

# Cisco NCS 4200 Series Route Switch Processor

Centralized network timing. Control plane and data plane elements. The Cisco® NCS 4200 Route Switch Processor (RSP) is the powerful centralized engine that provides these features and more for Cisco NCS 4206/4216 Series systems. The NCS 4200 RSP (Figure 1) addresses the requirements of converged service provider networks, from Carrier Ethernet technologies to advanced services such as Multiprotocol Label Switching (MPLS). The NCS 4200 RSP helps providers add innovative traffic management and intelligent circuit emulation, packet switching, and routing features. The models include the Cisco NCS 4206 Route Switch Processor and the Cisco NCS 4216 Route Switch Processor.

## Product Overview

The NCS 4200 RSP modules contain separate control plane and data plane components. These include the main control plane CPU for the Cisco IOS® Software operating system and platform control software. The data plane packet processing and traffic management are performed by the Carrier Ethernet Application-Specific Integrated Circuit (ASIC).

**Figure 1.** NCS 4206 RSP and NCS 4216 RSP



## Fully Distributed and Unique Packet/Circuit Capabilities for Converged Access Networks

The Cisco NCS 4206/4216 Route Switch Processor is compatible with the following multiple Ethernet and TDM/SONET/SDH interface modules:

- Cisco NCS 4200 Series 1-Port 100GE CPAK Module: This module supports one 100 Gigabit Ethernet port.
- Cisco NCS 4200 Series 2-Port 40GE QSFP Module: This module supports two QSFP ports.
- Cisco NCS 4200 Series 8-Port 10GE SFP+ Module: This module supports eight SFP+ ports.
- Cisco NCS 4200 Series 8-Port 1GE SFP and 1-port 10GE SFP+ Module: supports eight Gigabit Ethernet SFP ports and one 10 Gigabit Ethernet SFP+ port.
- Cisco NCS 4200 Series 16-port 1GE CSFP / 8-port GE SFP and 1-port 10GE SFP+ / 1-port GE SFP / 2-port GE CSFP Module: supports up to eighteen Gigabit Ethernet CSFP ports or up to sixteen Gigabit Ethernet CSFP ports and one 10 Gigabit Ethernet SFP+ port.
- Cisco NCS 4200 Series 48-Port T1/E1 CEM Module: Supports 48 T1 or E1 ports. The port type is software configurable per interface module. Mixing T1 and E1 ports on a single interface module is not supported.
- Cisco NCS 4200 Series 48-Port T3/E3 CEM Module: Supports 48 T3 or E3 ports. The port type is software configurable per interface module. Mixing T3 and E3 ports on a single interface module is not supported.

- 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. The port type is software configurable per interface module. Mixing T1 and E1 or T3 and E3 ports on a single interface module is not supported.
- Cisco NCS 4200 Series 1-Port 10G (OCn/STM-n) and 8-Port 1G (OCn/STMn) CEM and OTN Module: This combination module is designed to be software configurable in different modes: 1xOC192 or STM-64, and up to 4xOC48 or STM-16 and up to 8xOC3/12 or STM-1/-4.

The Cisco NCS 4200 RSP also supports a field-replaceable Global Navigation Satellite System (GNSS) module that allows direct interface to external antennas. The GNSS module supports several satellite systems, such as the Global Positioning System (GPS), GLONASS, GALILEO, BEIDU, QZSS, and SBAS.

The Cisco NCS 4200 RSP is available in two different sizes in order to support the differences in form factors of the NCS 4200 chassis types. The capabilities of the different form factors are identical, and the software is identical as well. The wide form-factor RSP engine (NCS4216-RSP) is supported in the NCS 4216 and NCS 4216 F2B chassis, while the small form-factor RSP engine (NCS420X-RSP or NCS420X-RSP-128) is supported in the NCS 4206 chassis.

The NCS 4200 interface module support is dependent on the combination of the RSP, the chassis, software version, and the interface module slot. [The Cisco NCS 4200 Series Interface Modules Datasheet](#) contains the compatibility matrix for the several combinations.

## Features and Benefits

Feature	Benefit
<b>Carrier Ethernet ASIC</b>	Delivers essential Carrier Ethernet technologies such as Hierarchical Quality of Service (HQoS), IPv4, IPv6, MPLS/Flex LSP, and Hierarchical Virtual Private LAN Services (HVPLS). It provides line-rate performance and incorporates innovative traffic management capabilities while providing intelligent packet switching and routing operations.
<b>Service enhancement</b>	Provides advanced per-traffic-class metering and offers bidirectional packet-count and byte-count statistics. The service offering is enhanced with Operations, Administration, and Maintenance (OAM) functionality that includes Layer 2 Connectivity Fault Management (CFM), IP Service-Level Agreements (IP SLA) for Layer 3, and MPLS OAM.
<b>Service scale</b>	Provides flexible service scalability in a small footprint, delivering high performance and scale for point-to-point and multipoint services, accommodating the requirements from the most demanding wireline and wireless applications.
<b>Clocking and timing services</b>	Offers integrated support for the Global Navigation Satellite System (GNSS), Building Integrated Timing Supply (BITS), 10 MHz, 1 Pulse Per Second (1 PPS), and Time Of Day (TOD) interfaces, crucial functions required in a modern unified network. As the central system clocking and timing functions for the NCS 4200 Series platform, the Cisco NCS 4200 RSPs support Synchronous Ethernet (SyncE), IEEE 1588-2008, and can act as the clock source for network clocking of Time-Division Multiplexing (TDM) and SDH/SONET interfaces.  The NCS 4200 Series can act as an IEEE 1588-2008 ordinary clock, boundary clock, end-to-end transparent clock, and master clock function in an IEEE 1588-2008 timing domain.
<b>High availability and modularity</b>	Delivers optional intrachassis hardware redundancy for all hardware components and supports software redundancy with In-Service Software Upgrade (ISSU) support when a pair of route switch processors is inserted in the Cisco NCS 4200 system chassis fully modular platform.  With two RSPs inserted in the Cisco NCS 4206, in the Cisco NCS 4216 or in the Cisco NCS 4216 F2B systems, one RSP operates in active mode, and the other RSP operates in hot standby mode. The Cisco NCS 4200 RSP is a Field-Replaceable Unit (FRU), and it can be Online Inserted and Removed (OIR) while the Cisco NCS 4200 system is operating. The removal or failure of the active RSP in the Cisco NCS 4200 system results in the automatic switchover to the standby RSP.
<b>Management interfaces</b>	Contains the Out-Of-Band (OOB) management interfaces for the system. To offer flexible access to the router, a variety of interfaces are available for management access to the platform, including a dual-mode console port that functions as either a USB console or a serial console port.  In addition to the serial console access, the Cisco NCS 4200 RSP contains an Ethernet management port that has no interaction with actual Carrier Ethernet ASIC traffic. In addition to the OOB control interfaces, a USB port can connect USB flash devices for loading Cisco IOS Software images and configurations on the platform.

## Industry Leading, Carrier-Class Cisco IOS Software

The NCS 4200 Series systems are supported in Cisco IOS XE Software. The Cisco IOS XE Software is designed to provide modular packaging, feature velocity, and powerful resiliency.

The Cisco IOS XE software provides scale and serviceability for service providers by:

- Supporting the complete set of Cisco IOS Software features for a consistent experience
- Scaling advanced service delivery without affecting system performance
- Integrating applications in the network, improving security, reliability, and simplicity
- Facilitating programmability for cloud service orchestration

The initial software support for the Cisco NCS 4206 chassis and Cisco NCS 4216 chassis was added in Cisco IOS XE Software Release 3.18SP. The initial software support for the Cisco NCS 4216 F2B chassis was added in Cisco IOS XE Software Release 16.5.1.

## Product Specifications

Tables 1 through 4 list the product specifications and compliance information for the Cisco NCS 4200 RSP modules. Individual modules are identified by product number.

**Table 1.** Cisco NCS 4200 RSP Product Specifications

Product ID	Cisco NCS420X-RSP-128	Cisco NCS420X-RSP	Cisco NCS4216-RSP
Typical power consumption	180W	176W	184W
Maximum power consumption	220W	220W	230W
RSP CPU DRAM memory	4 GB	8 GB	8 GB
Flash memory	2 GB	8 GB	8 GB
Service scale	Base	Large	Large
Ethernet and TDM interface module compatibility	NCS4200-1T8LR-PS NCS4200-8E1T1-CE NCS4200-3GMS	NCS4200-1T8LR-PS NCS4200-1T8S-10CS NCS4200-8T-PS NCS4200-2Q-P NCS4200-1H-PK NCS4200-48T1E1-CE NCS4200-48T3E3-CE	NCS4200-1T8LR-PS NCS4200-1T8S-10CS NCS4200-8T-PS NCS4200-2Q-P NCS4200-1H-PK NCS4200-48T1E1-CE NCS4200-48T3E3-CE
Maximum Transmission Unit (MTU)	Configurable MTU of up to 9216 bytes, for bridging on Gigabit Ethernet, 10, 40 and 100 Gigabit Ethernet		
Maximum interface throughput	128 Gbps	480 Gbps	480 Gbps
IP version 4 performance	180 Mpps	600 Mpps	600 Mpps
IP version 6 performance	180 Mpps	600 Mpps	600 Mpps
Management ports <sup>4</sup>	Copper 10/100/1000Base-T LAN management port - RJ45 connector port Console/Aux RS232 serial ports - RJ45 connector port Console - USB 2.0 type A receptacle connector port		

Product ID	Cisco NCS420X-RSP-128	Cisco NCS420X-RSP	Cisco NCS4216-RSP
<b>Timing ports<sup>5</sup></b>	BITS simultaneous input and output (J1/T1/E1) - RJ48 connector port 1 pps input - mini-coax connector port 1 pps output - mini-coax connector port 2.048/10 MHz input - mini-coax connector port 2.048/10 MHz output - mini-coax connector port		
<b>External USB flash memory</b>	Mass storage - USB 2.0 type A receptacle connector port		
<b>Shipment package size (LxWxH)</b>	14.38 in. x 14.38 in. x 6.25 in.	14.38 in. x 14.38 in. x 6.25 in.	21.75 in. x 15.75 in. x 6.56 in.
<b>Shipment package weight</b>	6.2 lbs.	6.2 lbs.	7.0 lbs.
<b>MTBF at 104°F (40°C) operating temperature</b>	400,000 hours	228,090 hours	229,170 hours

**Table 2.** Maximum Single-Dimensional Service Scale<sup>1, 2</sup>

Product ID	NCS420X-RSP-128	NCS420X-RSP and NCS4216-RSP
<b>MAC addresses</b>	16,000	200,000
<b>Bridge domains</b>	4,000	8,000
<b>Ethernet flow points</b>	3,998	8,000
<b>L3 interfaces</b>	1,000	1,000
<b>IPv4 routes</b>	20,000	192,512
<b>IPv6 routes</b>	4,000	65,536
<b>Multicast routes</b>	1,000	4,000
<b>MPLS VPN</b>	128	1,000
<b>MPLS labels</b>	15,994	32,000
<b>EoMPLS tunnels per system</b>	4,000	8,000
<b>VPLS instances</b>	2,000	4,000
<b>Queues</b>	8,000	48,000
<b>Classifications</b>	10,000	24,000
<b>Ingress policers</b>	6,000	24,000
<b>Class maps</b>	1,000	1,000
<b>Queue counters (packet and byte)</b>	8,000	240,000
<b>Policer counters (packet and byte)</b>	18,000	72,000
<b>IPv4 ACL entries<sup>3</sup></b>	1,500	1,000
<b>BFD sessions</b>	1,000	1,023
<b>IEEE 802.1ag (CFM) at 3.3ms interval</b>	1,000	1,024

<sup>1</sup> Not all services can be scaled at maximum scale concurrently (multidimensional service scale). The numbers above are unidirectional scale numbers.

<sup>2</sup> The scale numbers are hardware capabilities. The actual scale may be limited in a specific software release and only become available in a future software release.

<sup>3</sup> Maximum 500 access control entries per ACL.

**Table 3.** Environmental Specifications

	Cisco NCS 4200 Series System
<b>Operating environment and altitude<sup>1</sup></b>	–40 to 65°C operating temperature (DC operation, with the 900W or 1200W power supplies) –40 to 65°C operating temperature (AC operation, with the 900W or 1200W power supplies) –60 to 1800m operating altitude (for full operating temperature range) Up to 4000m operating altitude (at up to 40°C temperature)
<b>Outside plant</b>	For an outside plant installation, it is required that the system be protected against airborne contaminants, dust, moisture, insects, pests, corrosive gases, polluted air, or other reactive elements present in the outside air. To achieve this level of protection, it is recommended that the unit be installed in a fully sealed enclosure. Examples of such cabinets include IP65 cabinets with heat exchanger complying with Telecordia GR487.
<b>Relative humidity</b>	5 to 95%, noncondensing
<b>Acoustic noise<sup>3</sup></b>	Acoustic noise peak operation complies with Network Equipment Building Standards (NEBS) GR-63-Core Issue 4 sound power level of 78 dB at 27°C operation as measured by the ANSI S12.10/ISO 7779 NAIS noise measurement test standard.
<b>Storage environment</b>	Temperature: –40 to 70°C altitude: 15,000 ft. (4570m)
<b>Seismic</b>	Zone 4
<b>Hazardous substances</b>	Reduction Of Hazardous Substances (ROHS) 6

<sup>1</sup> Minimum temperature range of chassis, fan tray, RSP engine, power supply, optics, and interface modules will dictate the supported operating temperature range. Maximum cooling fan tray module is assumed.

<sup>2</sup> Not more than the following in a one-year period: 96 consecutive hours, or 360 hours total, or 15 occurrences.

<sup>3</sup> The above are for normal (nonfailure) operation. When operating with a fan failure, the above may be exceeded.

**Table 4.** Safety and Compliance

Type	Standards
<b>Safety</b>	<ul style="list-style-type: none"> <li>• UL 60950-1, 2<sup>nd</sup> edition</li> <li>• CAN/CSA C22.2 No. 60950-1-07 2<sup>nd</sup> edition</li> <li>• IEC 60950-1, 2<sup>nd</sup> edition</li> <li>• EN 60950-1, 2<sup>nd</sup> edition</li> <li>• AS/NZS 60950.1:2003</li> </ul>
<b>Electromagnetic Emissions compliance</b>	<ul style="list-style-type: none"> <li>• FCC CFR47 Part 15 Class A</li> <li>• EN55022, class A</li> <li>• CISPR22, class A</li> <li>• ICES-003, class A</li> <li>• EN 300 386, class A</li> <li>• VCCI, class A</li> <li>• KN22, class A</li> <li>• EN61000-3-2 to EN61000-3-3</li> </ul>
<b>Immunity compliance</b>	<ul style="list-style-type: none"> <li>• EN 300 386</li> <li>• EN 61000-6-1</li> <li>• EN 50082-1</li> <li>• CISPR24</li> <li>• EN 55024</li> <li>• KN 24</li> <li>• EN 50121-4</li> <li>• EN/KN 61000-4-2 to EN/KN 61000-4-6</li> <li>• EN/KN 61000-4-8</li> <li>• EN/KN 61000-4-11</li> </ul>
<b>NEBS</b>	<ul style="list-style-type: none"> <li>• GR-63-CORE Issue 4</li> <li>• GR-1089-CORE Issue 6</li> <li>• SR-3580 NEBS Level 3</li> </ul>
<b>ETSI</b>	<ul style="list-style-type: none"> <li>• ETS/EN 300 119 Part 4</li> <li>• ETS/EN 300 019 - Storage: Class 1.2, Transportation: Class 2.3, In-Use/Operational: Class 3.2</li> <li>• ETS/EN 300 753</li> </ul>

Type	Standards
<b>Network synchronization</b>	<ul style="list-style-type: none"> <li>• GNSS</li> <li>• ANSI T1.101</li> <li>• GR-1244-CORE</li> <li>• GR-253-CORE</li> <li>• ITU-T G.813</li> <li>• ITU-T G.823</li> <li>• ITU-T G.824</li> <li>• ITU-T G.703 clause 5</li> <li>• ITU-T G.703 clause 9</li> <li>• ITU-T G.8261/Y.1361</li> <li>• ITU-T G.781</li> <li>• ITU-T G.8262</li> <li>• ITU-T G.8264</li> <li>• ITU-T G.8265.1</li> <li>• ITU-T G.8275.1</li> <li>• IEEE1588-2008</li> </ul>

## Ordering Information

Table 5 describes the Cisco IOS XE Software universal consolidated packages supported on the system, which include all Cisco IOS XE Software functionalities and features enabled. Table 6 lists the hardware parts available for Cisco NCS 4200 RSP modules.

**Table 5.** Universal Cisco IOS XE Software Packages for Cisco NCS 4200 RSP Modules

Cisco IOS XE Consolidated Package	Part Number	Description
<b>Cisco NCS 4206/4216 Series RSP IOS XE Release 3.18SP – No Payload Encryption</b>	SNCS42R3NK9318SP	<ul style="list-style-type: none"> <li>• Provides a consolidated software package for NCS4200 RSP3</li> <li>• Includes SSH and SNMPv3 support but not data plane encryption support</li> </ul>
<b>Cisco NCS 4206/4216/4215 F2B Series RSP IOS XE Release 16.5.1 – No Payload Encryption</b>	SNCS42R3NK9165	<ul style="list-style-type: none"> <li>• Provides a consolidated software package for NCS4200 RSP3</li> <li>• Includes SSH and SNMPv3 support but not data plane encryption support</li> </ul>
<b>Cisco NCS 4206/4216/4215 F2B Series RSP IOS XE Release 16.5.1 –Payload Encryption</b>	SNCS42R3K9165	<ul style="list-style-type: none"> <li>• Provides a consolidated software package for NCS4200 RSP3</li> <li>• Includes SSH and SNMPv3 support and data plane encryption support</li> </ul>
<b>Cisco NCS 4206/4216/4215 F2B Series RSP IOS XE Release 16.6.1 – No Payload Encryption</b>	SNCS42R3NK9166	<ul style="list-style-type: none"> <li>• Provides a consolidated software package for NCS4200 RSP3</li> <li>• Includes SSH and SNMPv3 support but not data plane encryption support</li> </ul>
<b>Cisco NCS 4206/4216/4215 F2B Series RSP IOS XE Release 16.6.1 –Payload Encryption</b>	SNCS42R3K9166	<ul style="list-style-type: none"> <li>• Provides a consolidated software package for NCS4200 RSP3</li> <li>• Includes SSH and SNMPv3 support and data plane encryption support</li> </ul>
<b>Cisco NCS 4206/4216/4215 F2B Series RSP IOS XE Release 16.7.1 – No Payload Encryption</b>	SNCS42R3NK9167	<ul style="list-style-type: none"> <li>• Provides a consolidated software package for NCS4200 RSP3</li> <li>• Includes SSH and SNMPv3 support but not data plane encryption support</li> </ul>
<b>Cisco NCS 4206/4216/4215 F2B Series RSP IOS XE Release 16.7.1 –Payload Encryption</b>	SNCS42R3K9167	<ul style="list-style-type: none"> <li>• Provides a consolidated software package for NCS4200 RSP3</li> <li>• Includes SSH and SNMPv3 support and data plane encryption support</li> </ul>

**Table 6.** Hardware Components for Cisco NCS 4200 RSP Modules

Part Number	Description
<b>NCS420X-RSP</b>	NCS 4206 Router & Switching Processor and Controller - 400G
<b>NCS420X-RSP=</b>	NCS 4206 Router & Switching Processor and Controller - 400G, spare
<b>NCS420X-RSP-128</b>	NCS 4206 Router & Switching Processor and Controller - 128G
<b>NCS420X-RSP-128=</b>	NCS 4206 Router & Switching Processor and Controller - 128G, spare
<b>NCS4216-RSP</b>	NCS 4216 Router & Switching Processor and Controller - 400G
<b>NCS4216-RSP=</b>	NCS 4216 Router & Switching Processor and Controller - 400G, spare
<b>A900-CM-GNSS</b>	ASR 900 Global Navigation Satellite System Module
<b>A900-CM-GNSS=</b>	ASR 900 Global Navigation Satellite System Module, spare
<b>Cisco NCS 4200 RSP Accessories</b>	
<b>A90X-RSPA-BLANK=</b>	ASR 90X Route Switch Processor Type-A Blank Cover, spare
<b>A90X-RSPB-BLANK=</b>	ASR 90X Route Switch Processor Type-B Blank Cover, spare
<b>A900-WWA-RJ48-V</b>	ASR 900 RSP wire wrap adapter for RJ48 connector – Vertical (NCS 4206)
<b>A900-WWA-RJ48-H</b>	ASR 900 RSP wire wrap adapter for RJ48 connector – Horizontal (NCS 4216)

## 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 7 are available as part of the Cisco Carrier Ethernet Switching Service and Support solution and are available directly from Cisco and through resellers.

**Table 7.** Service and Support

Advanced Services	Features	Benefits
<b>Cisco Total Implementation Solutions (TIS), available directly from Cisco</b> <b>Cisco Packaged TIS, available through resellers</b>	<ul style="list-style-type: none"> <li>• Project management</li> <li>• Site survey, configuration, and deployment</li> <li>• Installation, test, and cutover</li> <li>• Training</li> <li>• Major moves, adds, and changes</li> <li>• Design review and product staging</li> </ul>	<ul style="list-style-type: none"> <li>• Supplement existing staff</li> <li>• Help ensure functions meet needs</li> <li>• Mitigate risk</li> </ul>
<b>Cisco SP Base Support and Service Provider-Based Onsite Support, available directly from Cisco</b> <b>Cisco Packaged Service Provider- Based Support, available through resellers</b>	<ul style="list-style-type: none"> <li>• 24-hour access to software updates</li> <li>• Web access to technical repositories</li> <li>• Telephone support through the Cisco Technical Assistance Center (TAC)</li> <li>• Advance replacement of hardware parts</li> </ul>	<ul style="list-style-type: none"> <li>• Facilitate proactive or expedited problem resolution</li> <li>• Lower total cost of ownership by taking advantage of Cisco expertise and knowledge</li> <li>• Reduce network downtime</li> </ul>

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