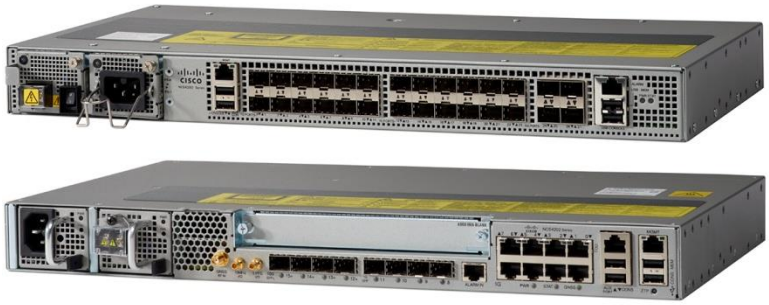
Cisco Network Convergence System 4201/4202 Series

Designed for circuit-switched network migration and business applications, the Cisco® NCS 4201 and NCS4202 Series deliver best-in-class Circuit Emulation (CEM) and Carrier Ethernet capabilities.

Legacy copper access networks, based on Plesiochronous Digital Hierarchy (PDH), and optical metro networks, based on Synchronous Optical Network (SONET) or Synchronous Digital Hierarchy (SDH) technologies, set the standards for reliability, capacity, and efficiency, transporting Time-Division Multiplexing (TDM) traffic and carrying voice and data services. Service providers and carriers are nonetheless faced with many challenges and limitations imposed by these legacy networks and need alternatives for migrating their circuit-switched transport networks to future-proof packet-based networks.

The Cisco NCS 4201 and NCS 4202 Series Network Convergence Systems (Figure 1) are full-featured, compact 1RU high converged access platforms designed for the cost-effective delivery of TDM to IP/MPLS migration services. These temperature-hardened, high-throughput, small-form-factor, low-power-consumption systems are optimized for circuit emulation and business applications. NCS 4201 and NCS 4202 systems allow service providers to deliver dense scale in a compact form factor and unmatched CEM and Carrier Ethernet capabilities. They also provide a comprehensive and scalable feature set, supporting both Layer 2 VPN (L2VPN) and Layer 3 VPN (L3VPN) services in a compact package.

Figure 1. NCS 4201 and NCS 4202 Systems



Feature	Benefit
Support for TDM and SONET/SDH migration to modernized packet-based optical metro network	Provides cost-effective delivery of CEM and Carrier Ethernet capabilities over a redundant and protected packet-based network (MPLS/FlexLSP).
Metro Carrier Ethernet aggregation	Enables the service flexibility and delivery of Layer 2, Layer 3, IP, and MPLS transport for advanced L2VPN, L3VPN, and multicast services.
Industry-leading, carrier-class CEM technology	Delivers any-to-any connectivity through a packet-based network (MPLS/Flex LSP) using TDM, PDH, SONET/SDH, and Carrier Ethernet (FE, GE, and 10GE) interfaces.

Feature	Benefit
Next-generation access network with fully distributed and unique packet capabilities	Supports state-of-the-art Pseudowire Emulation Edge-to-Edge (PWE3), Hierarchical Quality of Service (H-QoS), and next generation IP/MPLS. Cisco's MPLS FlexLSP guarantees resiliency (sub-50-ms switchover time), fault propagation, connectivity verification, statistical multiplexing and scalability, with RSVP-TE extensions as the control plane for bidirectional tunnel (LSP) setup and programmability for SDN functionality support.
Operation efficiency with end-to-end network management	Supported by the Evolved Programmable Network Manager (EPN-M), which enables business agility and operational efficiencies through automated device operations, fast provisioning, and proactive assurance.
Flexible and compact platform	Designed with a compact 1RU form factor, the Cisco NCS 4201 and NCS4202 can be deployed in space-constrained locations such as ETSI 300-mm deep cabinets, and the extended temperature range feature supports deployment in locations with minimum environmental control. Ethernet interfaces are available in copper and fiber, with speeds ranging from 10 Mbps to 10 Gbps. Legacy interfaces are available in speeds ranging from nxDS1/E1 and nxDS3/E3, for PDH, to OC-3/STM-1 and OC-12/STM-4 SONET/SDH.

Industry-Leading, Carrier-Class CEM Technology

Although the legacy TDM infrastructure is aging, expensive to operate, and an inefficient platform for data transport, service providers and carriers are still required to maintain their TDM connectivity. End customers are sometimes reluctant to move to native Ethernet/IP/MPLS handoffs and might switch to a different service provider if forced to transition early.

The NCS 4201 and NCS4202 Series products provide a purpose-built solution that enables service providers to meet their legacy TDM requirements. With a wide variety of TDM, PDH, SONET/SDH, and Carrier Ethernet (FE, GE, and 10GE) interfaces in a very compact 1RU form factor, the NCS 4201 and NCS 4202 Series deliver any-to-any connectivity through a packet-based network (MPLS/Flex LSP), more efficiently than any other packet transport mechanism, and are not bounded by TDM transport inefficiencies. The NCS 4200 Series features include:

- Cisco's industry-leading circuit emulation technology, which provides entry-level dense TDM circuit emulation over a protected Flex LSP core in a compact form factor
- A complete central office modernization option for legacy TDM DCS migration and SONET/SDH ADM ring overlay/migration, as well as facilitating the transition to packet-based networks over time
- A compact design that requires a much smaller central office footprint (some configurations provide more than two times the capacity of multiple DCS/ADM equipment) with significant power and cooling savings compared to legacy products

Fully Distributed and Unique Packet Capabilities for Converged Access Networks

Migrating circuit-switched TDM, PDH, and SONET/SDH networks to Ethernet/IP/MPLS-capable switches and routers can be challenging, particularly when service providers need to replicate the functionalities and provisioning capabilities of the legacy infrastructure. Solutions such as pure OTN-capable switching products can address the bandwidth constraints of legacy optical transport networks, but they are based solely on Layer 2, VLANs, and G.8031/8032 protocols, which do not scale properly for a modernized packet-based metro network.

The NCS 4201 and NCS 4202 Series products enable service providers to easily transition to an MPLS next-generation metro network. To support the technological requirements of a next-generation architecture, the NCS 4200 Series products feature:

- State-of-the-art pseudowire emulation edge-to-edge (PWE3) and Hierarchical Quality of Service (H-QoS). The NCS 4201 and NCS4202 provide advanced per-traffic-class metering and offer bidirectional packet-count and byte-count statistics. The service offering is enhanced with Operations, Administration, and Maintenance (OAM) functions that include Layer 2 Connectivity Fault Management (CFM), IP Service-Level Agreements (SLAs) for Layer 3, and MPLS OAM.
- Synchronous Ethernet (SyncE) and IEEE-1588 timing services required in today's converged access networks. The NCS 4202 model provides a built-in GNSS receiver, which can act as a grandmaster clock for aggregating and backhauling TDM traffic.
- The NCS 4202 model also supports Cisco Universal Power over Ethernet (Cisco UPOE®), which can be used to power small equipment. The router can be deployed in small, completely sealed cabinets in outside environments, because of its small form factor and its durability in extended temperature ranges.
- The NCS4202 model supports security services such as IP Security (IPSec), Network Address Translation (NAT), and Port Address Translation (PAT) to help protect against vulnerabilities to customer traffic and the network.
- IP/MPLS features capable of delivering the required functionalities for a next-generation copper and optical access network, including MPLS FlexLSP; a predictable, deterministic, transport-centric evolution of MPLS-TP, which guarantees resiliency (sub-50-ms switchover time); fault propagation; connectivity verification; statistical multiplexing and scalability, with RSVP-TE extensions as the control plane for bidirectional tunnel (LSP) setup; and programmability for SDN functionality support.

Operational Efficiency and Flexible Deployment Options

Service providers and carriers require capabilities that help them simplify and automate the management of their networks, promoting efficiency gains in the deployment and operation of the networks. They also need to be aware of the tremendous costs associated with housing and operating their infrastructure.

The NCS 4201 and NCS4202 products enable service providers to operate more efficiently, not only in the services they deliver, but also in the management of their infrastructure. Designed with a very compact form factor (1RU high) to accommodate deployment in small spaces and available with a range of mounting options, the system can be deployed in space-constrained locations such as ETSI 300-mm deep cabinets, and the extended temperature range supported by the device allow it to be deployed in locations with minimum environmental control. Small footprint and extended temperature range support allow service providers to extend the reach of their access networks to more challenging and remote locations. The interface modules, AC and/or DC redundant power supplies, and fan tray are all field-replaceable, providing high-availability capability to service providers.

In addition, the NCS 4201 and NCS4202 Series are supported by the EPN-M application, which provides simplified, converged, end-to-end lifecycle management across an optical and Carrier Ethernet infrastructure. EPN Manager is designed with SDN, NFV, and multilayer management in mind. Based on model-driven extensible architecture, EPN Manager allows service providers to:

- Increase their agility and operational efficiencies through automated device operations, fast provisioning, and proactive assurance

- Quickly respond to major market transitions, including traffic proliferation, new business models prompted by Over-The-Top (OTT) entrants, and packet optical network convergence and migration

Tables 1 through 3 list the product, power, and environmental specifications for the Cisco NCS 4201 and NCS 4202 Series systems. Table 4 provides safety and compliance information.

Table 1. Cisco NCS 4201 and NCS 4202 Series System Specifications

	Cisco NCS4201-SA	Cisco NCS4202-SA
Physical specifications [1)] (H x W x D)	1.72 x 17.5 x 10 in. (43.7 x 444.5 x 255 mm), 1RU	1.73 x 17.5 x 11.28 in. (44 x 444.5 x 286.54 mm), 1RU
Weight	8.5 lb (3.9kg) - empty chassis	9.25 lb (4.2 kg) - empty chassis
Rack mounts	ETSI rack-mount kit 19-in. rack-mount kit 23-in. rack-mount kit	ETSI rack-mount kit 19-in. rack-mount kit 23-in. rack-mount kit
Air flow	Front-to-back	Front-to-back
Power supplies	2 power supplies (AC or DC)	2 power supplies (AC or DC)
Mean Time Between Failures (MTBF) (hours)	NCS4201-SA: 546,260 ASR-920-FAN-F: 2,581,770 ASR-920-PWR-A: 1,598,000 ASR-920-PWR-D: 1,129,417	NCS4202-SA: 407,230 ASR-920-FAN-TRAY: 2,811,680 A920-PWR400-A: 356,809 A920-PWR400-D: 331,879

[1)] Measured from the front of the chassis (excluding handles from the power supply, door, fan tray, and interface modules installed in the chassis).

Table 2. Power Specifications

Description	Cisco NCS4201-SA	Cisco NCS4202-SA
Power consumption	Max 145W, Typical: 110W	Max 150W, Typical: 130W (without PoE)
AC input voltage and frequency	Voltage range: 85V AC to 264V AC, nominal 100V AC to 240V AC Frequency Range: 47 to 63 Hz, nominal 50 to 60 Hz	Voltage range: 85V AC to 264V AC, nominal 100V AC to 240V AC Frequency Range: 47 to 63 Hz, nominal 50 to 60 Hz
DC input voltage	Voltage range: -18 to -32 VDC or -36 to -72 VDC Nominal: -24 VDC/-48 VDC	Voltage range: -18 VDC to -32 VDC or -40 VDC to -72 VDC Nominal -24VDC/-48VDC/-60VDC

Table 3. Environmental Specifications

Description	Cisco NCS 4201 and NCS4202 Series System
Operating environment and altitude [1)]	-40 to 70ºC, up to 1,000 feet (300m) -40 to 65ºC, up to 6,000 feet (1800m) -40 to 55ºC, up to 13,000 feet (4000m)
Relative humidity	5 to 95 percent, noncondensing
Acoustic noise [2)]	Acoustic noise peak operation maximum 55 dBA (59 dBA for NCS4202-SA) sound pressure level, bystander position for rack-mount products at 20ºC operation as measured by ISO 7779 NAIS noise measurement test standard. Acoustic noise peak operation compliant to the Network Equipment Building Standards (NEBS) GR-63-Core Issue 3 sound power level of 78 dB at 27ºC operation as measured by the ANSI S12.10/ISO 7779 NAIS noise measurement test standard. Actual measurement is less than 63dB.
Storage environment	Temperature: -40 to 70ºC altitude: 15,000 feet (4570m)
Seismic	Zone 4

[1)] Optics used might limit the temperature range.

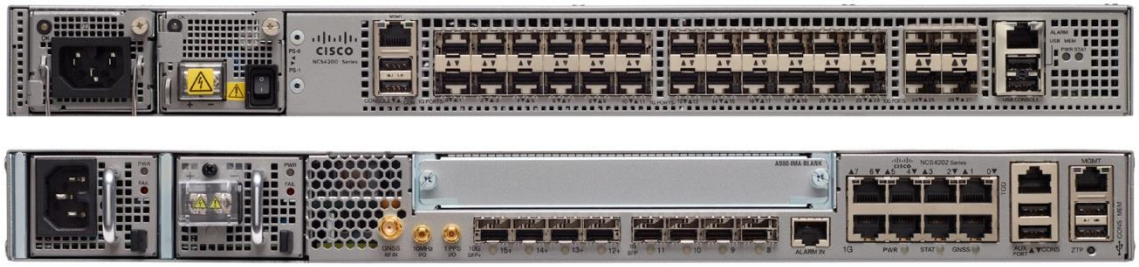
[2)] The numbers in Table 3 are for normal (nonfailure) operation. When operating with a fan failure, these numbers might be exceeded.

Table 4. Safety and Compliance

Type	Standards
Safety	• UL 60950-1, 2nd edition • CAN/CSA C22.2 No. 60950-1-07 2nd edition • IEC 60950-1, 2nd edition • EN 60950-1, 2nd edition • AS/NZS 60950.1:2003
Electromagnetic	• FCC CFR47 Part 15 Class A
Emissions compliance	• EN55022, class A • CISPR22, class A • ICES-003, class A • EN 300 386, class A • VCCI, class A • KN32, class A • EN61000-3-2 to EN61000-3-3
Immunity compliance	• EN 300 386 • EN 61000-6-1 • EN 50082-1 • CISPR24 • EN 55024 • KN 35 • EN/KN 61000-4-2 to EN/KN 61000-4-6 • EN/KN 61000-4-8 • EN/KN 61000-4-11
NEBS	• GR-63-CORE Issue 4 • GR-1089-CORE Issue 6 • SR-3580 NEBS Issue 4
ETSI	• ETS/EN 300 119 Part 4 • ETS/EN 300 019 - Storage: Class 1.2, Transportation: Class 2.3, In-Use/Operational: Class 3.2 (NCS4201 only) • ETS/EN 300 753
Network synchronization	• ANSI T1.101 • GR-1244-CORE • GR-253-CORE • ITU-T G.703 clause 5 • ITU-T G.703 clause 9 • ITU-T G.781 • ITU-T G.813 • ITU-T G.823 • ITU-T G.824 • ITU-T G.8261/Y.1361 • ITU-T G.8262 • ITU-T G.8264 • IEEE1588-2008

Table 5 lists the primary system components for the Cisco NCS 4201 and NCS 4202 Series systems.

Figure 2. Ordering Information (NCS 4201 and NCS 4202)



Part Number	Description
NCS 4201 System Components	
NCS4201-SA	NCS 4201 Shelf Assembly - 4x10GE + 24x GE/FE (1 RU)
NCS4200-1RU-DOOR	NCS 4200 1 RU Door and Ancillary
ASR-920-PWR-A	ASR 920 AC Power Supply
ASR-920-PWR-D	ASR 920 DC Power Supply
SNCS4201NK9318SP	Cisco NCS 4201 IOS XE 3.18SP UNIVERSAL
SNCS4201NK9165	Cisco NCS 4201 IOS XE 16.5.1 UNIVERSAL
ASR-920-FAN-F	ASR 920 Fan for Fixed Chassis
A920-RCKMT-19	EIA 19in Rack mount Option for the Cisco ASR 920
A920-RCKMT-ETSI	ETSI Rack mount Option for the Cisco ASR 920
A920-RCKMT-23	EIA 23in Rack mount Option for the Cisco ASR 920
NCS 4202 System Components	
NCS4202-SA	NCS 4202 Shelf Assembly - 4x10GE + 12x GE/FE + 1 IM slot (1 RU)
NCS4200-1RU-DOOR	NCS 4200 1 RU Door and Ancillary
A920-PWR400-A	Cisco ASR 920 400W AC PSU
A920-PWR400-D	Cisco ASR 920 400W DC PSU
SNCS4202NK9318SP	Cisco NCS 4202 IOS XE 3.18SP UNIVERSAL
SNCS4202NK9165	Cisco NCS 4202 IOS XE 16.5.1 UNIVERSAL
ASR-920-FAN-TRAY	Cisco ASR 920 Fan Tray
A920-RCKMT-19	EIA 19in Rack mount Option for the Cisco ASR 920
A920-RCKMT-ETSI	ETSI Rack mount Option for the Cisco ASR 920
A920-RCKMT-23	EIA 23in Rack mount Option for the Cisco ASR 920

Interface Modules

Interface modules supported on the NCS 4202 systems are listed in Table 5.

Table 5. Interface Modules Supported on Cisco NCS 4202 Systems

Part Number	Description	Supported as of Cisco IOS XE Release
NCS4200-8E1T1-CE	NCS 4200 8x T1/E1 CEM Line Card - RJ48C	3.18.0SP
NCS4200-1T8LR-PS	NCS 4200 1x 10GE + 8x GE/FE Line Card	3.18.0SP
NCS4200-3GMS	NCS 4200 12x T1/E1, 4x T3/E3, 4x OC3/12 / STM-1/4 Line Card	16.7.1

Cisco NCS 4202 Series 8-Port T1/E1 Module

This interface module delivers 8 ports of T1 or E1 connectivity on NCS 4202 systems. The module can be software-configured as either T1 mode or E1 mode per interface module. This interface module provides physical connectivity using 8 onboard individual physical RJ-48C port connectors. When using this interface module with the NCS 4202 model, ports 20-23 of the chassis are not usable.

The module is software-configurable for 8 T1 or 8 E1 ports with CEM. Mixing T1 and E1 ports on the same interface module is not supported. The module can be clocked from a line or from an internal clock source. The protocols supported on the module are software-configurable per interface, allowing for flexible deployment and efficient use of the hardware.

Cisco NCS 4200 Series 8-Port 1GE SFP and 1-Port 10GE SFP+ Module

This interface module delivers eight ports of Gigabit Ethernet and Fast Ethernet and one port of 10 Gigabit Ethernet interface on Cisco NCS 4200 Series systems. The interface speed of the SFP interfaces can be selected per interface, depending on the optic used. For the 10 Gigabit Ethernet SFP+ port, the speed is not configurable. This module provides physical connectivity using eight SFP transceivers and one SPF+ transceiver.

Table 6 lists the pluggable optics supported in the Cisco NCS 4200 Series 8-Port 1GE SFP and 1-Port 10GE SFP+ Module, on the Cisco IOS Software releases for the NCS 4200 Series system.

Table 6. Ethernet Optics Supported in 8-Port 1GE SFP and 1-Port 10GE SFP+ Module

Optic Product Number	Supported as of Cisco IOS Software Release	Description
GLC-FE-100FX	3.18.0SP	100BASE-FX SFP for Fast Ethernet SFP Ports, 1310 nm wavelength, 2 km over MMF
GLC-FE-100LX	3.18.0SP	100BASE-LX SFP for Fast Ethernet SFP Ports, 1310 nm wavelength, 10 km over SMF
GLC-FE-100EX	3.18.0SP	100BASE-EX SFP for Fast Ethernet SFP Ports, 1310 nm wavelength, 40 km over SMF
GLC-FE-100ZX	3.18.0SP	100BASE-ZX SFP for Fast Ethernet SFP Ports, 1550 nm wavelength, 80 km over SMF
GLC-FE-100FX-RGD	3.18.0SP	100BASE-FX SFP module for Industrial Ethernet 100-MB ports, 1310 nm wavelength, 2 km over MMF
GLC-FE-100LX-RGD	3.18.0SP	100BASE-LX SFP module for Industrial Ethernet 100-MB ports, 1310 nm wavelength, 10 km over SMF
GLC-FE-100BX-U	3.18.0SP	100BASE-BX10-U SFP for Fast Ethernet SFP Ports. Single-strand SMF up to 10 km, transmits on a 1310-nm channel and receives on a 1550-nm signal
GLC-FE-100BX-D	3.18.0SP	100BASE-BX10-D SFP for Fast Ethernet SFP Ports. Single-strand SMF up to 10 km, transmits on a 1550-nm channel and receives on a 1310-nm signal
GLC-SX-MMD	3.18.0SP	1000BASE-SX SFP transceiver module for MMF, 850-nm wavelength, extended operating temperature range and DOM support, dual LC/PC connector
GLC-LH-SMD	3.18.0SP	1000BASE-LX/LH SFP transceiver module for MMF and SMF, 1300-nm wavelength, extended operating temperature range and DOM support, dual LC/PC connector
GLC-EX-SMD	3.18.0SP	1000BASE-EX SFP transceiver module for SMF, 1310-nm wavelength, extended operating temperature range and Digital Optical Monitoring (DOM) support, dual LC/PC connector
GLC-ZX-SMD	3.18.0SP	1000BASE-ZX SFP transceiver module for SMF, 1550-nm wavelength, extended operating temperature range and Digital Optical Monitoring (DOM) support, dual LC/PC connector
GLC-SX-MM-RGD	3.18.0SP	1000BASE-SX SFP transceiver module for MMF, 850-nm wavelength, industrial Ethernet, dual LC/PC connector
GLC-LX-SM-RGD	3.18.0SP	1000BASE-LX/LH SFP transceiver module for MMF and SMF, 1300-nm wavelength, industrial Ethernet, dual LC/PC connector
GLC-ZX-SM-RGD	3.18.0SP	1000BASE-ZX SFP transceiver module for SMF, 1550-nm wavelength, industrial Ethernet, dual LC/PC connector

Optic Product Number	Supported as of Cisco IOS Software Release	Description
GLC-TE	16.5.1	1000BASE-T SFP transceiver module for Category 5 copper wire, extended operating temperature range, RJ-45 connector
SFP-GE-T	3.18.0SP	1000BASE-T SFP transceiver module for Category 5 copper wire, extended operating temperature range, RJ-45 connector
SFP-GE-S	3.18.0SP	1000BASE-SX SFP transceiver module for MMF, 850-nm wavelength
SFP-GE-L	3.18.0SP	1000BASE-LX/LH SFP transceiver module for MMF and SMF, 1310-nm wavelength
SFP-GE-Z	3.18.0SP	1000BASE-ZX SFP transceiver module for SMF, 1550-nm wavelength
GLC-BX-D	3.18.0SP	1000BASE-BX10 SFP module for single-strand SMF, 1490-nm TX/1310-nm RX wavelength, single LC/PC connector
GLC-BX-U	3.18.0SP	1000BASE-BX10 SFP module for single-strand SMF, 1310-nm TX/1490-nm RX wavelength, single LC/PC connector
GLC-BX40-U-I	3.18.0SP	1000BASE-BX10 SFP module for single-strand SMF, 1310-nm TX/1490-nm RX wavelength, 40 km reach, single LC/PC connector
GLC-BX40-D-I	3.18.0SP	1000BASE-BX10 SFP module for single-strand SMF, 1550-nm TX/1310-nm RX wavelength, 40 km reach, single LC/PC connector
GLC-BX40-DA-I	3.18.0SP	1000BASE-BX10 SFP module for single-strand SMF, 1490-nm TX/1310-nm RX wavelength, 40 km reach, single LC/PC connector
GLC-BX80-U-I	3.18.0SP	1000BASE-BX10 SFP module for single-strand SMF, 1490-nm TX/1490-nm RX wavelength, 80 km reach, single LC/PC connector
GLC-BX80-D-I	3.18.0SP	1000BASE-BX10 SFP module for single-strand SMF, 1570-nm TX/1310-nm RX wavelength, 80 km reach, single LC/PC connector
GLC-GE-DR-LX	16.5.1	Dual Rate 100BASE-LX / 1000BASE-LX/LH SFP transceiver module for MMF and SMF, 1300-nm wavelength, extended operating temperature range and DOM support, dual LC/PC connector
ONS-SC-GE-LX	16.5.1	1000BASE-LX Gigabit Ethernet transceiver module for SMF, 1310 nm wavelength, commercial operating temperature range and DOM support, dual LC/PC connector
ONS-SI-GE-LX	3.18.0SP	1000BASE-LX Gigabit Ethernet transceiver module for SMF, 1310 nm wavelength, extended operating temperature range and DOM support, dual LC/PC connector
ONS-SC-GE-BXD	16.5.1	1000BASE-BX10 SFP module for single-strand SMF, 1490-nm TX/1310-nm RX wavelength, single LC/PC connector
ONS-SC-GE-BXU	16.5.1	1000BASE-BX10 SFP module for single-strand SMF, 1310-nm TX/1490-nm RX wavelength, single LC/PC connector
ONS-SE-ZE-EL	3.18.0SP	10/100/1000BASE-T SFP transceiver module for Category 5 copper wire, extended operating temperature range, RJ-45 connector
ONS-SE-Z1	16.5.1	1000BASE-LX Gigabit Ethernet / OC-48/STM-16 IR / OC-12/-2 / STM-1/-4 SR transceiver module, 1310 nm, SFP, extended temperature range
DWDM-SFP-xxxx (36 wavelengths)	3.18.0SP	Cisco 1000BASE-DWDM Gigabit Ethernet SFP, with 36 different wavelengths ranging from 1561.42 nm to 1530.33nm or ITU channel 20 to 59
DWDM-SFP10G-C	3.18.0SP	Cisco 10G BASE-DWDM tunable SFP+ with 96 DWDM ITU-50GHz channels to which the device can be tuned, ranging from 1528-nm to 1566-nm
CWDM-SFP-xxxx (8 wavelengths)	3.18.0SP	Cisco CWDM Gigabit Ethernet SFP, with eight different wavelengths ranging from 1470 nm to 1610 nm
SFP-10G-SR-S	3.18.0SP	Cisco 10GBASE-SR Ethernet SFP+ transceiver module for MMF, 850 nm, S-class
SFP-10G-LR-S	3.18.0SP	Cisco 10GBASE-LR Ethernet SFP+ transceiver module for SMF, 1310 nm, S-class
SFP-10G-ER-S	3.18.0SP	Cisco 10GBASE-ER Ethernet SFP+ transceiver module for SMF, 1550 nm, S-class
SFP-10G-ZR-S	3.18.0SP	Cisco 10GBASE-ZR Ethernet SFP+ transceiver module for SMF, 1550 nm, S-class
SFP-10G-SR	3.18.0SP	Cisco 10GBASE-SR Ethernet SFP+ transceiver module for MMF, 850 nm
SFP-10G-LR	3.18.0SP	Cisco 10GBASE-LR Ethernet SFP+ transceiver module for SMF, 1310 nm
SFP-10G-ER	3.18.0SP	Cisco 10GBASE-ER Ethernet SFP+ transceiver module for SMF and MMF, 1550 nm
SFP-10G-ZR	3.18.0SP	Cisco multirate 10GBASE-ZR, 10GBASE-ZW and OTU2/OTU2e SFP+ transceiver module for SMF and MMF, 1550 nm
SFP-10G-SR-X	3.18.0SP	Cisco 10GBASE-SR Ethernet SFP+ transceiver module for MMF, 850 nm, extended temperature range

Optic Product Number	Supported as of Cisco IOS Software Release	Description
SFP-10G-LR-X	3.18.0SP	Cisco 10GBASE-LR Ethernet SFP+ transceiver module for SMF, 1310 nm, extended temperature range
ONS-SC+-10G-SR	3.18.0SP	Cisco 10GBASE-SR Ethernet SFP+ transceiver module for MMF, 850 nm, commercial temperature range
ONS-SC+-10G-LR	3.18.0SP	Cisco 10GBASE-LR Ethernet SFP+ transceiver module for SMF, 1310 nm, commercial temperature range
ONS-SC+-10G-ER	3.18.0SP	Cisco 10GBASE-ER Ethernet SFP+ transceiver module for SMF, 1550 nm, commercial temperature range
ONS-SC+-10G-ZR	3.18.0SP	Cisco 10GBASE-ZR Ethernet SFP+ transceiver module for SMF, 1550 nm, commercial temperature range
DWDM-SFP10G-xx.xx	3.18.0SP	Cisco multirate (LAN/WAN/OTU2/OTU2E) 10GBASE-DWDM single wavelength SFP+ module (100-GHz ITU grid) – 40 individual wavelength pluggable modules
ONS-SC+-10G-xx.x	3.18.0SP	Cisco multirate 10G BASE DWDM SFP+ with different wavelengths ranging from 1530-nm to 1561-nm, 100 GHz, LC
ONS-SC+-10GEPxx.x	3.18.0SP	Cisco multirate 10G BASE DWDM Edge Performance SFP+ with different wavelengths ranging from 1530-nm to 1561-nm, 100 GHz, LC
SFP-10G-BXD-I	3.18.0SP	10GBASE-BX single-strand SMF bidirectional SFP+ module, 1320-nm to 1340-nm TX/1260-nm to 1280-nm RX wavelength, single LC/PC connector, 10 km reach
SFP-10G-BXU-I	3.18.0SP	10GBASE-BX single-strand SMF bidirectional SFP+ module, 1260-nm to 1280-nm TX/1320-nm to 1340-nm RX wavelength, single LC/PC connector, 10 km reach
SFP-10G-BX40D-I	3.18.0SP	10GBASE-BX single-strand SMF bidirectional SFP+ module, 1320-nm to 1340-nm TX/1260-nm to 1280-nm RX wavelength, single LC/PC connector, 40 km reach
SFP-10G-BX40U-I	3.18.0SP	10GBASE-BX single-strand SMF bidirectional SFP+ module, 1260-nm to 1280-nm TX/1320-nm to 1340-nm RX wavelength, single LC/PC connector, 40 km reach

Cisco NCS 4200 Series 12-Port T1/E1 + 4-port T3/E3 + 4-port OC3/STM-1 or 4-port OC12/STM-4 or 1-Port OC48/STM-16 Module

This interface module delivers up to 12 active ports of T1/E1 plus up to 4 active ports of T3/E3 connectivity, plus 4 active ports of OC3/STM-1, or 4 active ports of OC12/STM-1, or 1 active port of OC48/STM-16 connectivity on NCS 4200 Series Router.

This Interface Module supports:

- Clear Channel (SAToP) and Channelized T1/E1 (CESoP – Future software release)
- Channelized OC-3/STM-1 to clear channel T1/E1 (SAToP), clear channel DS3/E3 (SAToP) and Channelized T1/E1 (CESoP – Future software release)
- Channelized OC-12/STM-4 to clear channel T1/E1 (SAToP)
- Clear channel OC-3/STM-1 (CEP)
- Clear Channel OC12/STM-4 (CEP)
- Clear Channel OC48/STM-16 (CEP)

This module delivers a true multiservice and multi-rate capability in a small form factor in combination with an incremental pricing model. The interface module can be software configured as either Synchronous Optical Networking (SONET) mode or Synchronous Digital Hierarchy (SDH) mode per module in the NCS 4200 Series configuration.

The interface module hardware has been designed for high availability, including Access Circuit Redundancy (ACR), 1+1 Automatic Protection Switching (APS) across two modules, and SDH Linear Multiplexer Section Protection (MSP) protocols. Support of these capabilities is software dependent and described in the Cisco IOS XE Software for Cisco NCS 4200 Series Routers data sheet.

This interface module provides physical connectivity using pluggable SFP optics. Table 7 lists the pluggable optics that are supported in the Cisco NCS 4200 Series 12-port T1/E1 + 4port DS3/E3 + 4-Port OC3/STM1 or 4-Port OC12/STM4 Module or 1-port OC48/STM-16 Interface Module on the Cisco IOS XE Software releases for NCs 4200 Series routers.

Table 7. Optics Supported in the Cisco NCS 4200 12-port T1/E1 + 4port DS3/E3 + 4-Port OC3/STM1 or 4-Port OC12/STM4 Module or 1-port OC48/STM-16 Interface Module

Optic Product ID	Supported As of Cisco IOS XE Release	Description
ONS-SI-155-SR-MM	16.7.1	OC-3/STM-1, Short Reach (SR), 1310 nm, Multimode (MM), SFP, industrial temperature range
ONS-SI-155-I1	16.7.1	OC-3/STM-1 Intermediate Reach (IR), 1310 nm, SFP, industrial temperature range
ONS-SI-155-L1	16.7.1	OC-3/STM-1 Long Reach (LR), 1310 nm, SFP, industrial temperature range
ONS-SI-155-L2	16.7.1	OC-3/STM-1 LR, 1550 nm, SFP, industrial temperature range
ONS-SC-155-EL	16.7.1	STM-1 Electrical SFP, Commercial temperature range
ONS-SI-622-SR-MM	16.7.1	OC-12/STM-4, SR, 1310 nm, MM, SFP, industrial temperature range
ONS-SI-622-I1	16.7.1	OC-12/STM-4 IR, 1310 nm, SFP, industrial temperature range
ONS-SI-622-L1	16.7.1	OC-12/STM-4 LR, 1310 nm, SFP, industrial temperature range
ONS-SI-622-L2	16.7.1	OC-12/STM-4 LR, 1550 nm, SFP, industrial temperature range
ONS-SI-2G-I1	16.7.1	OC-48/STM-16 IR, 1310 nm, SFP, industrial temperature range
ONS-SI-2G-L1	16.7.1	OC-48/STM-16 LR, 1310 nm, SFP, industrial temperature range
ONS-SI-2G-L2	16.7.1	OC-48/STM-16 LR, 1550 nm, SFP, industrial temperature range
ONS-SI-2G-S1	16.7.1	OC-48/STM-16 SR, 1310 nm, SFP, industrial temperature range

The module requires an external patch panel and a breakout cable to deliver RJ48 (T1/E1) or HDBNC (T3/E3) ports for the user application.

Table 8 lists the cables and patch panels required with the Cisco NCS 4200 12-port T1/E1 + 4port DS3/E3 + 4-Port OC3/STM1 or 4-Port OC12/STM4 Module or 1-port OC48/STM-16 Interface Module on the Cisco IOS Software releases for NCS 4200 Series systems.

Table 8. Accessories Required with the Cisco NCS 4200 12-port T1/E1 + 4port DS3/E3 + 4-Port OC3/STM1 or 4-Port OC12/STM4 Module or 1-port OC48/STM-16 Interface Module

Product ID	Supported as of Cisco IOS Software Release	Description
PANEL-3G-COMBO-1	16.7.1	Single 12 x E1 + 4 x DS3 Patch panel for 3G CEM/IMSG interface module
PANEL-3G-COMBO-2	16.7.1	Double 12 x E1 + 4 x DS3 Patch panel for 3G CEM/IMSG interface module
P3G1-RCKMNT-19IN	16.7.1	EIA 19 Inch mounting brackets for single 3G CEM/IMSG IM patch panel
P3G1-RCKMNT-ETSI	16.7.1	ETSI 21 Inch mounting brackets for single 3G CEM/IMSG IM patch panel
P3G1-RCKMNT-23IN	16.7.1	EIA 23 Inch mounting brackets for single 3G CEM/IMSG IM patch panel
P3G2-RCKMNT-19IN	16.7.1	EIA 19 Inch mounting brackets for double 3G CEM/IMSG IM patch panel
P3G2-RCKMNT-ETSI	16.7.1	ETSI 21 Inch mounting brackets for double 3G CEM/IMSG IM patch panel
P3G2-RCKMNT-23IN	16.7.1	EIA 23 Inch mounting brackets for double 3G CEM/IMSG IM patch panel
CABLE-16TDM-C	16.7.1	16 port cable for TDM CEM IM, no red, 10 Feet
CABLE-16TDM-C-L1	16.7.1	16 port cable for TDM CEM IM, no red, 56" / 4.7 ft / 1.4 m
CABLE-16TDM-C-L2	16.7.1	16 port cable for TDM CEM IM, no red, 63" / 5.3 ft / 1.6 m
CABLE-16TDM-C-L3	16.7.1	16 port cable for TDM CEM IM, no red, 85" / 7.1ft / 2.2 m
CABLE-16TDM-C-L4	16.7.1	16 port cable for TDM CEM IM, no red, 96" / 8 ft / 2.4 m

Warranty Information

Warranty information is available on Cisco.com at the Product Warranties page.

Service and Support

Cisco offers a wide range of services programs to help accelerate customer success. These innovative services programs are delivered through a unique combination of people, processes, tools, and partners, promoting high levels of customer satisfaction. Cisco Services help you protect your network investment, optimize network operations, and prepare your network for new applications to extend network intelligence and the power of your business. For more information about Cisco Services, refer to Cisco Technical Support Services or Cisco Advanced Services.

Cisco is committed to reducing your total cost of ownership. Cisco offers a portfolio of technical support services to help ensure that Cisco products operate efficiently, remain highly available, and benefit from the most up-to-date system software. The services and support programs described in Table 9 are available as part of the Cisco Carrier Ethernet Switching Service and Support solution and are available directly from Cisco and through resellers.

Table 9. Service and Support

Advanced Services	Features	Benefits
Cisco Total Implementation Solutions (TIS), available directly from Cisco **Cisco Packaged TIS, available through resellers**	• Project management • Site survey, configuration, and deployment • Installation, text, and cutover • Training • Major moves, adds, and changes • Design review and product staging	• Supplement existing staff • Help ensure functions meet needs • Mitigate risk
Cisco SP Base Support and Service Provider-Based Onsite Support, available directly from Cisco **Cisco Packaged Service Provider-Based Support, available through resellers**	• 24-hour access to software updates • Web access to technical repositories • Telephone support through the Cisco Technical Assistance Center (TAC) • Advance replacement of hardware parts	• Facilitate proactive or expedited problem resolution • Lower total cost of ownership by taking advantage of Cisco expertise and knowledge • Reduce network downtime

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Printed in USA C78-737800-02 01/18