

Cisco Network Convergence System 5500 Series: 400GE Line Cards

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The new generation of Cisco NCS 5500 series 400GE line cards increases forwarding capacity of NCS 5500 by 2.7 times to a maximum of 153.6 Tbps per system.

Product overview

Based on the Cisco® Global Cloud Index, digitalization is projected to grow global data center and public/private cloud network traffic more than 25 percent annually. To help network providers meet these challenges, the Cisco Network Convergence System 5500 Series is built with features such as extremely high port densities, deep packet buffering, and forwarding hardware optimized for these types of deployments.

The Cisco NCS 5500 Series modular chassis provides a wide variety of line cards to address customer needs to use flexible interfaces and port densities, along with full bandwidth utilization of the forwarding ASIC. The latest generation of line cards, which are shipping today, will provide the capability for dense 400G interface ports with QSFP-DD optics, thus providing operators with readiness for mass-scale networking.

The new generation consists of two line cards: the base version and the scale (SE) version, which supports enhanced configuration needs with expanded Forwarding Information Base (FIB), Quality of Service (QoS), Access Control Lists (ACL), and so on. These line cards are capable of advanced packet forwarding, segment routing, programmable network management, and telemetry, along with the robust and mature features already present in 64-bit Cisco IOS® XR Software. Note that the newer generation line cards require the second-generation fabric cards and fan trays for [NCS 5500 modular chassis](#) to be installed on the system.

The new line cards are backward compatible and they can co-exist with previous generation line cards on a chassis with second-generation fabric cards and fan trays, supporting the same features and scale as the previous generation line cards. This mode of operation will be referred to as compatibility mode. On a system with only the newer line cards, referred to as native mode, the system will support richer feature set and higher feature scale and will be supported in future software releases.

The Cisco NC57-24DD line card (Figure 1) provides 24 ports of 400 GE, providing an aggregate bandwidth of 9.6 Tbps. This line card uses QSFP28 / QSFP+ / QSFP-DD transceivers and is to be used in any of the NCS 5500 series of modular chassis.



Figure 1.
Cisco NCS 5500 Series 24-port 400 GE Base Line Card

The second line card is an enhanced scale (SE) version which improves the FIB scale capabilities up to additional 4M+ routes compared to the base line card. The Cisco NC57-18DD-SE (Figure 2) provides **18 ports of 400 GE or 30 ports of 200 GE/100 GE**, and provides up to 7.2 Tbps bandwidth per line card. The 18 400GE ports are the even numbered ports between port 1 and port 29 and the ports 0, 19, 21 and 23. They are highlighted in blue on the face plate of the scale line card.



Figure 2.
Cisco NCS 5500 Series 18-port 400 GE Scale Line Card

If all the 18 ports in NC57-18DD-SE are used in 400 GE mode, the remaining 12 ports will be disabled. Alternately, the line card can be used as all 30 ports in 200 GE or 100 GE mode or as a mix of 100 GE or 200 GE or 400 GE, up to a total of 7.2 Tbps. Note that ports 0 to 17 and ports 24 to 29 on NC57-18DD-SE line card can only be used in pairs (one top port and its respective bottom port make a pair). Within a pair, if the top port has 200 GE or 100GE or 40GE optics, the respective bottom port in the pair should also be the same 200GE or 100GE or 40GE optics.

As the QSFP-DD optics have the same mechanical characteristics and cage size as other QSFP optics, the same ports on the 400 GE line cards can act as 40 GE, 100 GE, 200 GE, or 400 GE, therefore allowing operators to migrate to 400 GE at their own pace as the need arises. The 400 GE ports will also support 100 GE via breakout of 4x100 GE.

Cisco IOS XR software overview

The Cisco NCS 5500 Series is powered by an industry-leading carrier-class 64-bit version of Cisco IOS XR Software designed on operational efficiency, optimized utilization, and service agility ([evolved programmable network](#)). Cisco IOS XR Software offers rich features such as iPXE boot, autoprovisioning, native support for third-party application hosting, machine-to-machine interface, telemetry, and flexible software package delivery.

For a complete list of supported features, refer to [Cisco Feature Navigator](#).

Software Requirements

The newer NCS 5500 Series 400GE line cards are supported on Cisco IOS XR Software Release 7.0.2 or later.

Features and benefits

Table 1 lists the features and benefits of the NCS 5500 Series 400GE line cards. Table 2 shows the features and benefits of the new generation line cards. Table 3 outlines the software feature support for the line cards, Table 4 lists the environmental features and Table 5 details the regulatory standards compliance.

Table 1. Features and Benefits of Cisco NCS 5500 Series 400GE Line Cards (Cisco IOS XR Software 7.0.2 or later)

Feature	Specification
Integrated interface	400 GE, 200 GE, 100 GE, 40 GE, 2x100GE, 4x100GE breakout supported
Industry-leading, carrier-class Cisco IOS® XR Software	Visibility and telemetry Machine-to-machine interface Application hosting Flexible platform and packaging Modularity Automation
Management ports	Provides easy access to system console
External USB port	Helps simplify image and file management
Embedded USB (eUSB) storage	Flash memory devices for storing software image, configuration, logging, and recovery
Power consumption	Ultra-low power per Gigabit Ethernet
Redundancy	Redundant Route Processor Redundant System Controller Redundant Fabric Cards (Redundancy with NC57-18DD-SE line card) Redundant fan tray Redundant AC or DC power supply

Table 2. Features and Benefits of the NCS 5500 Series 400GE Line Cards

Feature	Specification	
Product ID (PID)	NC57-24DD	NC57-18DD-SE
Specifications	<ul style="list-style-type: none"> • 24 ports 400 Gigabit Ethernet • 2 forwarding ASICs • FIB scale up to 2.5M IPv4 or to 1M IPv6 routes • On-chip Ternary Content-Addressable Memory (TCAM) for network Access Control Lists (ACL) and Quality of Service (QoS) • Supports SyncE and IEEE1588 PTP in combination with route processor NC55-RP-E 	<ul style="list-style-type: none"> • 18 ports 400 Gigabit Ethernet or 30 ports 200/100 Gigabit Ethernet • 2 forwarding ASICs • External TCAM provides FIB scale for additional 4M IPv4 or to 2M IPv6 routes (unidimensional figures that are to increase with future Cisco IOS XR releases) • On-chip Ternary Content-Addressable Memory (TCAM) for network ACLs and QoS • Supports SyncE and IEEE1588 PTP in combination with route processor NC55-RP-E

Feature	Specification	
Power consumption	Line card with no transceivers: Typical: 880 watts Maximum: 890 watts Line card with 400GE QSFP-DD LR8 transceivers on all ports at 100% line rate: Typical: 1110 watts Maximum (40° C): 1210 watts	Line card with no transceivers: Typical: 800 watts Maximum: 900 watts Line card with 400GE QSFP-DD LR8 transceivers on all ports at 100% line rate: Typical: 1010 watts Maximum (40° C): 1140 watts
Physical specifications	Height: 1.69 in (4.27 cm) Width: 16.89 in (42.9 cm) Depth: 17.89 in (43.32 cm) Weight: 18.25 lbs (8.27 kg) without optics	Height: 1.69 in (4.27 cm) Width: 16.89 in (42.9 cm) Depth: 17.89 in (43.32 cm) Weight: 18.9 lbs (8.57 kg) without optics

Table 3. Software Feature Support on NCS 5500 Modular Chassis in Cisco IOS XR Software

Note: The list of supported features is not exhaustive, and some features are supported in later software releases.

Description	Specification
Layer 3	<ul style="list-style-type: none"> • IPv4 and IPv6 unicast • Layer 3 interfaces: physical and sub-interfaces • Routing protocols: static, Open Shortest Path First (OSPFv2), OSPFv3, Intermediate System to Intermediate System (ISIS), ISISv6, and Border Gateway Protocol (BGP) • 64-way Equal-Cost Multipath (ECMP) • Layer 3 ingress and egress IPv4 ACL and IPv6 ACL • Bidirectional Forwarding Detection (BFD) • Cisco bundle Ethernet technology (up to 64 ports per Ethernet bundle) • Link Aggregation Control Protocol (LACP): IEEE 802.3ad • Jumbo frame support (up to 9216 bytes) • Virtual Router Redundancy Protocol (VRRP) • Layer 3 Virtual Private Network (L3VPN)
MPLS	<ul style="list-style-type: none"> • Label switching • LDP • MPLS traffic engineering • Ethernet over MPLS (EoMPLS)
Segment routing	<ul style="list-style-type: none"> • Segment routing-based transport • ISIS extensions to segment routing • OSPF extensions to segment routing • BGP egress peering engineering • Segment Routing Traffic Engineering (SR-TE) • Segment routing Topology Independent Loop-Free Alternatives (TI-LFA)

Description	Specification
Quality of Service (QoS)	<ul style="list-style-type: none"> • QoS • Ingress classification based on class of service (Layer 2), IP differentiated services code point (Layer 3), IP ACL (Layer 3 / Layer 4), IP precedence (type of service) (Layer 3) • DSCP marking • 8 numbers of queues for user traffic • Support for priority queuing
Automation	<ul style="list-style-type: none"> • Zero-Touch Provisioning (ZTP), iPXE • Configuration management • Network Configuration Protocol (NETCONG/YANG model)
Security	<ul style="list-style-type: none"> • Provides comprehensive network security features, including ACLs; control-plane protection; management plane protection; routing authentications; Authentication, Authorization, and Accounting (AAA) and Terminal Access Controller Access-Control System Plus (TACACS+); Secure Shell (SSH) Protocol; SNMPv3; and RPL support • Layer 2 ingress ACLs • Layer 3 ingress ACLs • BGP flow spec
Management	<ul style="list-style-type: none"> • MIB, XML, JSON, GPB, and SNMP • MPLS OAM (label-switched path [LSP] ping, LSP traceroute) • Ethernet OAM

Supported transceiver modules

Please visit the [Cisco Optics Compatibility Matrix tool](#) to review the supported transceiver / optic module support for the new 400GE line cards, NC57-24DD and NC57-18DD-SE.

Table 4. Environmental Properties

Property	Cisco NCS 5500 Series
Operating temperature	32 to 104°F (0 to 40°C)
Non-operating (storage) temperature	-40 to 158°F (-40 to 70°C)
Operating humidity	5% to 95% (noncondensing) Note: Not to exceed 0.024kg water or dry air
Storage (relative) humidity	5% to 95% at 40°C per NEBS GR-63-Core Note: Not to exceed 0.024kg water or dry air
Altitude	0 to 10,000 ft (0 to 3000m)
Power inputs	Worldwide ranging AC (90-265V; 50-60 Hz) Worldwide ranging DC (-40V to -72V)
Air flow	Front to back

Table 5 describes regulatory standards compliance information.

Table 5. Regulatory Standards Compliance: Safety and EMC

Specification	Description
Regulatory compliance	Products should comply with CE markings according to directives 2004/108/EC and 2006/95/EC
Network Equipment Building Standards (NEBS)	Designed to meet GR-63-CORE and GR-1089-CORE
Safety	<ul style="list-style-type: none"> • UL 60950-1 Second Edition • CAN/CSA-C22.2 No. 60950-1 Second Edition • EN 60950-1 Second Edition • IEC 60950-1 Second Edition • AS/NZS 60950-1 • GB4943
EMC standards	<ul style="list-style-type: none"> • 47CFR Part 15 (CFR 47) Class A • AS/NZS CISPR22 Class A • CISPR22 Class A • EN55022 Class A • ICES003 Class A • VCCI Class A • EN61000-3-2 • EN61000-3-3 • KN22 Class A • CNS13438 Class A
EMC immunity	<ul style="list-style-type: none"> • EN55024 • CISPR24 • EN300386 • KN 61000-4 series
Restriction of Hazardous Substances (RoHS)	The product is RoHS-6 compliant with exceptions for leaded-ball grid-array (BGA) balls and lead press-fit connectors

Get additional information related to [NCS 5500 regulatory compliance and safety standards](#).

System requirements

Table 6. New Generation Fabric Cards and Fan Trays for 400GE line cards

Fabric Cards	Requires NCS5500 2 nd generation Fabric cards (NCS-5508-FC2 or NCS-5516-FC2)
Fan Trays	Requires NCS5500 2 nd generation Fan trays (NCS-5508-FAN2 or NCS-5516-FAN2)

Refer the [datasheet](#) for second generation fabric cards and fan trays for more details.

Ordering information

Table 7. Ordering Information for NCS 5500 Series Line Cards

Part number	Sub-component	Product description
Hardware		
NC57-24X400G-BA		NCS 5500 Series 24 ports of 400 GE base line card bundle for perpetual pay as you grow consumption model.
	NC57-24DD	NCS 5500 Series 24X400 GE base line card.
	NC57-24DD-RTU	NCS 5500 24X400 GE Right to Use License.
NC57-24X400G-BA=		NCS 5500 Series 24 ports of 400 GE base line card spare bundle for perpetual pay as you grow consumption model.
	NC57-24DD	NCS 5000 Series 24X400 GE base line card.
	NC57-24DD-RTU	NCS 5500 24X400 GE Right to Use License.
NC57-18D12TH-SB		NCS 5500 Series 18 ports of 400 GE or 30 ports of 200 GE / 100 GE scale line card bundle for perpetual pay as you grow consumption model.
	NC57-18DD-SE	NCS 5500 Series 18 ports of 400 GE or 30 ports of 200 GE / 100 GE scale line card.
	NC57-18DD-SE-RTU	NCS 5500 Series 18 ports of 40 0GE or 30 ports of 200 GE / 100 GE Right to Use License.
NC57-18D12TH-SB=		NCS 5500 Series 18 ports of 400 GE or 30 ports of 200 GE / 100 GE scale line card spare bundle for perpetual pay as you grow consumption model.
	NC57-18DD-SE	NCS 5500 Series 18 ports of 400 GE or 30 ports of 200 GE / 100 GE scale line card.
	NC57-18DD-SE-RTU	NCS 5500 Series 18 ports of 400 GE or 30 ports of 200 GE / 100 GE Right to Use License.
NC-57-24DD	NC-57-24DD	NCS 5500 Series 24 ports of 400 GE base line card with Flexible Consumption Model (Requires Smart Licensing).
NC-57-24DD=	NC-57-24DD	NCS 5500 Series 24 ports of 400 GE base line card with Flexible Consumption Model (Requires Smart Licensing) spare.

Part number	Sub-component	Product description
NC-57-18DD-SE	NC-57-18DD-SE	NCS 5500 Series 8 ports of 400 GE or 30 ports of 200 GE / 100 GE linecard with Flexible Consumption Model (Requires Smart Licensing).
NC-57-18DD-SE=	NC-57-18DD-SE	NCS 5500 Series 8 ports of 400 GE or 30 ports of 200 GE / 100 GE linecard with Flexible Consumption Model (Requires Smart Licensing) spare.
Software		
XR-NC55-P-07.00		Cisco IOS XR Software 7.0.2 Release software image.
XR-NC55-PK9-07.00		Cisco IOS XR Software 7.0.2 Release software crypto image.

For details on Cisco Network Convergence System 5500 Series Perpetual Software Licenses, refer [datasheet](#) for the same. And details on flexible consumption model for NCS 5500 series are available in the [datasheet](#) for IOS XR software flexible consumption model.

Warranty information

The Cisco NCS 5500 Series routers have a 1-year limited hardware warranty. The warranty includes hardware replacement with a 10-day turnaround from receipt of a Return Materials Authorization (RMA).

Cisco environmental sustainability

Information about Cisco’s environmental sustainability policies and initiatives for our products, solutions, operations, and extended operations or supply chain is provided in the “Environment Sustainability” section of Cisco’s [Corporate Social Responsibility](#) (CSR) Report.

Reference links to information about key environmental sustainability topics (mentioned in the “Environment Sustainability” section of the CSR Report) are provided in the following table:

Sustainability topic	Reference
Information on product material content laws and regulations	Materials
Information on electronic waste laws and regulations, including products, batteries, and packaging	WEEE compliance

Cisco makes the packaging data available for informational purposes only. It may not reflect the most current legal developments, and Cisco does not represent, warrant, or guarantee that it is complete, accurate, or up to date. This information is subject to change without notice.

Service and Support

Cisco offers a wide range of services to help accelerate your success in deploying and optimizing the Cisco NCS 5500 Series. These innovative Cisco Services offerings are delivered through a unique combination of people, processes, tools, and partners, and they are focused on helping you increase operating efficiency and improve your data center network.

Cisco Advanced Services use an architecture-led approach to help you align your data center infrastructure with your business goals and achieve long-term value.

Cisco SMARTnet® Service helps you resolve mission-critical problems with direct access at any time to Cisco network experts and award-winning resources. With this service, you can take advantage of the Cisco Smart Call Home service, which offers proactive diagnostics and real-time alerts on your Cisco NCS 5500 Series. Spanning the entire network lifecycle, Cisco Services offerings help increase investment protection, optimize network operations, support migration operations, and strengthen your IT expertise.

Cisco Capital

Flexible payment solutions to help you achieve your objectives

Cisco Capital makes it easier to get the right technology to achieve your objectives, enable business transformation and help you stay competitive. We can help you reduce the total cost of ownership, conserve capital, and accelerate growth. In more than 100 countries, our flexible payment solutions can help you acquire hardware, software, services and complementary third-party equipment in easy, predictable payments. [Learn more.](#)

For more information

For more information about the Cisco NCS 5500 Series, visit [Cisco Network Convergence System 5500 Series](#).

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