Cisco NCS 4216 14RU Overview

The Cisco NCS 4216 F2B is a 14-rack unit router that belongs to the Cisco NCS 4200 family of routers. This router complements Cisco's offerings for IP RAN solutions for the GSM, UMTS, LTE, and CDMA. Given its form-factor, interface types, and Gigabit Ethernet density the Cisco NCS 4216 14RU can also be positioned as a Carrier Ethernet aggregation platform.

The Cisco NCS 4216 14RU is a cost optimized, fully redundant, centralized forwarding, extended temperature, and flexible pre-aggregation router.

Note   In this document, the Cisco NCS 4216 F2B is also called by the name Cisco NCS 4216 14RU.

Cisco NCS 4216 14RU Features

The key feature of the Cisco NCS 4216 14RU is to increase per platform and rack-unit interface density, especially when combining multiple interface types such as Gigabit Ethernet (GE), TDM, 10GE, 40GE and 100GE.

The Cisco NCS 4216 14RU has the following hardware features:

- A large service scale and high throughput (400G) Route Switch Processors (RSP)—NCS4216-RSP
- One-port 100GE Interface Module (NCS4200-1H-PK)
- Two-port 40GE Interface Module (NCS4200-2Q-P)
- Eight-port 10 Gigabit Ethernet Interface Module (8X10GE) (NCS4200-8T-PS)
- SFP Combo IM—Eight-port Gigabit Ethernet (8X1GE) + One-port 10 Gigabit Ethernet (1X10GE) (NCS4200-1T8LR-PS)
- OC-192 Interface Module with 8-port Low Rate CEM Interface Module (10G HO / 10G LO) (NCS4200-1T8S-10CS)
- 48 T1/E1 TDM Interface Module (48XT1/E1) (NCS4200-48T1E1-CE)
- 48 T3/E3 TDM Interface Module (48XT3/E3) (NCS4200-48T3E3-CE)
- 900 Watt PSUs to power the new RSP modules

The Cisco NCS 4216 14RU includes the following specific components:

- Chassis —14-rack unit in height while still maintaining a shallow depth and front-to-back air flow.
- Fan-tray with removable dust filter.
- New form factor and high performance RSP—This high performance RSP has aggregate switching capacity of 480 Gbps in oversubscribed mode.
- The backplane and the RSP together have the provision to support higher density 10GE modules like 8x10GE and 100GE modules.
- Integrated air flow baffle allows system to redirect air flow and helps in cooling.
- Flexible I/O configurations through 16 hot pluggable interface modules (single width). For example:

    - 16x10G + 2x100G + 80x1G - Oversubscribed mode
    - 48x10G - Oversubscribed mode
    - 48 T1/E1 TDM Interface Module (48XT1/E1)
    - 48 T3/E3 TDM Interface Module (48XT3/E3)
    - OC-192 Interface Module with 8-port Low Rate CEM Interface Module (10G HO / 10G LO)

- Metro ENET switching features along with TDM pseudo-wire support.
- Network processor provides flexibility to off-load control plane CPU processing for select OAM and management packets (for example, CCM, BFD, LBM).
- Flexible ENET processing through table-driven packet processing engines.
- On-line insertion/removal (OIR) of all FRUs except GPS module, while the system is operational
- Power supply (2+1)—Support for DC power supply. Two PSUs should be powered-on at a time. If all the three PSUs are powered on, they work in a load-sharing mode.
- Fully-redundant system with redundant combined control plane and data plane (excluding interfaces), timing support, power supplies, and fans.
- Active and standby support of redundant control plane and data plane, and timing
- Intra-chassis IOS redundancy (requires both RSPs)
- Stateful-switchover between active and standby RSPs (for protocols supported by IOS).
- In-service software upgrade (ISSU) supported with same RSPs.
- Timing support for receipt and distribution of network frequency and time including SyncE, BITS, 1PPS/10MHz I/O, IEEE 1588-2008, and NTP.
- Support for ENET OAM.
- T1/E1 and T3/E3 line protection compliant with NEBS GR-1089.
- Patch Panel for the Interface Modules

The following figure illustrates the Cisco NCS 4216 14RU chassis design.

Figure 1: Cisco NCS 4216 14 RU Chassis Design
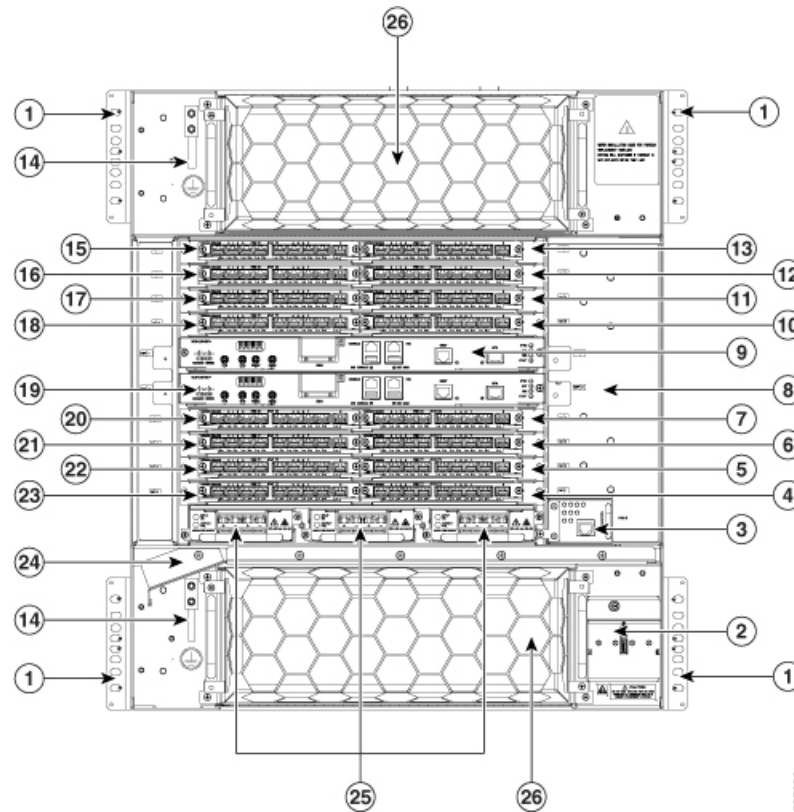
1	Mounting bracket	2	Fan Tray Input Terminal Block
3	PSU Fan Tray	4	Slot 1 for Interface Module
5	Slot 3 for Interface Module	6	Slot 5 for Interface Module
7	Slot 7 for Interface Module	8	System Enclosure
9	RSP Slot 1	10	Slot 9 for Interface Module
11	Slot 11 for Interface Module	12	Slot 13 for Interface Module
13	Slot 15 for Interface Module	14	Ground Lugs
15	Slot 14 for Interface Module	16	Slot 12 for Interface Module
17	Slot 10 for Interface Module	18	Slot 8 for Interface Module
19	RSP Slot 0	20	Slot 6 for Interface Module
21	Slot 4 for Interface Module	22	Slot 2 for Interface Module
23	Slot 0 for Interface Module	24	Cable support bracket
25	Redundant power units (three DC power units are shown)	26	Fan Trays

System Specifications

The following table summarizes the system specifications and environmental requirements for the Cisco NCS 4216 14RU.

Table 1: Cisco NCS 4216 14RU System Specifications

Dimensions (Height x Width x Depth) with FRUs	24.5 inches x 21.25 inches x 17.1 inches
	Note The additional depth is due to the projection of the handle from Chassis face.
Weight	
Chassis with back-plane	15.868 kg (34.982 lb)
Fan tray	3.618 kg (7.976 lb)
900W DC PSU	0.924 kg (2.037 lb)
RSP (NCS4216-RSP)	2.8 kg (6.17 lb)
Operating Temperature	The Cisco NCS 4216 14RU supports the following temperature ranges at 1800 m operating altitude: • -5º C to 55º C (23º F to 131º F) with front to back air flow **Note** Refer to Datasheets for system configuration.
Nonoperating Temperature	-40º C to +70º C (-40º F to 158º F) storage temperature
Operating Humidity	5–95% operating non-condensing relative humidity
Operating Altitude	-60 m to 1800 m operating altitude for full operating temperature range; up to 4000 m at up to 40º C (104º F).
Nonoperating Altitude	-60 m to 4570 m storage altitude
Vibration	1.0 g from 1.0 to 150 Hz
Shock	30 G half sine 6 ms and 11 ms
Nonoperating Vibration	Random: 1.15 g RMS 3 to 200 Hz, 30 minutes/axis Sine: 10 to 500 Hz at 0.8 G peak / 5 sweep cycles/axis
Operating Acoustics	78 dBA at 27ºC (80.6º F)

GNSS Module (NCS4216-CM-GNSS)

The GNSS module is present on the RSP. It is a pluggable module that allows direct interface with the external antenna.

Note Using a single GPS antenna input for both RSPs requires usage of external splitters.

Warning To reduce the risk of fire, use only No. 26 AWG or larger telecommunication line cord. Statement 1023

Note The GNSS module is not hot swappable.

GNSS Module RF Input Requirements

- The GNSS module requires an active GPS/GNSS antenna with built-in Low-Noise Amplifier (LNA) for optimal performance. The antenna LNA amplifies the received satellite signals for two purposes:
    - Compensation of losses on the cable
    - Lifting the signal amplitude in the suitable range for the receiver frontend

The Amplification required is 22dB gain + cable/connector loss + Splitter signal loss.

The recommended range of LNA gain (LNA gain minus all cable and connector losses) at the connector of the receiver module is 22dB to 30dB with a minimum of 20dB and a maximum of 35dB.

- GNSS module provides 5V to the active antenna through the same RF input.
- Surge requirement:

GNSS modules have built-in ESD protections on all pins, including the RF-input pin. However, additional surge protection may be required if rooftop antennas are being connected, to meet the regulations and standards for lightning protection in the countries where the end-product is installed.

A lightning protection must be mounted at the place where the antenna cable enters the building. The primary lightning protection must be capable of conducting all potentially dangerous electrical energy to PE (Protective Earth).

Surge arrestors should support DC-pass and suitable for the GPS frequency range (1.575GHz) with low attenuation.

- Antenna Sky visibility:

GPS signals can only be received on a direct line of sight between antenna and satellite. The antenna should see as much as possible from the total sky. For proper timing, minimum of four satellites should be locked.

Note The antenna terminal should be earthed at the building entrance in accordance with the ANSI/NFPA 70, the National Electrical Code (NEC), in particular Section 820.93, Grounding of Outer Conductive Shield of a Coaxial Cable.

Power Supply Features

The Cisco NCS 4216 14RU supports DC power supplies. The DC power supplies support:

• -40 VDC to -72 VDC

The power supplies are hot-swappable. However, the power supplies are automatically shut down when removed from the chassis. The power supplies are rated to deliver 900W (~75 A at +12 VDC) to the other FRUs in the system. The DC power supply has dual input feeds.

The following table shows the DC power supply specifications.

Table 2: DC Power Supply Specifications

Part numbers	A900-PWR900-D2
Input power specification	+48 V, -48 V
Minimum input voltage	-40.0 V
Maximum input voltage	-72 VDC
Output voltage	+12 VDC
Wire gauge for DC input power connections	10 AWG minimum for -48/-60 VDC. Connector accepts 6 AWG maximum.
Maximum power output	900 W

For more information about installing the Cisco NCS 4216 14RU power supplies, see the Installing the Power Supply .

Redundancy

Three power supplies can be plugged in the Cisco NCS 4216 14RU chassis that works in the 2+1 redundancy mode. For the normal operation of the chassis, at least two power supplies should be powered on. When all the three power supplies are plugged in, they work in a current sharing mode.

Each power supply has dual feed. It is recommended to connect each power feed to a separate input source.

Dying Gasp

The Cisco NCS 4216 14RU DC power supply does not support the Dying Gasp feature.

Status LEDs

LEDs are also provided on each power supply to indicate the status of the input power and the health of the power supply. For more information about the LEDs on the Cisco NCS 4216 14RU, see Troubleshooting section.

The *DC Power Supply Specifications* table summarizes the input power specifications for the Cisco NCS 4216 14RU DC power supply units.

Fan Tray

The fan tray module supported on the router is:

• A907-FAN-E (NCS4216-RSP)

The fan tray has:

- Four dual rotor fans—for the PSU area cooling

- 12 fans (three columns for four fans)—60x60x38mm fans for the RSP and IM area

The fan tray has the following hardware features:

- It provides front-to-back air flow
- It is field replaceable
- It contains status LEDs

For more information about air flow guidelines, see Air Flow Guidelines section. For instructions on how to install the fan tray, see Installing the Fan Tray section. For a summary of the LEDs on the fan tray, see LED Summary section.

Dust Filter (NCS4216-F2B-FAN-F)

The dust filter on the fan tray is a quadrafoam 45PPI filter which is 85 percent dust resistant. For installing the fan filter, see Removing and Replacing the Dust Filter section.

Door

The door provides access to the shelf, and acts as a protective panel.

Front Door

The front door of Cisco NCS 4216 14RU provides access to the shelf, and fan-tray assembly.

The front door NCS4216-F2B-DOOR acts as protective panels. The laser warning label is placed on the rear of the chassis.

The following figure illustrates the door design.

Figure 2: Door Design

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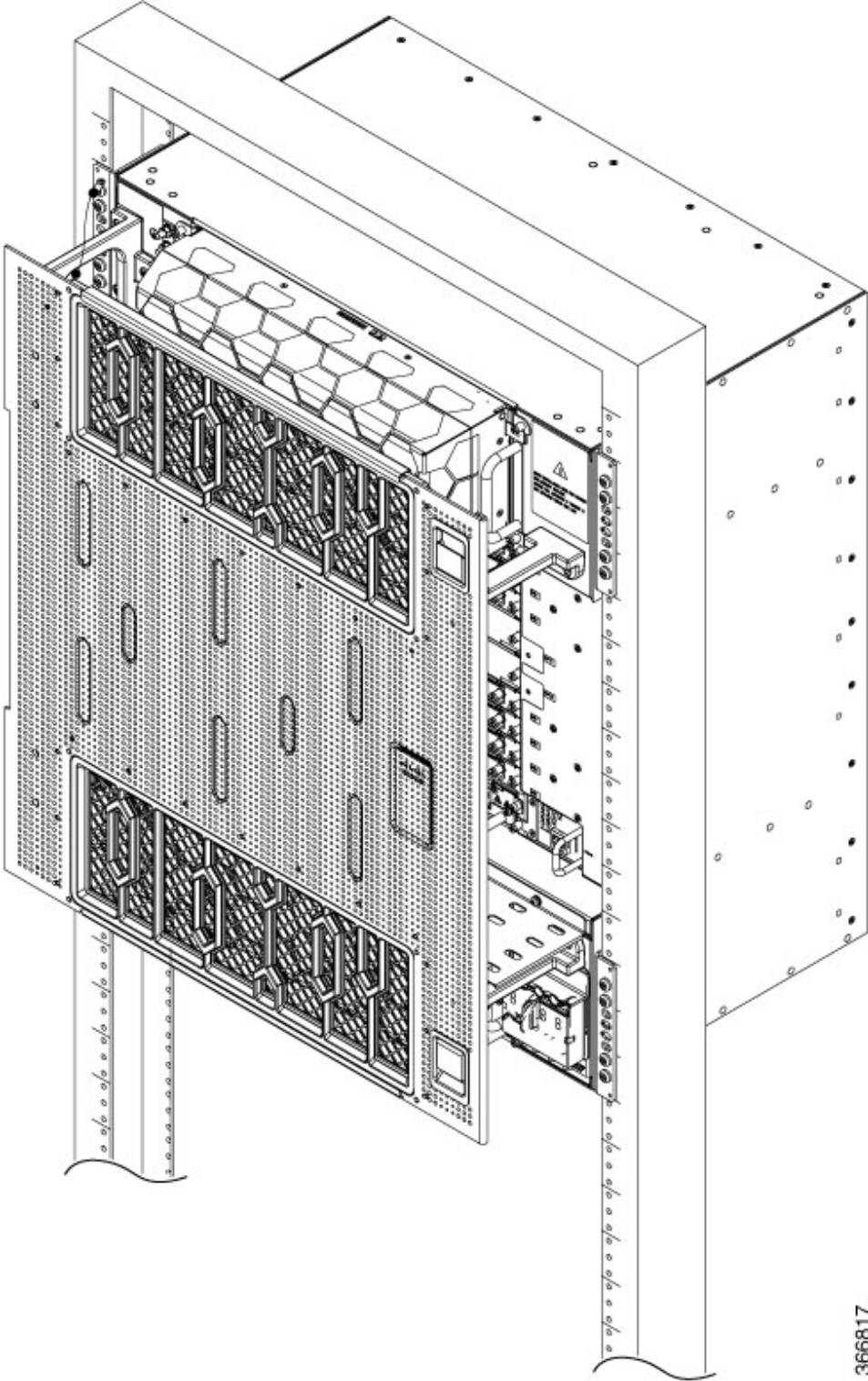
RSP Modules

The Cisco NCS 4216 14RU is designed to use up to two RSP modules to handle the data plane, network timing, and control plane functionalities for the router. The RSP configuration allows you to use Cisco IOS software to control chassis management, redundancy, external management, and system status indications on the router.

The following sections describe the Cisco NCS 4216 14RU RSP:

- Supported RSP Features
- RSP Redundancy
- Network Timing Interfaces
- RSP Interfaces

RSP features include:

- Loading software onto processor-based interface modules
- Redundant RSP management—The RSP manages detection of RSPs, exchange of health and status information, role negotiation, function for detection, health and status exchange, role negotiation
- Packet processing
- Traffic management, including buffering, queuing, and scheduling, Ethernet MAC functions
- Network clocking functions including phase and time-of-day for BITS, 1 PPS, 10 MHz, and 1588 PTP clock references
- Storage of software images, system configuration, SysLog
- PTP packet processing including IEEE 1588-2008 for recovering network timing (frequency, phase, and time) from upstream PTP clocks, for generating PTP frequency and phase references as inputs to the SETS, and for distributing them to downstream PTP clocks
- External management interfaces (RS232 console, management ENET, USB console, USB storage) and system status LED indicators

Supported RSPs

The Cisco NCS 4216 14RU supports the following RSP:

- NCS4216-RSP—Provides 8 GB of SDRAM, 20 Mb of TCAM memory on every ASIC.

The RSP does not provide external network interfaces for user traffic. All network interfaces are provided through separate IMs.

Supported RSP Features

The RSP provides the following features on the Cisco router:

- Centralized data plane, timing, and control plane functions for the system

- High-level control of interface modules

- Management functionalities for the router

- Control plane (host) CPU and associated memory in which Cisco IOS XE software and platform control software runs

- Nonvolatile memory for storage of software images, configurations, and system files

- Enabling and monitoring the health and presence of fan trays, interface modules, and power supplies

• Field replacement and hot-swap capabilities

Swapping of Interface Modules

The following interface modules support swapping on the Cisco NCS4216-RSP module:

Use the **hw-module subslot default** command before performing a swap of the modules to default the interfaces on the interface module.

• SFP Combo IM—8-port Gigabit Ethernet (8X1GE) + 1-port 10 Gigabit Ethernet (1X10GE)

• 2-port 40 Gigabit Ethernet Interface Module (2X40GE)

• 8-port 10 Gigabit Ethernet Interface Module (8X10GE)

• 1-port 100 Gigabit Ethernet Interface Module (1X100GE)

• 2-port 100 Gigabit Ethernet Interface Module (2X100GE)

• 8/16-port 1 Gigabit Ethernet (SFP/SFP) + 1-port 10 Gigabit Ethernet (SFP+) / 2-port 1 Gigabit Ethernet (CSFP) Interface Module

Use of **hw-module subslot default** command is not supported on the following interface modules.

• 1-port OC-192 Interface Module with 8-port Low Rate CEM Interface Module (10G HO / 10G LO)

• 48-port T1/E1 TDM Interface Module (48XT1/E1)

• 48-port T3/E3 TDM Interface Module (48XT3/E3)

• 1-port OC48/ STM-16 or 4-port OC-12/OC-3 / STM-1/STM-4 + 12-Port T1/E1 + 4-Port T3/E3 CEM Interface Module (NCS4200-3GMS)

• NCS 4200 Combo 8-Port SFP GE and 1-Port 10 GE 20G Interface Module (NCS 4200-1T8S-20CS)

Use the **hw-module subslot default** command before performing a swap of the modules to default the interfaces on the interface module.

See the *Cisco NCS 4216 Router Hardware Installation Guide* for information on Supported Interface Modules on the RSP.

Note   If the **license feature service-offload enable** command is configured, then the NCS4200-1T8LR-PS IM is not supported in the router for RSP3.

Note   There are certain restrictions in using the interface modules on different slots in the chassis. Contact Cisco Sales/Support for the valid combinations.

Table 3: Cisco NCS4216-RSP Supported Interface Modules and Part Numbers

RSP Module	Interface Modules	Part Number	Slot
NCS4216-RSP	SFP Combo IM—8-port Gigabit Ethernet (8X1GE) + 1-port 10 Gigabit Ethernet (1X10GE)	NCS4200-1T8LR-PS	2,5,6,9,10,13,14,15
	1-port 100 Gigabit Ethernet Interface Module (1X100GE)	NCS4200-1H-PK	7,8
	2-port 100 Gigabit Ethernet (QSFP) Interface Module (2X100GE)[1]	NCS4200-2H-PQ	7,8
	2-port 40 Gigabit Ethernet QSFP Interface Module (2X40GE)	NCS4200-2Q-P	3,4,7,8,11,12
	8/16-port 1 Gigabit Ethernet (SFP/SFP) + 1-port 10 Gigabit Ethernet (SFP+) / 2-port 1 Gigabit Ethernet (CSFP) Interface Module	NCS4200-1T16G-PS	All slots
	8-port 10 Gigabit Ethernet Interface Module (8X10GE)	NCS4200-8T-PS	3,4,7,8,11,12
	1-port OC-192 Interface Module with 8-port Low Rate CEM Interface Module (5G/ 10G HO / 10G LO)	NCS4200-1T8S-10CS	3,4,7,8,11,12 (10G mode) 0,1,2,5,6,9,10,13,14,15 (5G mode)
	NCS 4200 1-Port OC-192 or 8-Port Low Rate CEM 20G Bandwidth Interface Module	NCS4200-1T8S-20CS	3,4,7,8,11,12 (20G mode) 0,1,2,5,6,9,10,13,14,15 (10G mode)
	48XT1/E1 Interface module	NCS4200-48T1E1-CE	2,3,4,5,6,7,8,9,10,13,14,15
	48XT3/E3 Interface module	NCS4200-48T3E3-CE	2,3,4,5,6,7,8,9,10,13,14,15
	1-port OC48[2]/ STM-16 or 4-port OC-12/OC-3 / STM-1/STM-4 + 12-port T1/E1 + 4-Port T3/E3 CEM Interface Module	NCS4200-3GMS	All slots

[1] IM supports only one port of 100G with RSP3 as QSFP28 on Port 0 in both slots 7 and 8.
[2] If OC48 is enabled, then the remaining 3 ports are disabled.

RSP Redundancy

The Cisco NCS 4216 14RU chassis includes two RSP slots to allow for redundant RSPs. When the router uses redundant RSPs, one RSP operates in the active mode and the other operates in the hot standby mode. Removal or failure of the active RSP results in an automatic switchover to the standby RSP.

✎

Note   Interface Module Slot support will vary based on Interface Modules used in other slots. For more information, refer the Configuration Guides for details.

Network Timing Interfaces

The RSP supports the following network timing interfaces:

- BITS input/output port—RJ48 jack
  - Wire Wrap Interface Through an Adapter (A900-WWA-RJ48-H)

✎

Note   The BITS adapter comes along with RSP. To order one, use the A900-WWA-RJ48-H= part number.

- 1 PPS input and output—Mini coax connectors
- 10 MHz input and output—Mini coax connectors
- Time of Day (ToD) or 1 PPS input or output port—Shielded RJ45 jack

Network timing interfaces support redundancy in a redundant RSP configuration. Network timing interfaces on a redundant RSP remain in operation while the RSP is in hot standby mode.

RSP Interfaces

The following figure summarizes the interfaces on the RSP module.

Figure 3: Interfaces on the RSP Module
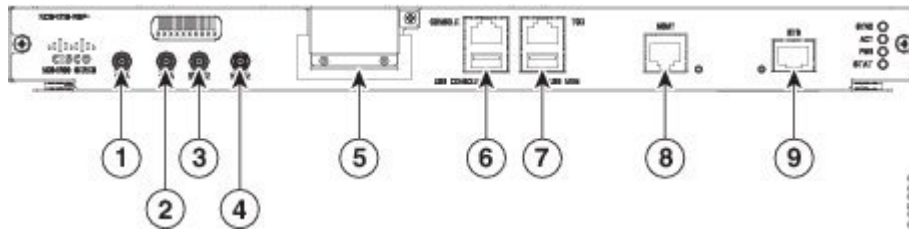
Label	Interface
1	1 PPS input timing port
2	1 PPS output timing port
3	10 MHz input timing port
4	10 MHz output timing port
5	GNSS RF IN (SMA Threaded Connector)
6	USB console port
7	USB memory port
8	Ethernet management port
9	BITS timing port

Interface Modules

The network interfaces are provided through pluggable interface modules.

The following list describes the various IM port density:

- GE SFP ports—Supports 100/1000 modes
- GE C-SFP ports—Supports 100/1000BASE-BX modes
- 100GE CPAK ports using 1x100G IM
- 2-Port 100 Gigabit Ethernet Interface Module (2X100 GE)
- 10GE ports through SFP+
- 2X40 GE interface module—Supports QSFP mode
- T1/E1 ports with integrated inter-office surge protection—Supports TDM channelized, PWE3 processing
- T3/E3 ports - Supports TDM channelized, PWE3 Processing
- OC3/OC12/OC48/OC192 - Supports TDM channelized, PWE3 Processing

Note For information about supported interface modules, see the data sheet for the Cisco NCS 4200 Series Aggregation Services Routers .

The Cisco NCS 4216 14RU interface modules are a field-replaceable units. In addition to the ports provided on an RSP, the Cisco NCS 4216 14RU supports the interface modules.

8-port 10 Gigabit Ethernet Interface Module (8X10GE)

Figure 4: 8x10 Gigabit Ethernet Interface Module
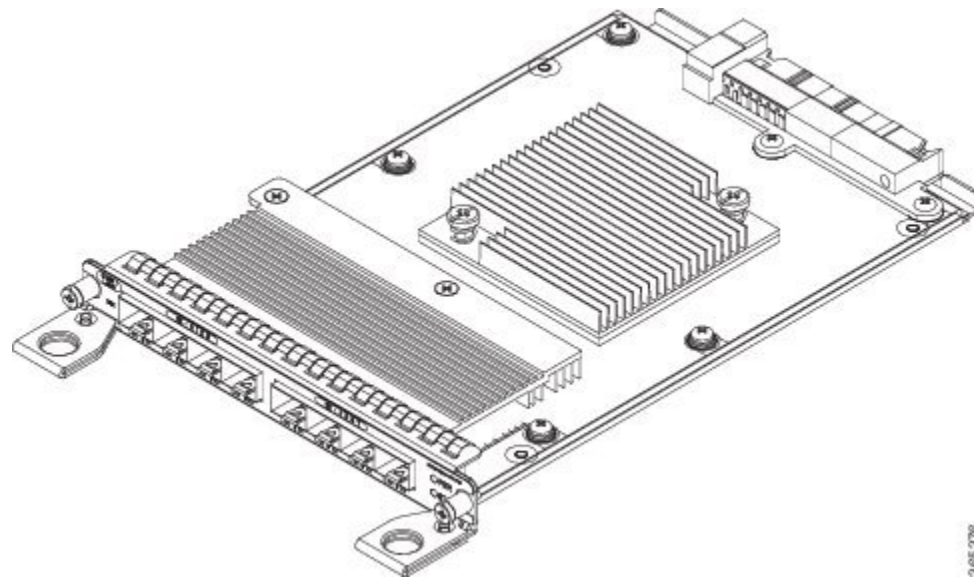
The high density 8x10 Gigabit Ethernet interface module supports eight 10 Gigabit Ethernet ports using SFP+ transceivers cages on the faceplate.

Note   It does not support XFP transceivers on the ports.

For more information about installing a 8X10GE module, see the Interface Module Installation section.

1-port 100 Gigabit Ethernet Interface Module (1X100GE)

Figure 5: 1x100 Gigabit Ethernet Interface Module
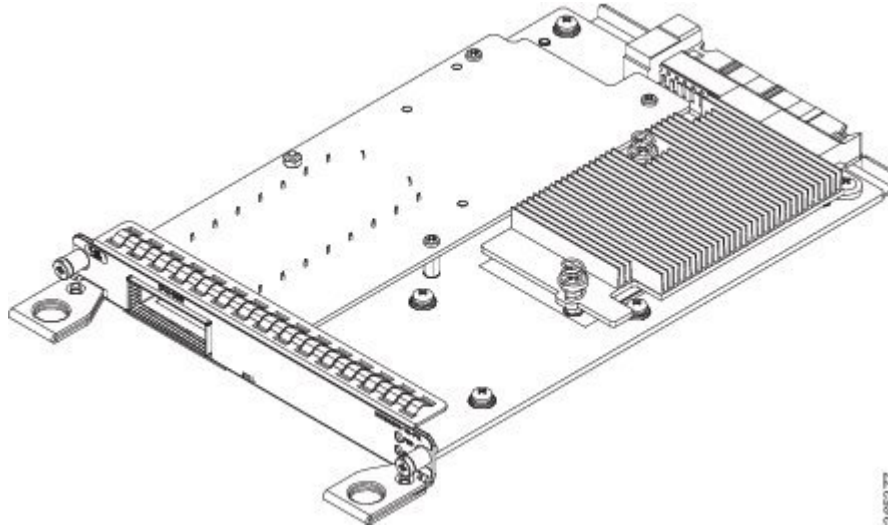
The single port 100 Gigabit Ethernet interface module supports 100 Gigabit Ethernet port. The figure above shows the interface module.

For more information about installing a 1X100GE module, see the Interface Module Installation section.

## 2-Port 100 Gigabit Ethernet Interface Module (2X100GE)

The 2-port 100 Gigabit Ethernet Interface Module (NCS4200-2H-PQ) design supports only one 100G QSFP28 optics on Port 0. Port 1 is disabled with RSP3. It currently supports only one mode of operation with 100Gbps of traffic with RSP3.
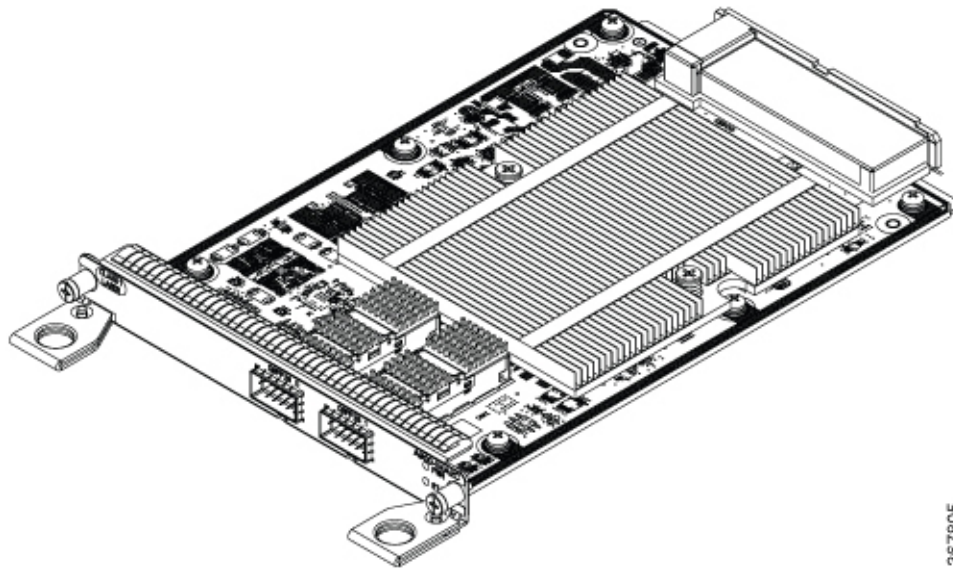
367805

Limitations of 2X100 GE IM

After any QSFP28 100G optics is inserted, it takes approximately 10 seconds for the optics to be detected and the link to come up. We recommend this time delay for complete initialization and operation.

After inserting the cable or after unshutting the 100G interface, the 100G link may take approximately about 2 seconds to come up.

Note QSFP-100G-SR4-S and QSFP-100G-LR4-S are the supported optics for 2X100GE IM for the release 16.10.1.

8x1 Gigabit Ethernet SFP+ 1x10 Gigabit Ethernet SFP+ Combination Interface Module

Figure 6: 8x1 GE SFP+ 1x10 GE SFP Interface Module
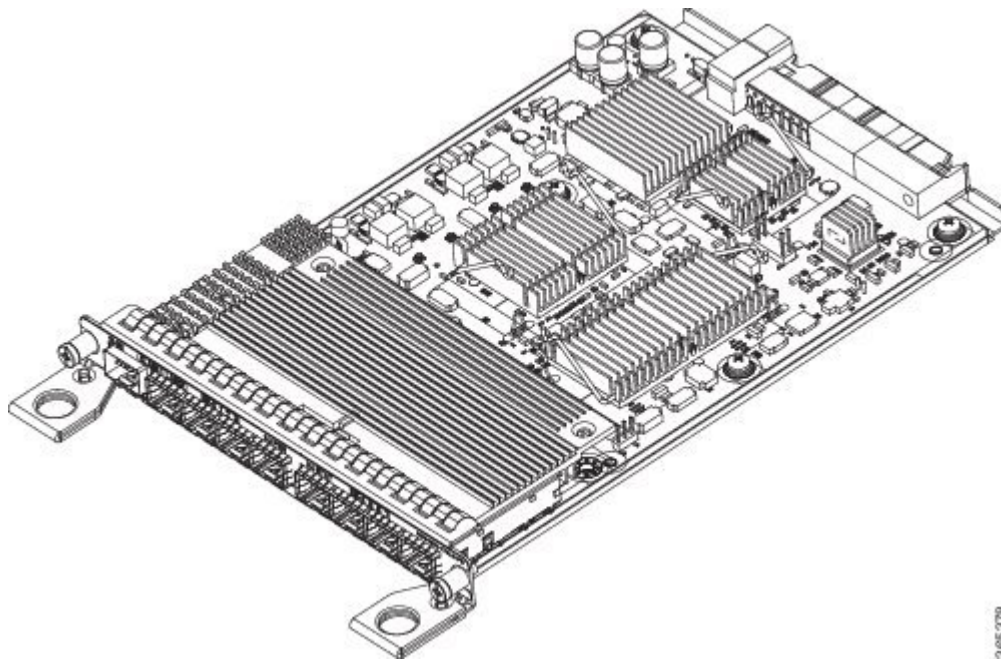
The 8-port 1 Gigabit Ethernet SFP interface module with the 1-port 10 Gigabit Ethernet interface module is a high density combination interface module. This module supports 8 Gigabit Ethernet SFP ports and 1 10 Gigabit Ethernet SFP+ port.

For more information about installing the 8X1 GE SFP + 1X10 SFP Gigabit Ethernet module, see the Interface Module Installation section.

2-port 40 Gigabit Ethernet QSFP Interface Module (2X40GE)

Figure 7: 2x40 Gigabit Ethernet Interface Module

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8/16-port 1 Gigabit Ethernet (SFP/SFP) + 1-port 10 Gigabit Ethernet (SFP+) / 2-port 1 Gigabit Ethernet (CSFP) Interface Module
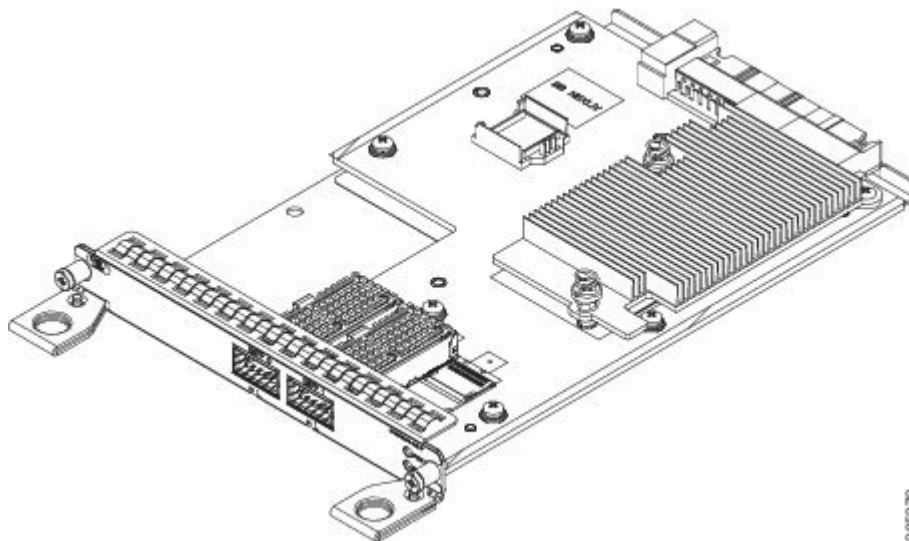
The dual port 40 Gigabit Ethernet interface module supports the 40 Gigabit Ethernet port. The 40G interface is supported using QSFP+ optics. The figure above shows the interface module.

For more information about installing a 2X40 GE module, see the Interface Module Installation section.

8/16-port 1 Gigabit Ethernet (SFP/SFP) + 1-port 10 Gigabit Ethernet (SFP+) / 2-port 1 Gigabit Ethernet (CSFP) Interface Module

The NCS4200-1T16G-PS interface module has the flexibility to support SFP+/SFP/CSFP on the modules as mentioned below:

- 1-Port 10 Gigabit Ethernet Small Form-Factor Pluggable (SFP+) interface supports one of three modules as 1xSFP+, 1xSFP or 1xCSFP.

- 8-Port Gigabit Ethernet Small Form-Factor Pluggable (SFP) interface supports as either 8xSFP, or 8xCSFP.

Figure 8: NCS4200-1T16G-PS Gigabit Ethernet Interface Module
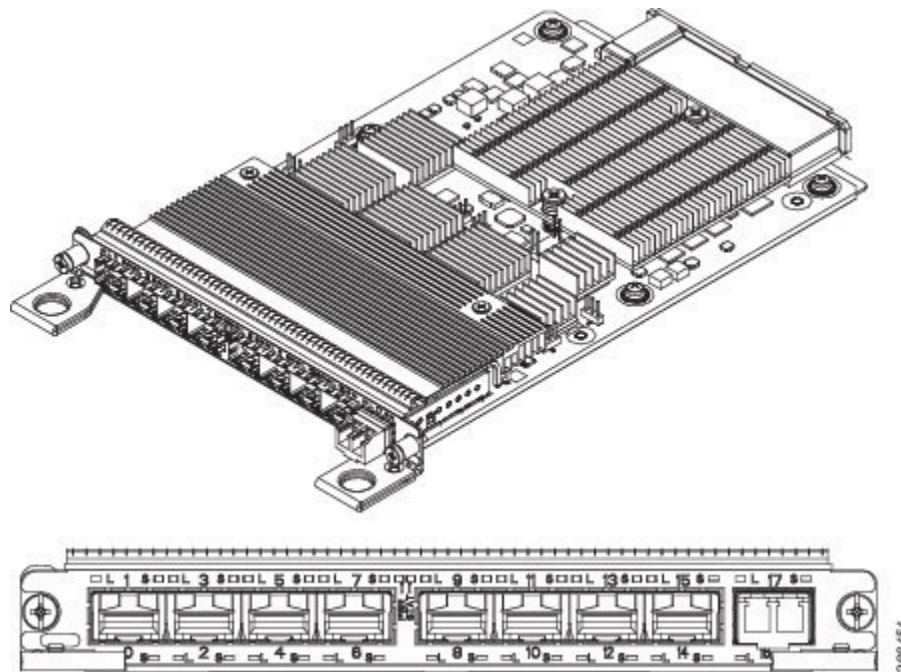
The following modes are supported for the Interface Module, based on slot capacity:

- 8 x 1GigE (SFP) Fully subscribed mode (FS)

- 8 x 1GigE (SFP) + 1 x 10GigE (SFP+) Fully subscribed mode (FS)

- 16 x 1GigE (C-SFP) + 1 x 10GigE (SFP+) Fully subscribed mode (FS)

- 16 or 18 x 1GigE (C-SFP) Oversubscribed mode (OS)

- 16 x 1GigE (C-SFP) + 1 x 10GigE (SFP+) Oversubscribed mode (OS)

- 8 or 9 x 1GigE (SFP) Fully subscribed mode (FS)

- 1 x 10GigE (SFP+) Fully subscribed mode (FS)

For more information about installing a 1xSFP or CSFP and 8xSFP or CSFP, see Installing an Interface Module.

For more information on port numbering, see Configuring 8/16-port 1 Gigabit Ethernet (SFP/SFP) + 1-port 10 Gigabit Ethernet (SFP+) / 2-port 1 Gigabit Ethernet (CSFP) Interface Module chapter of the Cisco NCS 4200 Series Software Configuration Guide, Cisco IOS XE Fuji 16.7.x.

OC-192 Interface Module with 8-port Low Rate CEM Interface Module (10G HO / 10G LO)

The OC-192 interface module with 8-port low rate CEM interface module is a high density combination interface module. This module supports 1 OC-192 port and 8 low rate CEM or 1 Gigabit Ethernet port.

Figure 9: OC-192 Interface Module
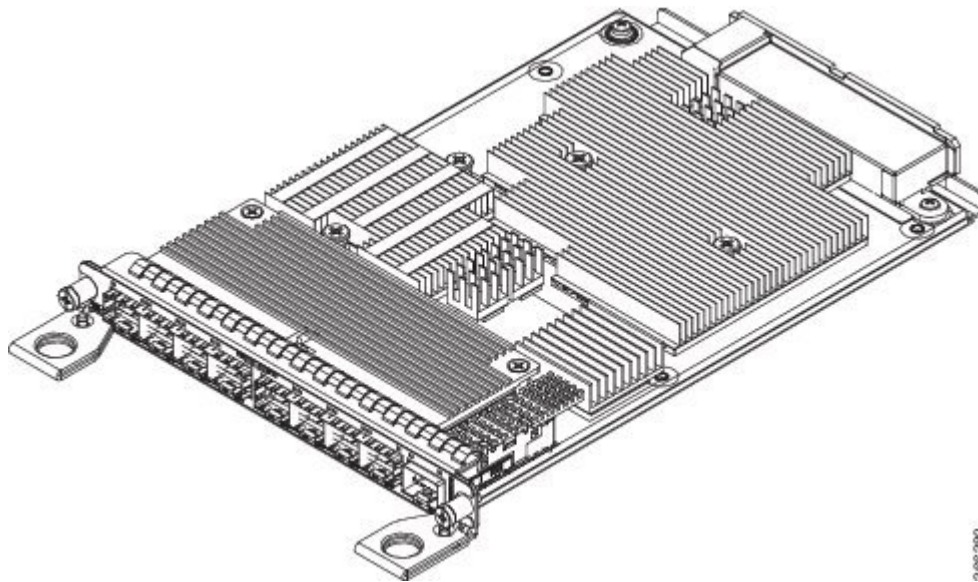
For more information about installing the OC-192 interface module, see the Interface Module Installation section.

For more information about port configuration, see Cisco NCS 4200 Series Software Configuration Guide .

NCS 4200 1-Port OC-192 or 8-Port Low Rate CEM 20G Bandwidth Interface Module (NCS4200-1T8S-20CS)

The NCS 4200 1-Port OC-192 or 8-Port Low Rate CEM 20G Bandwidth Interface Module, iMSG is a cost-effective interface module (IM) that supports CEM and Multiservice Gateway features on the OCn interfaces.

Note   The Multiservice Gateway features are not supported on this IM on Cisco IOS XE Release 16.12.1.

Figure 10: CEM and iMSG Interface Module
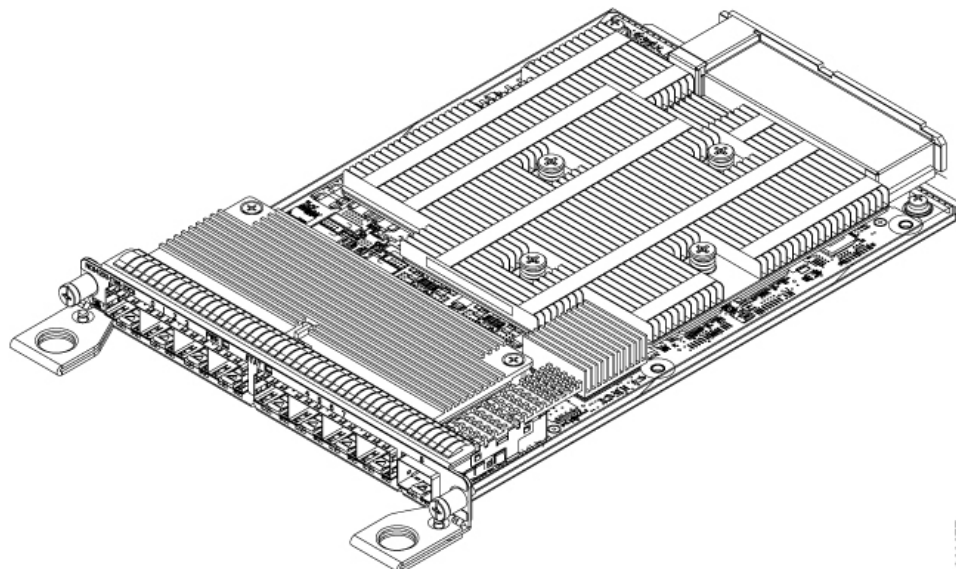
The NCS 4200 1-Port OC-192 or 8-Port Low Rate CEM 20G Bandwidth Interface Module, iMSG IM supports eight SFP optical interfaces supporting at OC-3/OC-12/OC-48/1G rates and a single SFP+ optical interface supporting at OC-192/10G.

This IM operates in two modes:

- 20G mode; uses two XFI lanes towards the system

- 10G mode; uses single XFI lane towards the system

The benefits of this IM are:

- Improves backplane efficiency

- Increases system capacity

- Increases client flexibility

The most important feature of the NCS 4200 1x10G MR + 8x20G LR CEM, iMSG IM is it provides more flexibility from the interface, which allows you to configure any interface speed on the OCn port irrespective of the IM bandwidth. The bandwidth restriction comes into effect only when the circuit is configured.

For example, you can configure the SFP+ port as an OC-192 and the other eight optical ports as OC-48 to have the total interface speed of 30G. However, if you configure only one STS-1 HO CEP on each port that will take only 9xSTS-1, which is equivalent to 500 Mbps (9 x 52Mbps x1.06) of the backplane traffic.

Restrictions

- On the port capable of OC-192 speed, lower speed such as, OC-3, OC-12, or OC-48 are not supported.

- No license is required to enable the Ethernet, OTN and Sonet/SDH functionalities.

- The SFP port supports OC-3, OC-12, and OC-48. SFP+ port supports OC-192.

Support Information

48 X T1/E1 CEM Interface Module

The 48 X T1/E1 interface module provides connectivity for up to 48 x T1/E1 ports through 3 high-density connectors on the front panel. Each port supports 16 TX and RX ports. For information on LEDs, see the Troubleshooting section.
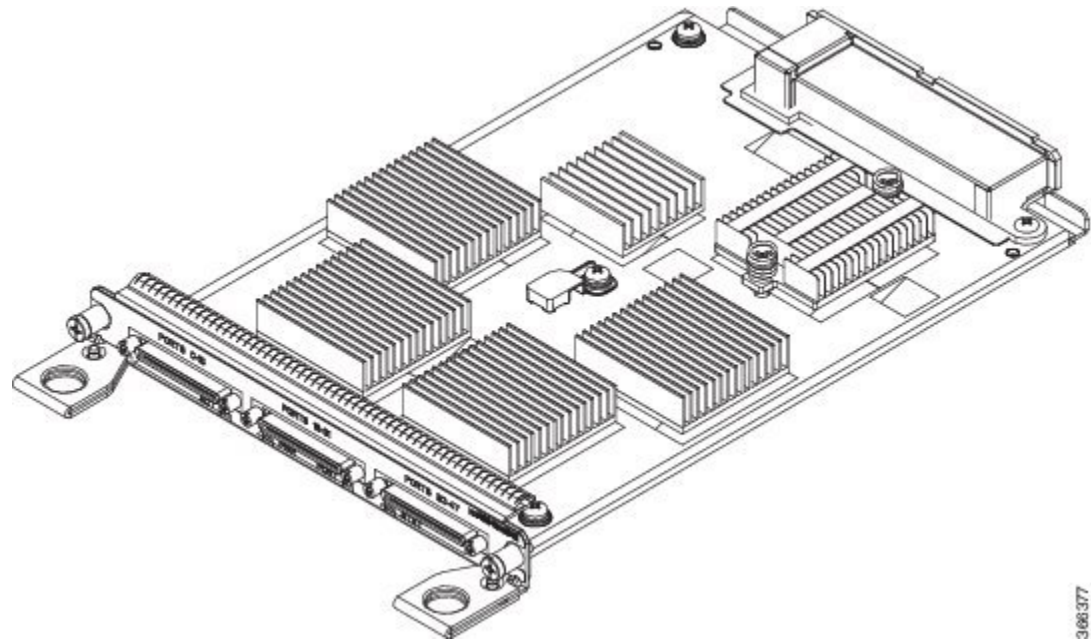
Figure 11: 48 x T1/E1 Interface Module
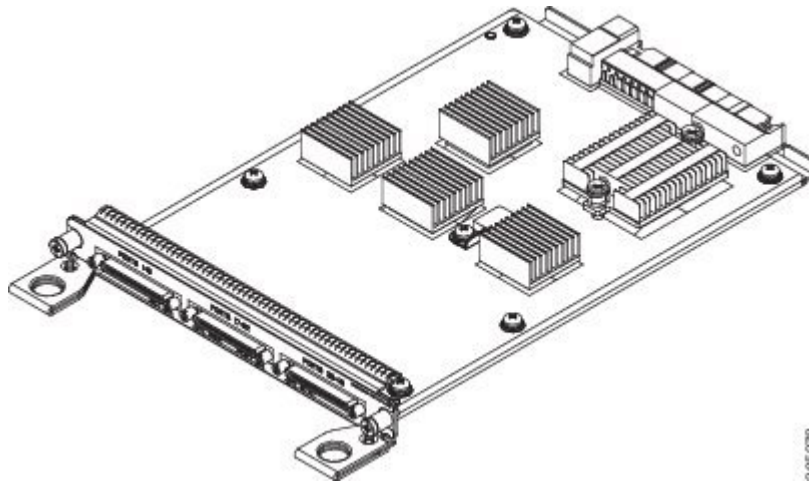
For more information about installing the 48 X T1/E1 interface module, see the Interface Module Installation section.

48 X T3/E3 CEM Interface Module

The 48 X T3/E3 interface module provides connectivity up to 48 X T3/E3 ports through 3 high-density connectors on the front panel. Each port supports 16 TX and RX ports. For information on LEDs, see the Troubleshooting section.

Note T3 DIN port supports up to 450 feet cable length with 75 ohm 734A coaxial cable.

Figure 12: 48 X T3/E3 Interface Module

For more information about installing the 48 X T3/E3 interface module, see the Interface Module Installation section.

1-Port OC48/ STM-16 or 4-port OC-12/OC-3 / STM-1/STM-4 + 12-port T1/E1 + 4-Port T3/E3 CEM Interface Module

The NCS4200-3GMS interface module supports:

- 12xDS1/E1 + 4xDS3/E3/STS-1e interface over the high-density port.

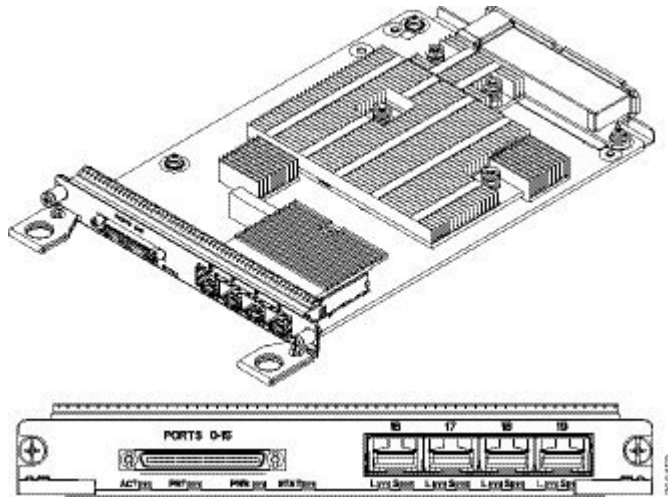- 1xOC48/12/3 or 1GE interface and 3xOC12/3 or 1GE interface.

✎

Note   If OC48 is enabled, then the remaining 3 ports are disabled.

Figure 13: NCS4200-3GMS Gigabit Ethernet Interface Module

For more information on the supported SFP modules, see the Cisco NCS 4200 Series Network Convergence System Interface Modules Data Sheet.

Temperature Sensor

The Cisco NCS 4216 14RU has a temperature sensor to detect ambient overtemperature conditions inside the chassis. The operating temperature range is between -5º C to 55º C. Temperatures outside this range are reported to the processor as an interrupt, and the software takes action to generate the appropriate alarms.

Patch Panels

The Cisco router has patch panels modules that provide interconnections with the interface modules.

The following table shows different types of patch panel:

Table 4: T1/E1 Patch Panel

Patch Panel	Description
PANEL-48-1-DIN	48X75 ohm E1/DS1 termination, through DIN 1.0/2.3 connectors
PANEL-48-1-RJ48	48X120 ohm E1/110 ohm DS1 termination, through RJ 48C connector
PANEL-48-1-AMP64	48X120 ohm E1/110 ohm DS1 termination, through 4xAMP 64-pin
PANEL-144-1-AMP64	144X120 ohm E1/110 ohm DS1 termination, through 12XAMP64-pin

Table 5: T3/E3 Patch Panel

Patch Panel	Description
PANEL-48-3-DIN	48X75 ohm E3/DS3 termination, through DIN 1.0/2.3 connectors

Patch Panel	Description
PANEL-48-3-HDBNC	48X75 ohm E3/DS3 termination, through HDBNC connectors

The 48 X T1/E1 TDM interface module and 48 X T3/E3 TDM interface module supports a maximum of 48 TDM ports. These ports are available on the interface modules through three Very-High-Density Cable Interconnect (VHDCI) 16-port connectors. The patch panels listed above make these 48 ports available to the customer via different port densities (48- or 144-port patch panels) with standard Telco connectors (DIN, RJ48, and AMP64 for T1/E1 and DIN, HDBNC for T3/E3).

Figure 14: VHDCI 16-port Connectors Interface View
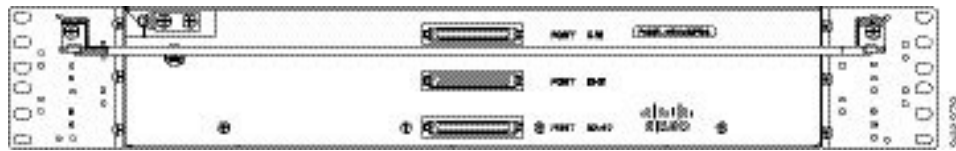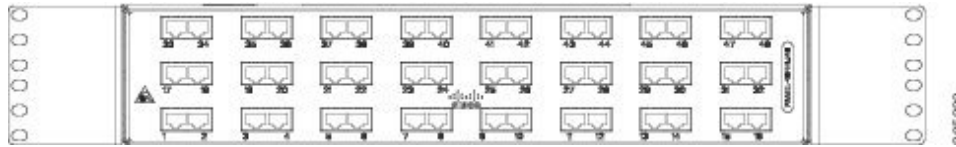
Figure 15: PANEL-48-1-RJ48 Interface View

Figure 16: PANEL-48-1-AMP64 Interface View

Figure 17: PANEL-48-1-DIN or PANEL-48-3-DIN Interface View
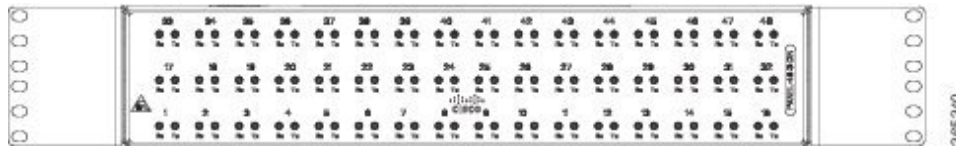
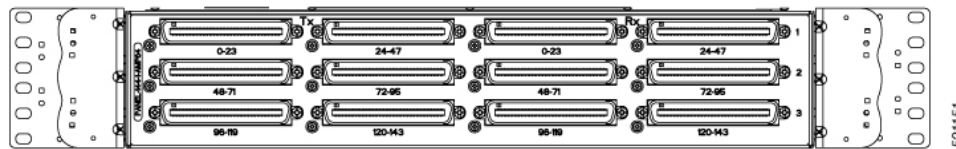**Figure 18: PANEL-144-1-AMP64 Interface View**

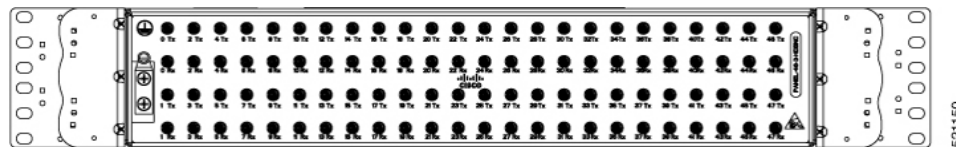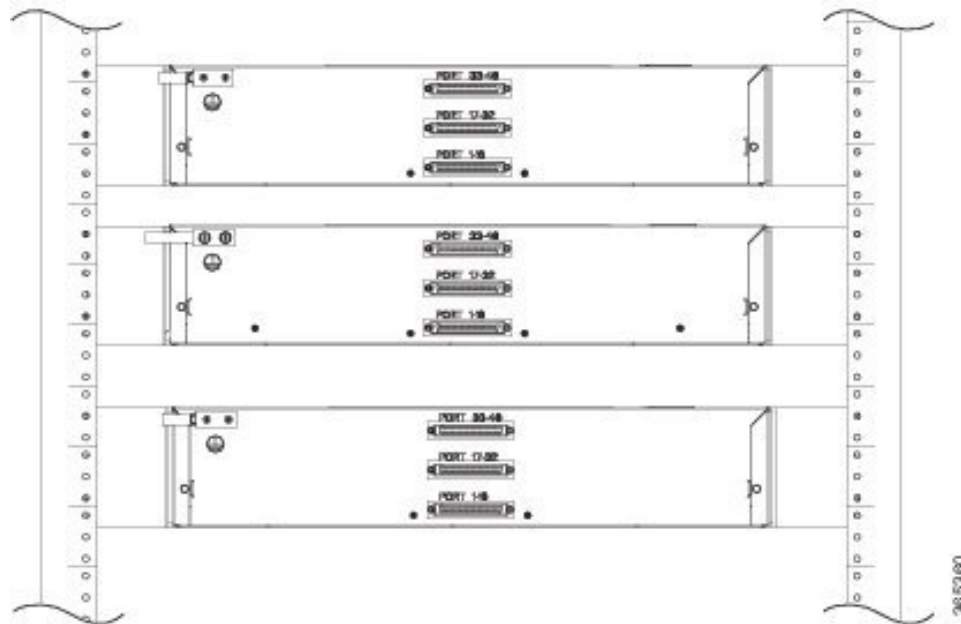**Figure 19: PANEL-48-3-HDBNC InterfaceView**

Figure 20: Patch Panel System Interface View

Interface Numbering

Following is an explanation of the slot or port numbering:

- The numbering format is **Interface type slot or interface number**. Interface (port) numbers begin at logical 0 for each interface type.
- Interface module slots are numbered from bottom to top, with logical interfaces on each module numbered from left to right. Interfaces are hard-wired. Therefore, port 0 is always logical interface 0/0, port 1 is always logical interface 0/1, and so on.

The following commands display the active RP slot number. The interface module is referenced as 1/x instead of 0/x:

- **show diag all eeprom detail**
- **show platform software trace message iomd**
- **show platform software agent iomd**
- **show platform software peer shell-manager brief**
- **show platform software peer chassis-manager**
- **show platform software memory iomd**
- **set platform software trace iomd**

Regulatory Compliance

For regulatory compliance and safety information, see the Regulatory Compliance and Safety Information for the Cisco NCS 4200 Series Aggregation Routers document.