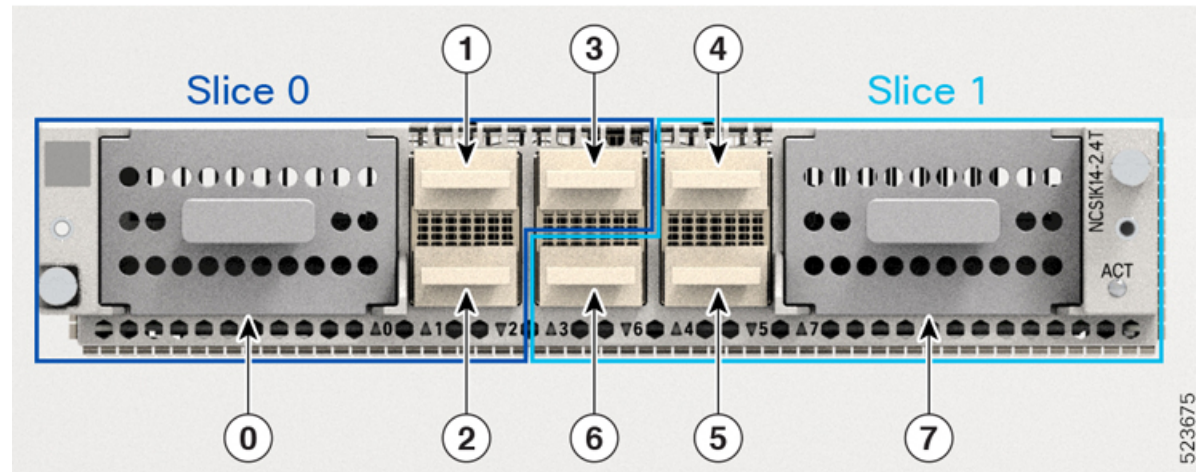
*Figure 6: 2.4T Card Client and Trunk Mapping*



*Table 9: 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 10: 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 11: L-Band Channel Wavelength Plan*

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

*Figure 7: NCS1K14-CCMD-16 Line Card Front View*
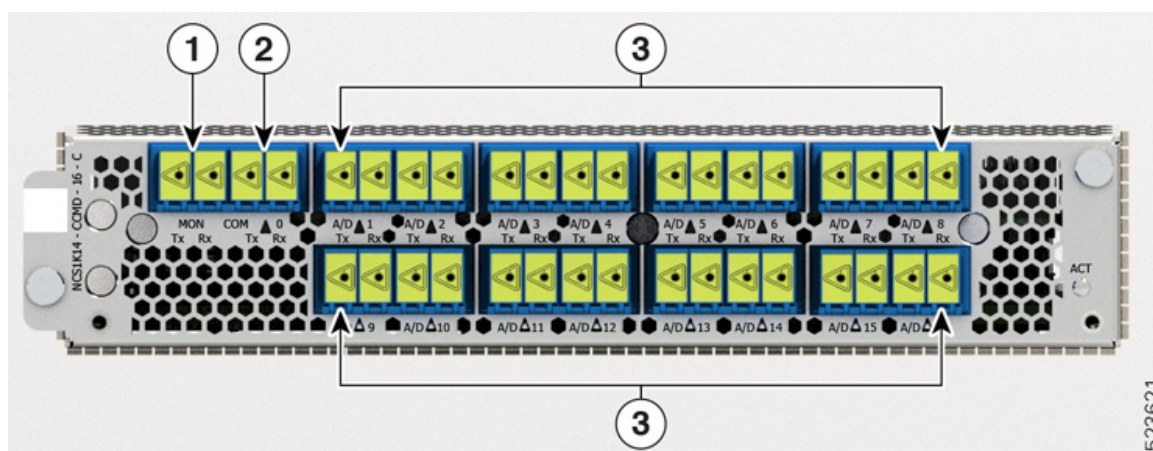


The following table shows the port names and their connector types for both CCDM-16-C and CCMD-16-L cards.

*Table 12: Line Card Interface and Connector Assignment*

| Callout | Connector Label | Connector Type | Port Name |
|---|---|---|---|
| 1 | MON | LC | MON TX |
| | | | MON RX |

| Callout | Connector Label | Connector Type | Port Name |
|---------|-----------------|----------------|-----------|
| 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 13: Feature History*

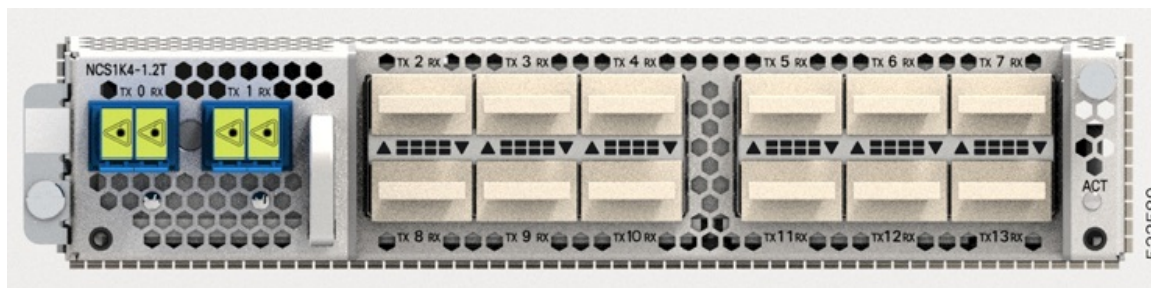| Feature Name | Release Information | Feature Description |
|--------------|--------------------|--------------------|
| NCS1K4-1.2T-L-K9 Line Card Support | Cisco IOS XR Release 24.4.1 | The NCS 1014 chassis now supports the **NCS1K4-1.2T-L-K9** line card. This card is the licensed version of the NCS 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<br><br>• purchase 100G incremental licenses to expand up to 12x 100G capacity for each card.<br><br>• set line rates from 100 to 600G.<br><br>• 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 8: 1.2T DWDM Line Card Front View



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

# 2.4TX line card

Table 14: 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.<br><br>• **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.<br><br>• **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 the this table.

*Table 15: 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 |
| 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.

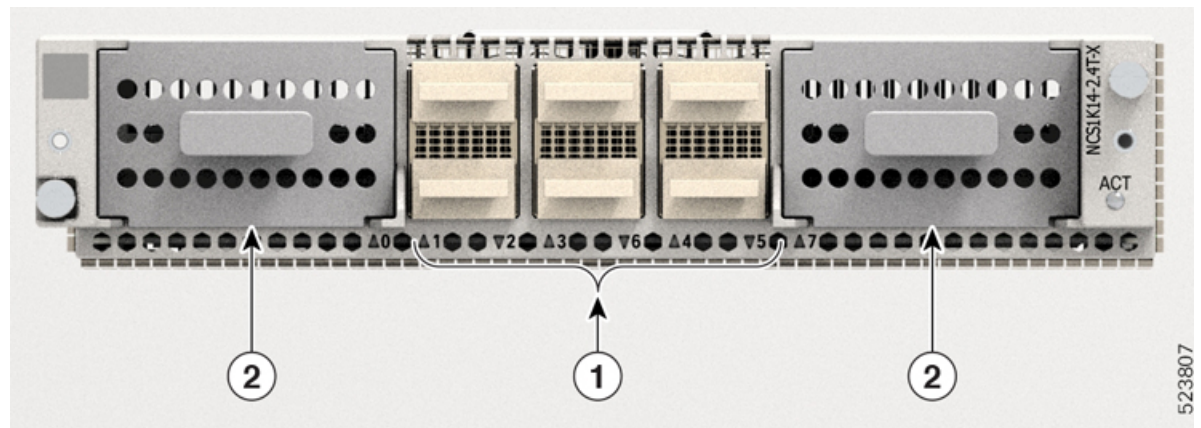*Figure 9: 2.4TX line card front view*



*Table 16: 2.4TX line card interfaces*

| Callout | Interface |
|---|---|
| 1 | Client port |
| 2 | Trunk port |

This figure shows the mapping between the client and trunk ports.
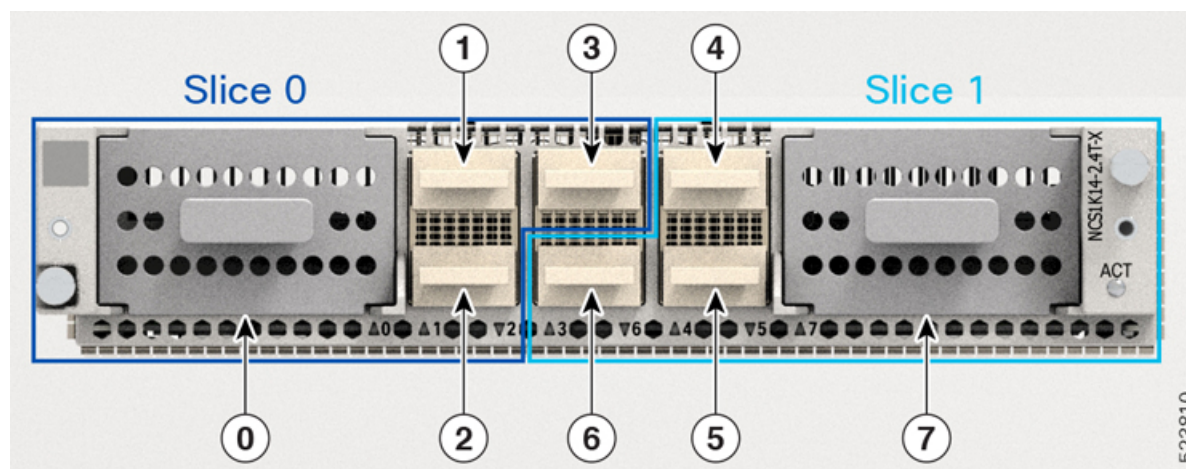
*Figure 10: 2.4TX card client and trunk mapping*



*Table 17: 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 18: 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 11: QXP-K9 Line Card Front View*
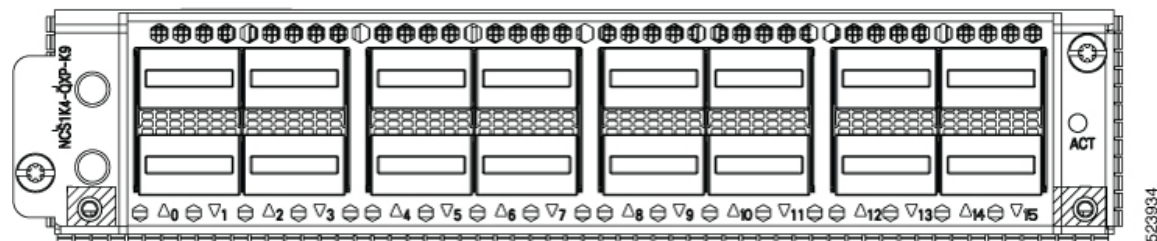


For more details of the QXP-K9 card, see the data sheet.

# NCS1K14-EDFA2 Optical Amplifier Line Card

*Table 19: 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
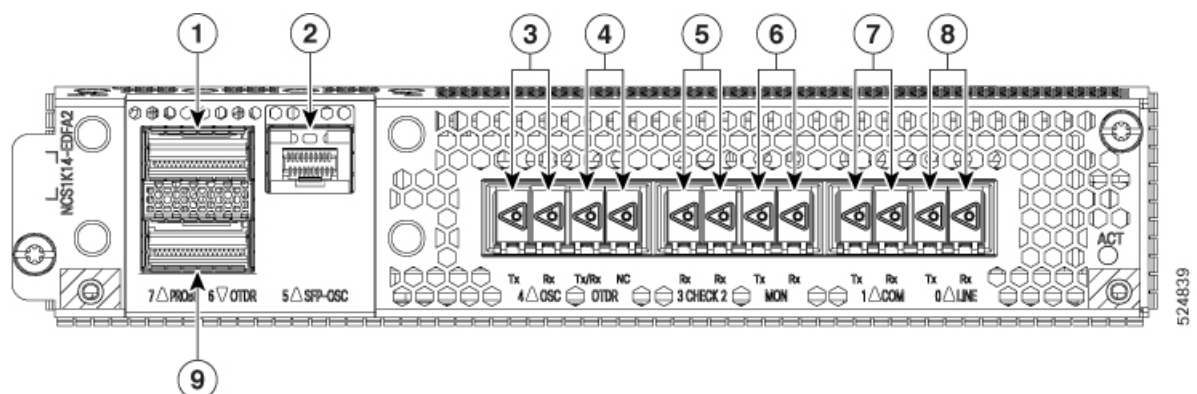
**Figure 12: NCS1K14-EDFA2 optical amplifier line card**

*Table 20: 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 |
| 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 21: 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 | | |

| Signal | Connector label | Port numbers | Operating frequency range [THz (nm)] | Note |
|---|---|---|---|---|
| OTDR | **OTDR** | NA | 197.45 (1518.32) | Bandwidth ± 3nm |
| OSC-TX/RX | **OSC TX** <br> **OSC RX** | 4 | 198.5 (1510.3) | Bandwidth ± 1.9nm |

## Optical specifications of EDFA2 Line Card

The maximum output power at LINE-TX is 22.5dBm, while at COM-TX it is 22dBm. The optical power at these two ports can be further adjusted through the two VOAs.

The optical specifications of the EDFA2 line card.

*Table 22: Preamplifier unit with two variable gain ranges*

| Parameter | Unit | Minimum | Typical | Maximum | Note |
|---|---|---|---|---|---|
| Gain range 1 <br><br> (from LINE-RX to COM-TX with VOA2 = 0dB) | dB | 0 | - | 25 [*] | (*) maximum gain can be extended up to 28dB with uncontrolled tilt |
| Gain range 2 <br><br> (from LINE-RX to COM-TX with VOA2=0dB) | dB | 20 | - | 36 [*] | (*) maximum gain can be extended up to 39dB with uncontrolled tilt |
| Total input power range | dBm | –33 [1] <br> –44 [2] | - | 22 [1] <br> 2 [2] | (1) Gain range 1 <br> (2) Gain range 2 |
| Typical per channel input Power range | dBm | –21 [1] <br> –32 [2] | - | 4 [1] <br> –16 [2] | (1) Gain range 1 <br> (2) Gain range 2 |
| Total output power range | dBm | -5 | - | 22 | - |
| Typical per channel output Power range | dBm | - | 4 | - | This range is for the provisioned 64 channels. |
| Tilt setting range | dB | –5 | - | 5 | - |
| Tilt/Gain variation | dB/dB | - | –0.8 | - | - |

*Table 23: BST2 amplifier with variable gain*

| Parameter | Unit | Minimum | Typical | Maximum | Note |
|---|---|---|---|---|---|
| Gain range <br><br> (from WB-output to LINE-TX with VOA1=0dB) | dB | 12 | - | 24 [*] | (*) maximum gain can be extended up to 27dB with uncontrolled tilt |
| Total input power range | dBm | –29 | - | 10.5 | - |

| Parameter | Unit | Minimum | Typical | Maximum | Note |
|---|---|---|---|---|---|
| Typical per channel input power range | dBm | −19.5 | - | −7.5 | - |
| Total output power range | dBm | −2 | - | 22.5 | This range is applicable when LINE-VOA=0dB. |
| Typical per channel output power range | dBm | - | 4.5 | - | This range is for the provisioned 64 channels. |
| Tilt setting range | dB | −5 | - | 5 | - |
| Tilt/Gain variation | dB/dB | - | −0.8 | - | - |

*Table 24: BST1 amplifier with variable gain*

| Parameter | Unit | Minimum | Typical | Maximum | Note |
|---|---|---|---|---|---|
| Nominal gain (from COM-RX to WB-input) | dB | - | 8 [1] | - | (1) Standard Gain |
| | | | 20 [2] | | (2) Extended Gain |
| | | | | | BST1 is designed flat at the nominal gain. |
| | | | | | +/-3dB gain tolerance with uncontrolled tilt. |
| Total input power range | dBm | −23 | - | 16 | Standard Gain |
| | | −29 | - | 4 | Extended Gain |
| Typical per channel input power range | dBm | - | −5 | - | Standard Gain |
| | | - | −17 | - | Extended Gain |
| Total output power range | dBm | - | - | 21 | - |
| Typical per channel output power range | dBm | - | 3 | - | This range is for the provisioned 64 channels. |

*Table 25: VOA 1 and VOA 2*

| Parameter | Unit | Minimum | Typical | Maximum | Note |
|---|---|---|---|---|---|
| Dynamic range | dB | 0 | - | 20 | VOA 1 range value |
| | | | | 15 | VOA 2 range value |

*Table 26: OCM*

| Parameter | Unit | Minimum | Typical | Maximum | Note |
|---|---|---|---|---|---|
| Dynamic ranges | dBm/ channel | −10 | - | 10 | This range is applicable at the BST2 and preamplifier output. |
| | | −30 | - | 10 | This range is applicable at the BST1 input. |
| | | −35 | - | 10 | This range is applicable at the preamplifier input. |
| Accuracy | dB | ± 0.5 | - | ± 2 | The range changes depending on the adjacent channel relative power. |
| Frequency range | THz | 191.2 | - | 196.175 | - |
| Frequency accuracy | GHz | - | - | ± 3 | - |
| Resolution Bandwidth | GHz | - | 12.5 | - | - |
| Frequency step | GHz | 6.25 | - | - | - |
| Scan Time | ms | - | - | 1200 | This time is applicable for all ports. |

*Table 27: OTDR Path*

| Parameter | Unit | Minimum | Typical | Maximum | Note |
|---|---|---|---|---|---|
| Path Loss OTDR insertion (from OTDR-RX port to LINE-TX or LINE-RX port) | dB | 1.5 | - | 2.3 | - |

*Table 28: OSC-TX/RX Path*

| Parameter | Unit | Minimum | Typical | Maximum | Note |
|---|---|---|---|---|---|
| Path loss OSC insertion/extraction (from OSC-RX to LINE-TX/RX or from LINE-TX/RX to OSC-TX) | dB | 0.5 | - | 2 | This range is applicable when VOA3 and VOA4 =0dB. |
| VOA3 and VOA4 dynamic range | dB | 0 | - | 15 | - |

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

**Table 29: 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. <br><br> 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.

# Cisco NCS 1014 Passive Devices

The Cisco NCS 1014 chassis supports the passive devices:

## NCS1K-MD-32x-CE Mux/Demux Passive Patch Panels

*Table 30: Feature History*

| Feature Name | Release Information | Feature Description |
|---|---|---|
| NCS1K-MD-32x-CE patch panel | Cisco IOS XR Release 25.1.1 | The MD-32x-CE patch panels are passive AAWG modules with 32 channels each. They support 150-GHz channel spacing, with a 75-GHz shift between ODD and EVEN panels. Combined, they offer 64 channels with 75-GHz spacing. Each panel supports wide optical pass-band and acts as an add/drop unit for 32 channels at 140 GBd.<br><br>The supported panels are:<br><br>  • NCS1K-MD-32E-CE<br><br>  • NCS1K-MD-32O-CE |

**Note**    NCS1K-MD-32x-CE is referred as MD-32x-CE patch panel.

The MD-32x-CE patch panels are a pair of passive Athermal Arrayed Waveguide Grating (AAWG) based modules. Each mux/demux panel has 32 channels and works as an add/drop unit for the NCS 1001 and NCS 1014 optical line systems. Each mux/demux panel allows the multiplexing and demultiplexing of 32 channels with 150-GHz spacing. 75-GHz frequency shift exists between the ODD and EVEN panels. When both panels are used on the same optical line systems (NCS 1001 or NCS 1014), the combined capacity becomes 64 channels with 75-GHz spacing. Each mux/demux panel provides a wide optical pass-band support. When used as a standalone, each panel acts as an add/drop unit for 32 channels at 140 GBd.

### Characteristics of MD-32x-CE

The MD32x-CE patch panel operates in C-band. It is the enhanced version of the NCS1K-MD-32O/E-C patch panel.

| Functionalities | NCS1K-MD-32E-CE | NCS1K-MD-32O-CE |
|---|---|---|
| Band type | C-band | |
| Loopback | Loopback is not supported. | |
| Frenquency range (THz) | 191.375 - 196.025 | 191.450 - 196.100 |
| Embedded optical modules | optical coupler | optical splitter |

| Functionalities | NCS1K-MD-32E-CE | NCS1K-MD-32O-CE |
|---|---|---|
| Coherent probe testing | MD32x-CE patch panel has a dedicated PROBE port to detect test probe signal to verify connection with the host card. | |

### Front panel of the MD-32x-CE

The interfaces of MD-32E-C patch panel is similar to the MD-32-O-CE patch panel.
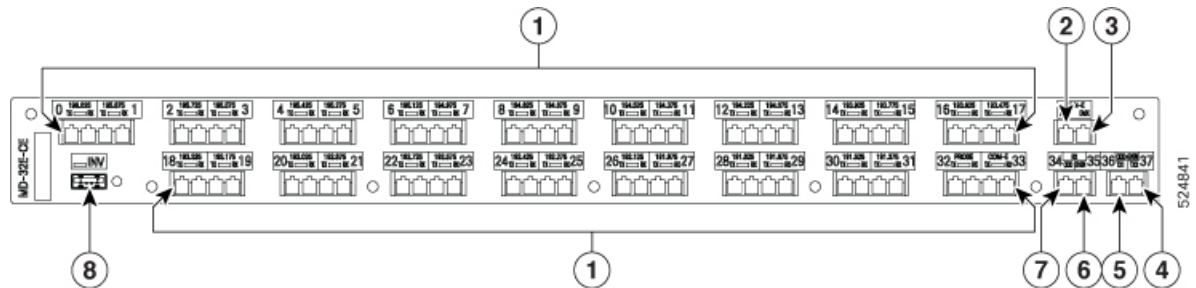
*Figure 13: MD-32x-CE interfaces*



*Table 31: Port Label Descriptions*

| Callout | Port label | Connector type | Description |
|---|---|---|---|
| 1 | CH-i TX/RX [i=0–31] | LC | Transmits and receives data through the 32 optical channels |
| | COM-x-TX/RX | LC | Transmits and receives the combined signals to multiplex or demultiplex. Its operating frequency range is 196.175–191.15 (1528.2–1568.4) [THz (nm)]. |
| | PROBE-TX/RX | LC | Starts the coherent test probe signal in TX port and detects the signal in RX port to verify connection with the host card |
| 2 | MON-x-MUX | LC | Monitors the aggregrated signal flowing out of the patch panel. Its operating frequency range is 196.175–191.15 (1528.2–1568.4) [THz (nm)]. |
| 3 | MON-x-DEMUX | LC | Monitors the aggregated signal coming into the patch panel to demultiplex the signal. Its operating frequency is the same as MON-x-MUX port. |
| 4 | ODD+EVEN-TX2 | LC | Transmits the ODD and EVEN optical channels |
| 5 | ODD+EVEN TX1 | LC | Transmits the ODD and EVEN optical channels |
| 6 | RX-EVEN | LC | Receives the EVEN optical channels |
| 7 | RX-ODD | LC | Receives the ODD optical channels |

| Callout | Port label | Connector type | Description |
|---|---|---|---|
| 8 | INV | USB Type A receptacle connector | Establishes USB communication channel with the optical line system |

### Communication with the NCS 1001 and NCS 1014 optical line system

The MD32x-CE patch panels communicate to the optical line system using a USB communication channel. The INV port is the dedicted USB 2.0 port in the patch panels that connect to the controllers to communicate.

The USB communication channel helps to:

- retrieve the inventory data and the insertion loss of the optical paths.
- retrieve the optical power levels monitored by the patch panels' photodiodes.
- activate an LED on request or other type of displays or electrical actuators.
- upgrade the patch panels firmware.

### Interoperability with EDFA2 line card

NCS1014 node containing an EDFA2 line card and one or more MD-32x-CE patch panels aggregate signals from 2.4T or 2.4TX transponders.

### Channel wavelength allocation

The table shows the frequency and wavelength allocated to each channel for both ODD and EVEN version of the MD-32x-C patch panels.

*Table 32: C-Band channel wavelength allocation*

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

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

# Cisco NCS 1014 Modules

The Cisco NCS 1014 chassis supports the following modules:

## Removable SSD

*Table 33: 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 14: Removable Chassis SSD*

# Fan modules

*Table 34: 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.<br><br>The cooling profiles of the programmable fans are:<br><br>• Low cooling<br><br>• High cooling<br><br>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** and **NCS1K14-FAN-P**) 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 R25.1.1, 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.

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

*Table 35: Comparison of legacy and programmable fan modules*

| Fan attributes | NCS1K14-FAN-P | NCS1K14-FAN |
|---|---|---|
| cooling profiles | supports dynamic cooling profile | supports legacy static cooling profile |
| inlet fan RPM | • low cooling: 3810 to 12698 rpm<br>• high cooling: 5397 to 17000 rpm | legacy cooling: 5482 to 17000 rpm |
| outlet fan RPM | • low cooling: 3694 to 11313 rpm<br>• 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 15: Perspective view of fan module*
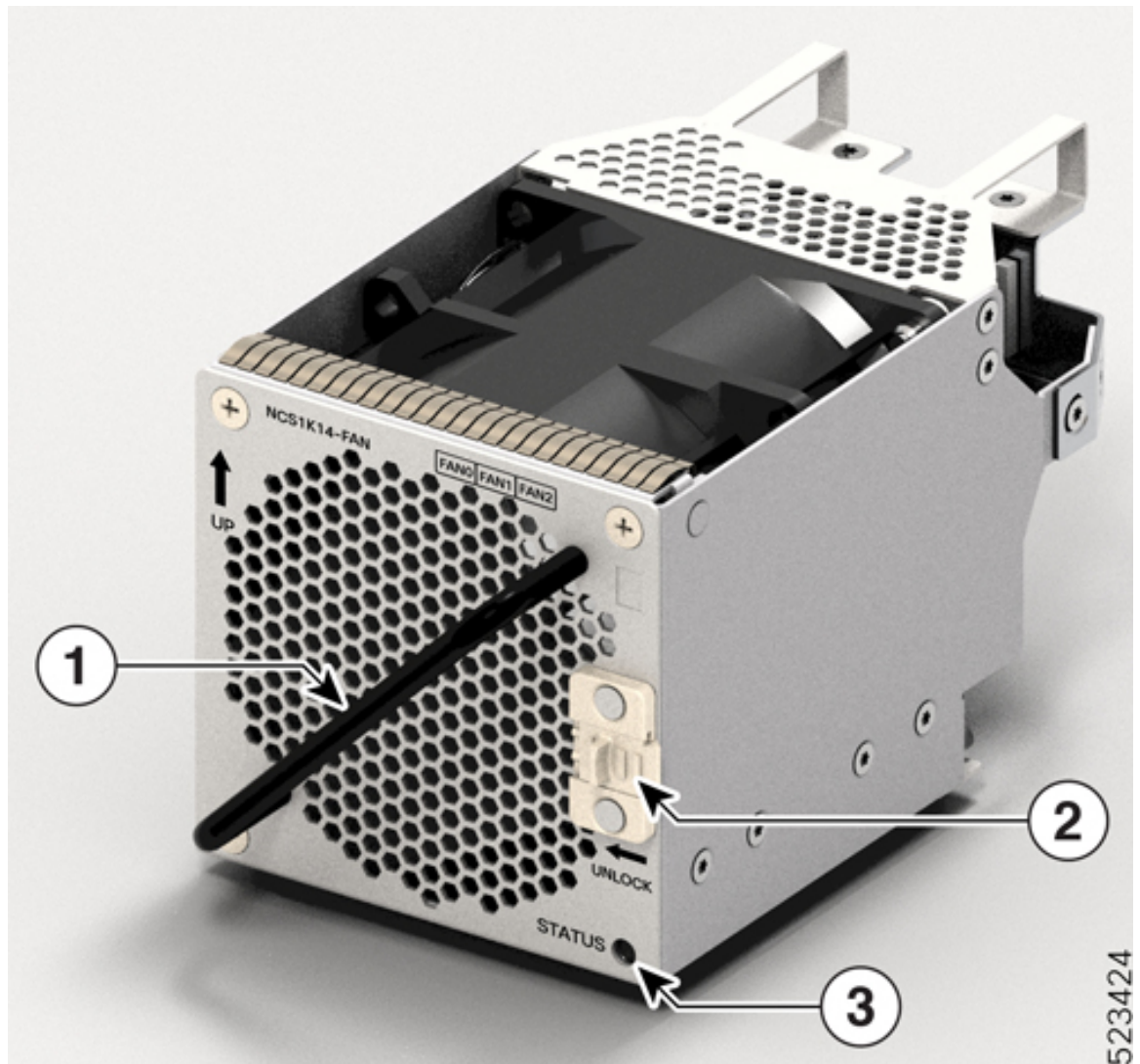


*Table 36: Fan module components*

| 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.
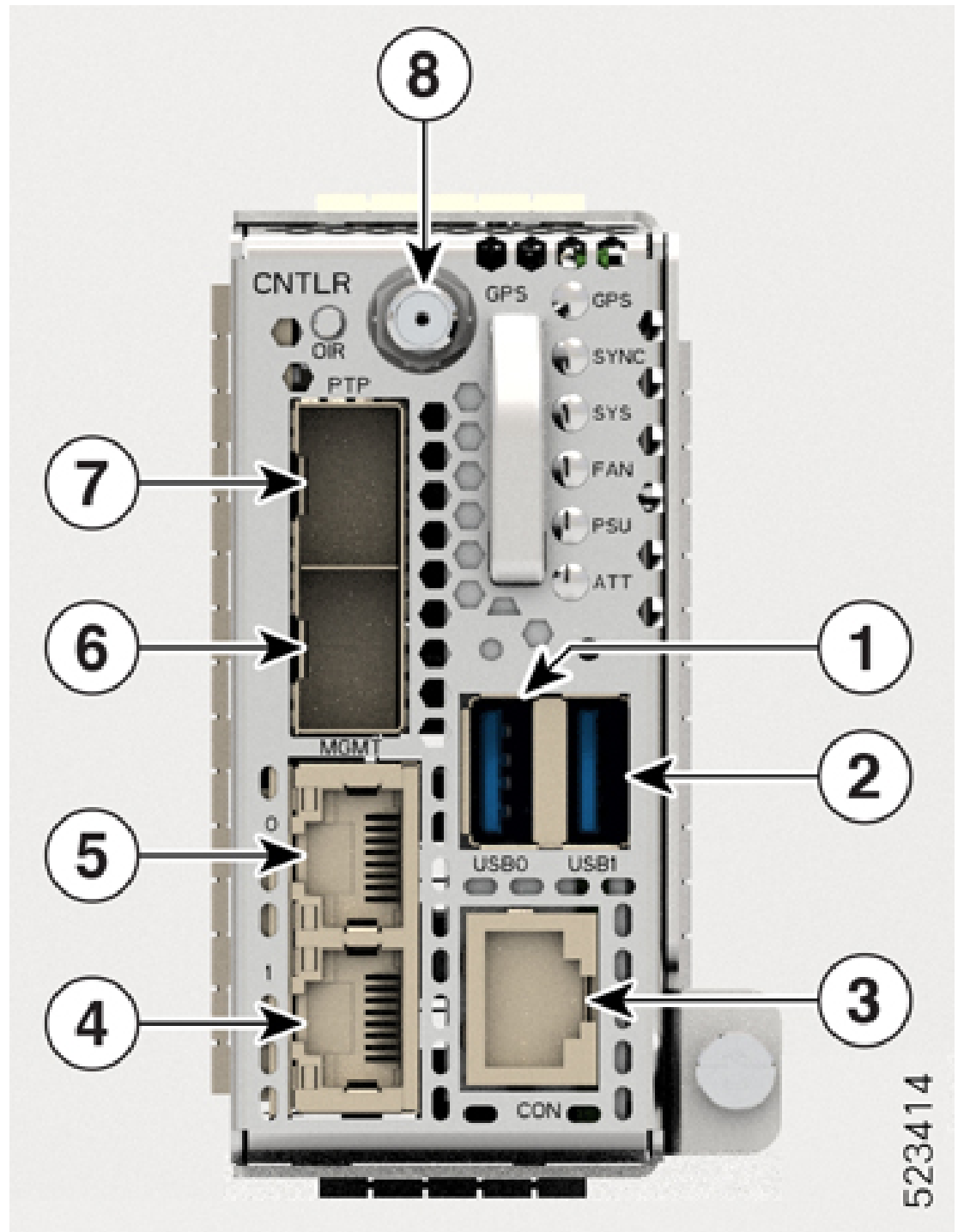
**Figure 16: NCS1K14-CNTLR-B-K9 Controller Card**
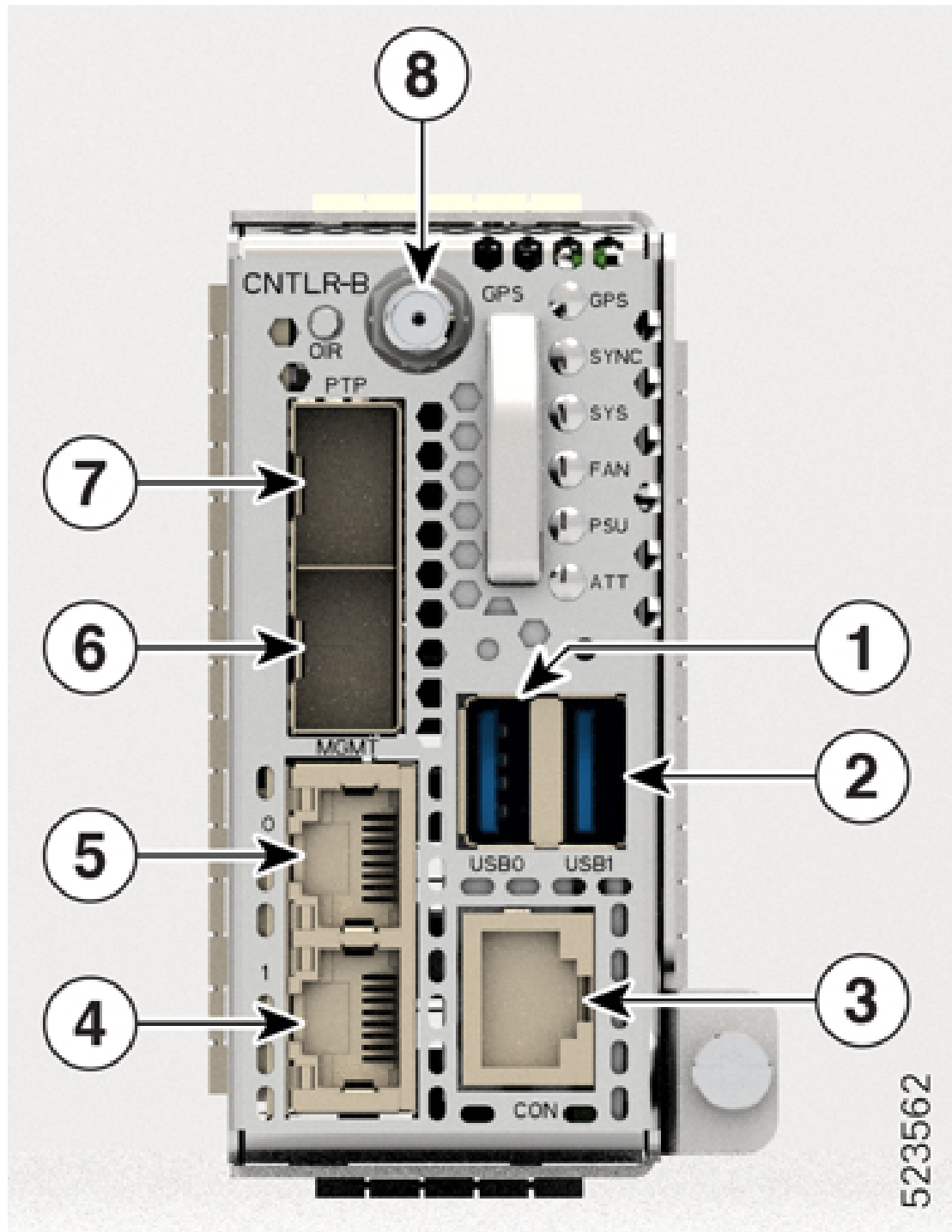


- **NCS1K14-CNTLR-K9**

  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 17: NCS1K14-CNTLR-K9 Controller Card*

*Table 37: 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)<br><br>The USB ports have following functions:<br><br>• Essential—boot the image through pen drive (Only USB 2.0 sticks and pen drives are supported).<br><br>• Optional—copy files to and from local devices (Only USB 2.0 sticks and pen drives are supported). |
| 3 | CON | Console interface (1x)<br><br>**Note**<br>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 DC redundant PSUs. Both the PSUs must always remain installed in the chassis, except during replacement. When the chassis has only one PSU installed, the system raises the *Power Module Redundancy Lost* alarm. The Cisco NCS 1014 chassis also supports 2-kW AC and DC PSUs.

### 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)

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.

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 a main output of 12 VDC.
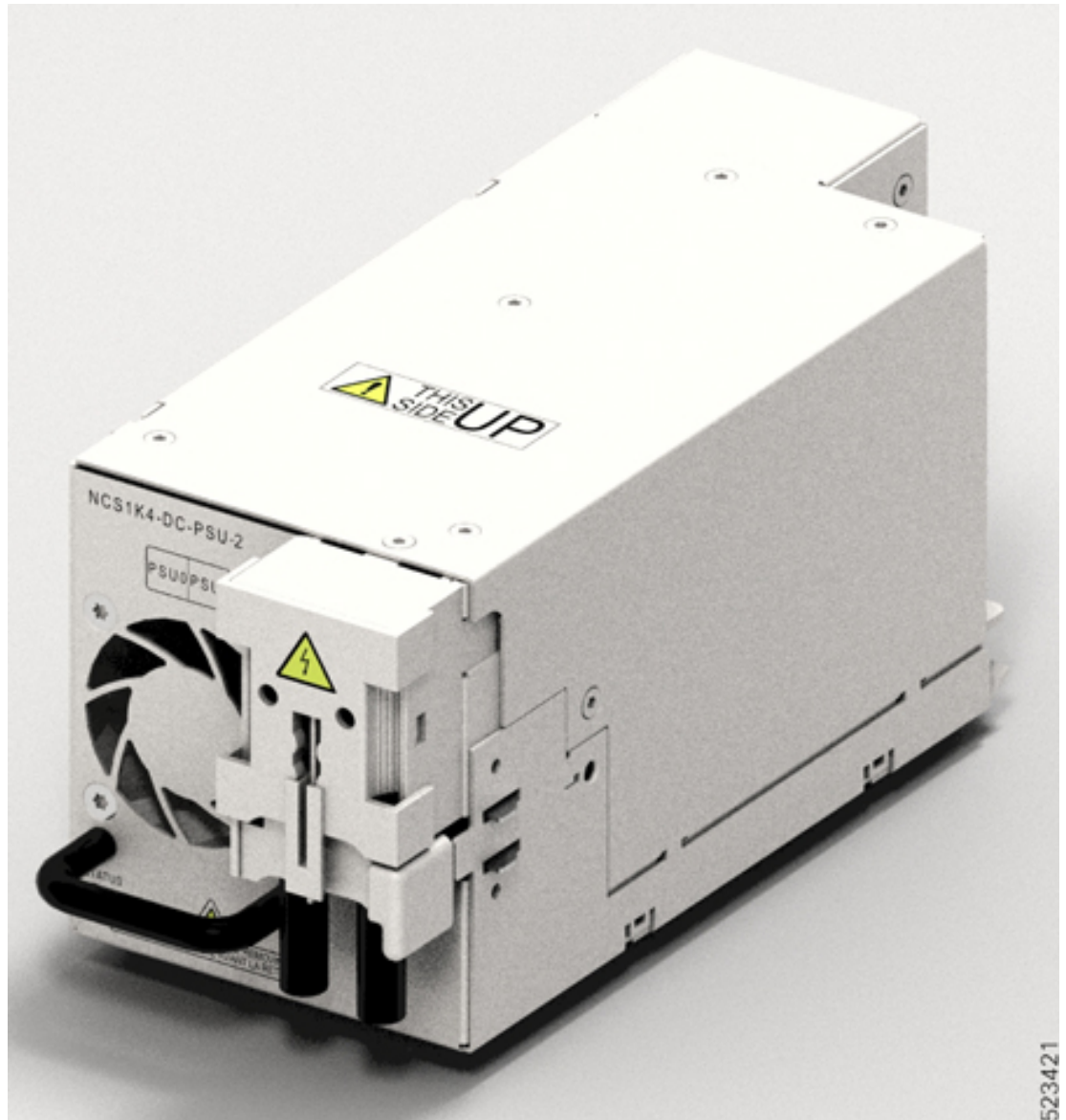
**Figure 18: NCS1K4-AC-PSU-2**
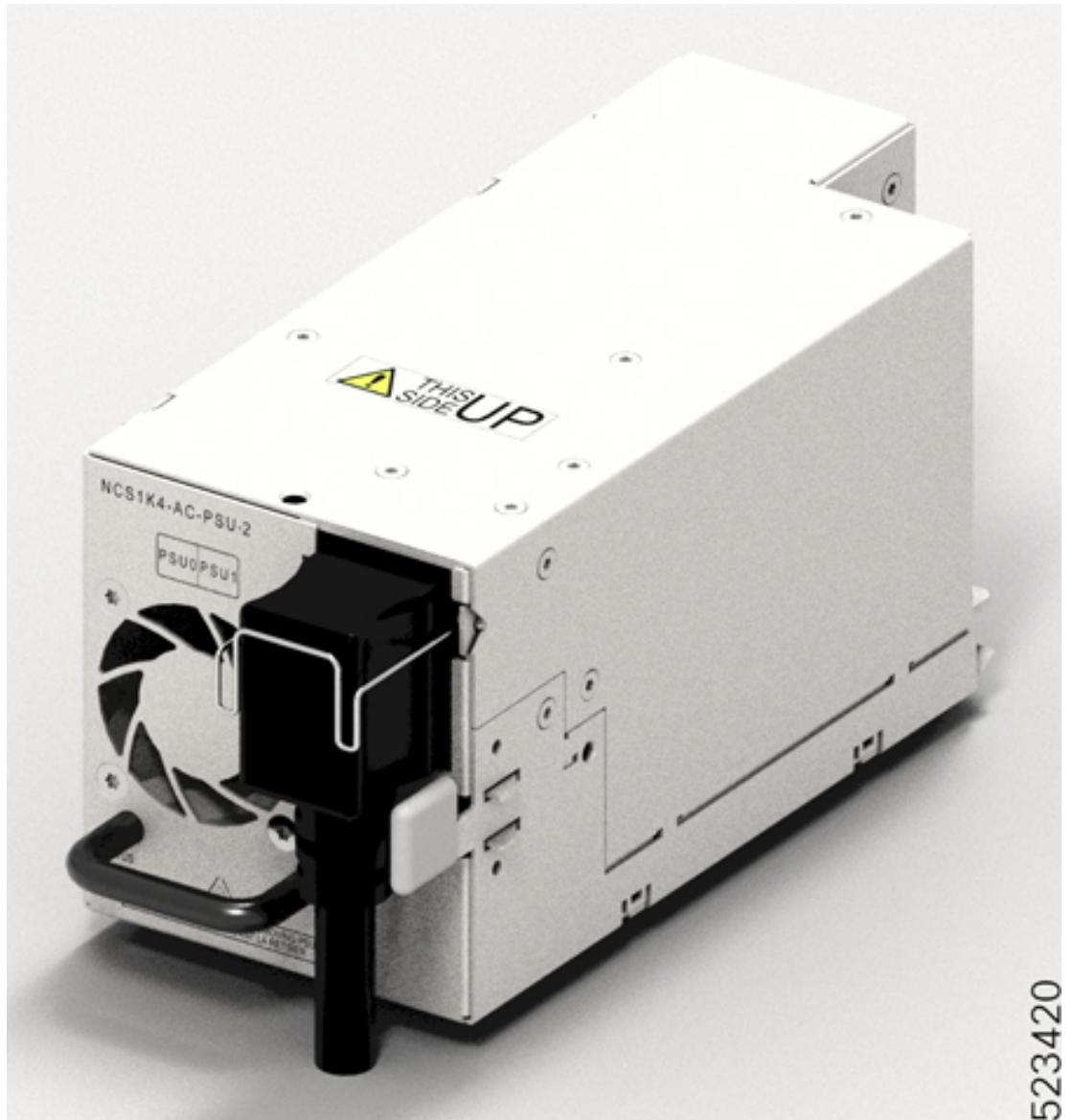


- **NCS1K4-DC-PSU-2**

  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 19: 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 a main output of 12 VDC.

- **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.

# 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**    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. Do not reuse the cleaned air filters. Replace them with a new air filter. We recommend having spare air filters in stock.

# Supported Pluggables

**Table 38: Feature History**

| 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:<br>• ONS-QSFP-OTDR<br>• DP01QSDD-ZT5-A1<br>• ONS-SC-PTP-1510 |

| Feature Name | Release | Description |
|---|---|---|
| Pluggables Support | Cisco IOS XR Release 24.3.1 | This client pluggable is supported on the QXP card:<br><br>• QDD-400G-LR4-S<br><br>This trunk pluggable is supported on the QXP card:<br><br>• QDD-400G-ZR-S<br><br>These client pluggables are supported on the 2.4TX card:<br><br>• QDD-2X100-CWDM4-S<br><br>• QDD-2X100-LR4-S<br><br>These trunk pluggables are supported on the 2.4TX card:<br><br>• CIM8-CE-K9=<br><br>• CIM8-LE-K9= |
| Pluggables Support | Cisco IOS XR Release 24.2.11 | The following pluggables are supported on the NCS1K14-2.4-T-X-K9 card:<br><br>• QDD-400G-LR4-S<br><br>• QDD-4X100G-FR-S |

## 2.4TX Line Card Pluggables

The 2.4TX line card supports the following pluggables:

*Table 39: 2.4TX Line Card Pluggables*

| Client Pluggables | Trunk Pluggables |
|---|---|
| • QDD-400G-FR4-S<br>• QDD-400G-AOCxM<br>• QDD-400G-DR4-S<br>• QDD-4X100G-LR-S<br>• QDD-400G-LR4-S<br>• QDD-4X100G-FR4-S<br>• QDD-2X100-CWDM4-S<br>• QDD-2X100-LR4-S | • CIM8-C-K9=<br>• CIM8-CE-K9=<br>• CIM8-LE-K9= |

### 2.4T Line Card Pluggables

The 2.4T line card supports the following pluggables:

**Table 40: 2.4T Line Card Pluggables**

| Client Pluggables | Trunk Pluggables |
|---|---|
| • QDD-400G-FR4-S<br>• QDD-400G-AOCxM<br>• QDD-400G-DR4-S<br>• QDD-4X100G-LR-S | • CIM8-C-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-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

### QXP Line Card Pluggables

The QXP line card supports the following pluggables:

*Table 41: QXP Line Card Pluggables*

| Client Pluggables | Trunk Pluggables |
|---|---|
| • QDD-400G-FR4-S<br>• QDD-400G-DR4-S<br>• QDD-400-AOCxM<br>• QDD-4x100G-LR-S<br>• QDD-400G-LR4-S | • DP04QSDD-HK9<br>• DP04QSDD-LK9<br>• DP04QSDD-HE0<br>• QDD-400G-ZR-S<br>• QDD-400G-ZRP-S |

### EDFA2 Line Card Pluggables

The EDFA2 line card supports the pluggables:

- ONS-QSFP-OTDR
- DP01QSDD-ZT5-A1
- ONS-SC-PTP-1510