Cisco Network Convergence System 540 Large Density Router

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Overview

The Cisco Network Convergence System (NCS) 540 large density routers are a 1RU platforms that support QSFP28 and QSFP56-DD ports and offer customers a 400G coherent optics transport solution. The NCS 540 large density platform enhances the existing NCS 540 portfolio by offering high throughput and flexible port interfaces ranging from 1G up to 400G.

Service providers are challenged by rapid traffic growth from mobile and fixed broadband users, a lack of an easily scalable network infrastructure, and siloed operational support and operational complexity. These challenges can be overcome by building a converged IP network. A single network infrastructure that is simple to operate, one that is capable of quickly scaling with growing demand and utilizes automation to increase flexibility and control will allow service providers to remove complexity and launch new revenue generating services. Aligning with Cisco® Routed Optical Networking Architecture to utilize coherent pluggable optics, the Cisco NCS 540 large density routers can be used as part of a converged IP transport solution. The NCS 540 large density routers are the leading platform in the industry supporting SFP56 interfaces, which is the same form factor as SFP/SFP+/SFP28 and leverages the PAM4 technology used for 400GE.

Cisco NCS 540 large density routers are temperature-hardened, small form factor, power-efficient devices suitable for both outdoor and indoor deployments. The NCS 540 large density platform offers 1Tbps throughput and best-in-class security both from a hardware and software standpoint. Powered by the industry-leading Cisco IOS® XR software, the platform offers not only operational efficiency and service agility, but also advanced features such as segment routing, EVPN, programmability, application awareness, network visibility, and can integrate automation tools.

Key product highlights

- 1RU small form factor with a 299-mm depth
- Front-to-back airflow
- Environmentally hardened, suitable for deployments in indoor or outdoor sealed cabinets
- Versatile Ethernet interface options: 1/10/25/40/50/100/200/400G
- Low latency forwarding, Class C compliant
- 400G/100G ZR/ZR+ optics support
- Precise frequency and phase/time synchronization using the latest industry standards
- Integrated GNSS receiver
- Rich quality-of-service capabilities for different SLAs
- Security-Trust Anchor module infrastructure, secure boot, image signing, run-time defense
- MEF 3.0 Compliant
- Excellent manageability
- Flexible consumption model

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Figure 1.
N540-24Q8L2DD-SYS: Cisco NCS 540 Large Density Router Family

Figure 2.
N540-24Q2C2DD-SYS: Cisco NCS 540 Large Density Router Family

Model details

Chassis PID	N540-24Q8L2DD-SYS	N540-24Q2C2DD-SYS
CPU Memory Storage	4-core 1.5Ghz x86 CPU 16GB DRAM 64GB storage	4-core 1.5Ghz x86 CPU 16GB DRAM 64GB storage
Interfaces	24x 25GE/10GE/1GE 8x 50GE/25GE/10GE/1GE 2x 400GE/3x100GE/200GE*/2x100GE/100GE/40GE	24x 25GE/10GE/1GE 2x 100GE/40GE 2x 400GE/3x100GE/200GE*/2x100GE/100GE/40GE
Performance	Up to 600 Mpps	Up to 600 Mpps
Power supplies Fans Airflow	2 hot-swappable AC/DC power supplies provide 1+1 redundancy. AC & DC PSU combination is supported. 6 fixed fans (5+1) Front to back	2 hot-swappable AC/DC power supplies provide 1+1 redundancy. AC & DC PSU combination is supported. 6 fixed fans (5+1) Front to back
Surge rating As per IEC 61000-4-5	AC: 1kV DM, 2kV CM DC: 1kV DM, 1kV CM	AC: 1kV DM, 2kV CM DC: 1kV DM, 1kV CM
Timing	SyncE, PTP Internal GNSS receiver (GPS, Galileo, Glonass, BeiDou) Interfaces: 1pps, 10MHz, ToD, antenna for GNSS Class C (400G/50G)	SyncE, PTP Internal GNSS receiver (GPS, Galileo, Glonass, BeiDou) Interfaces: 1pps, 10MHz, ToD, antenna for GNSS Class C (100G, 400G)
Physical specification	1RU Depth: 299 mm Dimension: 299 (D) x 439.42 (W) x 43.6 mm (H) Weight: chassis, 5.8 kg; single PSU, 0.6 kg	1RU Depth: 299 mm Dimension: 299 (D) x 439.42 (W) x 43.6 mm (H) Weight: chassis, 5.8 kg; single PSU, 0.6 kg

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Software feature support on NCS 540 in Cisco IOS XR:

Description	Specification
Layer 2	Layer 2 forwarding and bridging Bridge Domains (BD) Ethernet Flow Point (EFP) IEEE 802.1Q VLANs and Q-in-Q Ethernet Link Aggregation Group (LAG) Link Aggregation Control Protocol (LACP) 802.3ad G.8032 Spanning Tree Protocol Jumbo frames on all ports
Layer 3	IPv4 and IPv6 unicast routing Layer 3 interfaces: physical interfaces and sub-interfaces Virtual Routing and Forwarding (VRF) Open Shortest Path First (OSPFv2, OSPFv3) Intermediate System to Intermediate System (ISIS, ISISv6) Multiprotocol Border Gateway Protocol (MP-BGP) Equal-Cost Multipath (ECMP) Bidirectional Forwarding Detection (BFD) Virtual Router Redundancy Protocol (VRRP) Integrated Routing Bridging (IRB) with Bridge Virtual Interface (BVI) Generic Routing Encapsulation (GRE)
MPLS	Label switching (LER, LSR) Label Distribution Protocol (LDP) BGP Labeled Unicast (BGP-LU) MPLS Traffic Engineering with RSVP-TE Point-to-point L2VPN – Static, T-LDP, EVPN-VPWS Multipoint L2VPN – VPLS, EVPN L2/L3 EVPN with Anycast IRB 6PE, 6VPE IP Loop-Free Alternate (LFA) Fast Reroute (FRR) RSVP-TE Fast Reroute (FRR)
Segment Routing (SR)*	ISIS, OSPF, BGP extensions to segment routing Segment Routing with MPLS data plane (SR-MPLS) Segment Routing with IPv6 data plane (SRv6) BGP Egress Peering Engineering (BGP-EPE) Segment Routing Traffic Engineering (SRTE)

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Description	Specification
	Segment Routing IGP Flexible Algorithms (Flex-Algo) Segment Routing Path Computation Element (SR-PCE) Topology Independent Loop-Free Alternate (TI-LFA) Segment Routing On-Demand Next-hop (SR-ODN) Segment Routing Performance Measurement (SR-PM)
Multicast	IPv4 and IPv6 multicast routing PIM-SM, PIM-SSM IGMPv3, MLDv2 mLDP profiles 6, 7, and 14 mVPN P2MP-TE profiles 8 and 10
Quality of Service (QoS)	Class-based 3-level Hierarchical QoS Virtual Output Queueing (VOQ) Policing, Shaping Multi-level priority queuing Classification based on L2/L3/L4 fields Remarking Weighted Random Early Detection (WRED) Deep packet buffer
Timing	SyncE with ESMC Integrated GNSS receiver (GPS, Galileo, Glonass, BeiDou) IEEE 1588-2008 PTP T-GM, T-BC, T-TSC, A-PTS, Virtual Port G.8265.1, G.8275.1, G.8275.2, Multi-profile G.8273.2 Class C
Security	Control-plane and management plane protection Local Packet Transport Services (LPTS) Authentication, Authorization, and Accounting (AAA) Terminal Access Controller Access-Control System Plus (TACACS+) Secure Shell (SSH) Layer 3 ingress and egress ACLs for IPv4 and IPv6 Layer 2 ingress ACLs Unicast Reverse Path Forwarding (Unicast RPF)

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Description	Specification
OAM	CDP, LLDP, ICMP, DHCP Relay IP SLA MPLS OAM Ethernet OAM: CFM, Y.1731 DM/SLM TWAMP and TWAMP-Light Responders HW-based timestamping Y.1564 Model/Event-Driven Telemetry NetFlow SPAN/ERSPAN/PW-SPAN
Manageability	CLI SNMP MIB NETCONF/gRPC (XML, JSON, GPB) YANG models (native, open: OpenConfig, IETF) RPM-based SW infrastructure ZTP Third-party application hosting

Supported transceiver modules

Please refer to Transceiver Module Group (TMG) Compatibility Matrix for the NCS 540 Series supported transceivers.

Additional features

The NCS 540 Series Router also supports the Cisco DDoS Edge Protection solution.

Add leading DDoS protection directly to the NCS 540 Series Router to detect and block DDoS attacks on-box cost-effectively, without any impact on application latency.

DDoS edge protection can be leveraged for mobility traffic (GTP) and other traffic (IPv4/v6, MPLS, etc.) depending on the use case for the NCS 540 Series Router deployment.

Learn more about Cisco DDoS Edge Protection.

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Environment

- Environmental properties for NCS 540 fixed systems

Description	NCS 540 Large Density Router
Operating environment and altitude	–40° C to +65° C up to 300 m –40° C to +60° C up to 1800 m –40° C to +50° C up to 3900 m
Nonoperating (storage) temperature	–40 to 70° C (–40 to 158° F)
Operating humidity	5% to 85% (noncondensing)
Storage (relative) humidity	5% to 95% at 40° C per NEBS GR-63-Core
Altitude	0 to 3900 m
Acoustics	NEBS GR-63-CORE Issue 5 - ISO 3744
Power	Worldwide ranging AC (90–264V; 50/60 Hz) Worldwide ranging DC (–40V to –72V)
Outside plant installation	It is required that the router 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 an environmentally sealed enclosure with heat exchanger. Cabinets that conform to GR-487 are considered environmentally sealed. In addition, closures with a minimum NEMA rating of 4 or a minimum IP 66 rating can be considered environmentally sealed.

Regulatory standards compliance

- 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	ANSI/UL 60950-1 CAN/CSA C22.2 No. 60950-1 ANSI/UL 62368-1 CAN/CSA C22.2 No. 62368-1 EN/IEC 62368-1

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Specification	Description
EMC standards	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	EN55024 CISPR24 EN300386 KN 61000-4 series
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 ETS/EN 300 753
RoHS	The product is RoHS-6 compliant with exceptions for leaded-ball grid-array (BGA) balls and lead press-fit connectors.

Ordering information

Router PID	N540-24Q8L2DD-SYS	N540-24Q2C2DD-SYS
Description	NCS540-2x400G QSFP-DD+8x50G+24x25G	NCS540-2x400G QSFP-DD+2x100G+24x25G
Power supplies	**Power supply:** N540-PWR400-A N540-PWR400-D	**Power supply:** N540-PWR400-A N540-PWR400-D
Accessories	**Rackmounts:** N540DD-RKM-19 N540-RKM-23-FHC N540-RKM-ETSI-FHC **Cable brackets:** N540-CBL-BRKT-FHC	**Rackmounts:** N540DD-RKM-19 N540-RKM-23-FHC N540-RKM-ETSI-FHC **Cable brackets:** N540-CBL-BRKT-FHC
Software	XR-7.4-K9-AC-TRK TRK-7.4-54I-K9	XR-25.1-K9-AC-TRK TRK-25.1-54I-K9

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Ordering information for software licenses available on NCS 540

Part number	Description
ESS-AC-10G-RTU-1	Access Essentials SW Right-to-Use v1.0 per 10G
ADV-AC-10G-RTU-1	Access Advantage w/o Essentials SW RTU v1.0 10G
ADN-AC-10G-RTU-1	Access Advantage w/ Essentials SW RTU v1.0 10G
ESS-ADN-AC-10G-RT	Access Essentials to Advantage Upgrade RTU per 10G
ESS-AC-10G-SIA-3	Access Essentials SIA 10G 3-5 year term
ESS-AC-10G-SIA-5	Access Essentials SIA 10G 5-10 year term
ADV-AC-10G-SIA-3	Access Advantage w/o Essentials SIA 10G 3-5 year term
ADV-AC-10G-SIA-5	Access Advantage w/o Essentials SIA 10G 5-10 year term
ADN-AC-10G-SIA-3	Access Advantage w/ Essentials SIA 10G 3-5 year term
ADN-AC-10G-SIA-5	Access Advantage w/ Essentials SIA 10G 5-10 year term
ESS-ADN-AC-10G-S3	Access Essentials to Advantage Upgrade SIA 10G 3-5 yrs
ESS-ADN-AC-10G-S5	Access Essentials to Advantage Upgrade SIA 10G 5 – 10 yrs
N540-24Z8Q2C-FC-SW	NCS 540 Series additional Software Licenses (RTU, SIA)

Ordering information for power cables supported on NCS 540

Part number	Description
CAB-AC-SA	Power Cord - South Africa, 16/10A, 250V, 1830 mm, -40C to +85C
CAB-AC-ARG	Power Cord - Argentina, 10A, 250V, 2500 mm, -40C to +85C
CAB-AC-ISR	Power Cord - Israel, 16/10A, 250V, 2500 mm, -40C to +85C
CAB-AC-TAI	Power Cord - Taiwan, 15/10A, 125V, 2500 mm, -40C to +85C
CAB-AC-CHI	Power Cord - China, 10A, 250V, 2500 mm, -40C to +85C
CAB-AC-KOR	Power Cord - Korea, 16/10A, 125V, 2500 mm, -40C to +85C
CAB-AC-EUR	Power Cord - Europe, 16/10A, 250V, 2500 mm, -40C to +85C
CAB-AC-ITL	Power Cord - Italy, 10A, 250V, 2500 mm, -40C to +85C
CAB-AC-UK	Power Cord - UK, 13/10A, 250V, 2500 mm, -40C to +85C
CAB-AC-AUS	Power Cord - Australia, 10A, 250V, 2500 mm, -40C to +85C
CAB-AC-US	Power Cord - US, 15A, 125V, 2500 mm, -40C to +85C

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Part number	Description
CAB-AC-BRA	Power Cord - Brazil, 10A, 250V, 2500 mm, -40C to +85C
CAB-AC-IND	Power Cord - India, 16/10A, 250V, 2500 mm, -40C to +85C
CAB-AC-SUI	Power Cord - Swiss, 10A, 250V, 2500 mm, -40C to +85C
CAB-AC-SA	Power Cord - South Africa, 16/10A, 250V, 1830 mm, -40C to +85C
CAB-AC-ARG	Power Cord - Argentina, 10A, 250V, 2500 mm, -40C to +85C
CAB-AC-ISR	Power Cord - Israel, 16/10A, 250V, 2500 mm, -40C to +85C

Service and support

Cisco offers a wide range of services to help accelerate your success in deploying and optimizing the Cisco NCS 540. 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 network operation. Cisco Advanced Services uses an architecture-led approach to help you align your data center infrastructure with your business goals and achieve long-term value. Cisco Services 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 540. Spanning the entire network lifecycle, Cisco Services offerings help increase investment protection, optimize network operations, support migration operations, and strengthen your IT expertise.

Warranty

The Cisco NCS 540 has a one-year limited hardware warranty. The warranty includes hardware replacement with a 10-day turnaround from receipt of a Return Materials Authorization (RMA).

Product Sustainability

Information about Cisco's Environmental, Social and Governance (ESG) initiatives and performance is provided in Cisco's CSR and sustainability reporting.

Table 1. Cisco Environmental Sustainability Information

Sustainability Topic		Reference
General	Information on product-material-content laws and regulations	Materials
	Information on electronic waste laws and regulations, including our products, batteries and packaging	WEEE Compliance
	Information on product takeback and reuse program	Cisco Takeback and Reuse Program
	Sustainability Inquiries	Contact: csr_inquiries@cisco.com
Material	Product packaging weight and materials	Contact: environment@cisco.com

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Document history

New or revised topic	Described In	Date
Updated Worldwide Ranging AC Power	Environment - Environmental properties for NCS 540 fixed systems	February 7,2025
Updated CPU Memory Storage	Model details	February 7,2025

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