

Cisco Nexus 9500 Cloud-Scale Line Cards and Fabric Modules

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Product Overview

The Cisco Nexus® 9500 switching platform (Figure 1) offers three modular chassis:

- Cisco Nexus 9500 4-slot switch
- Cisco Nexus 9500 8-slot switch
- Cisco Nexus 9500 16-slot switch



Figure 1.
Cisco Nexus 9500 Series Cloud-Scale Switch Chassis







The Cisco Nexus 9500 Series modular switches are capable of supporting up to 172.8 Terabits per second (Tbps) bandwidth with a comprehensive selection of cloud-scale line cards and fabric modules that provide 1-, 10-, 25-, 40-, 50-, and 100-Gigabit Ethernet interfaces. Using these cloud-scale line cards the Cisco Nexus 9500 Series switches can be configured with up to:

1. 576 100-Gigabit Ethernet ports (or)
2. 576 40-Gigabit Ethernet ports (or)
3. 2304 25-Gigabit Ethernet ports (or)
4. 2304 1/10-Gigabit Ethernet ports

Cisco Nexus 9500 Platform Cloud-Scale Line Cards

The Cisco Nexus 9500 platform supports a rich selection of hot-swappable multispeed cloud-scale line cards and fabric modules optimized for data-center deployments. These cloud-scale line cards and fabric modules, built using Cisco® cloud-scale ASICs, provide the ideal foundation for large scalable data centers. The Cisco cloud-scale ASICs provide enhanced performance and features that are required to meet the evolving needs of the world's largest cloud-scale data centers. These ASICs not only support foundational L2/L3 networking capabilities but also support enhanced capabilities such as policy-based fabric architectures (ACI or VXLAN), smart buffering, integrated line rate security, and real-time streaming telemetry over multispeed Ethernet ports.

Table 1. Cisco Nexus 9500 Cloud-Scale Line Cards

Line Card Type	Description
100-Gbps line cards	
N9K-X9732C-EX: 100-Gigabit Ethernet Line Card 	<ul style="list-style-type: none"> • 32-port 100-Gigabit Ethernet Quad Small Form-Factor Pluggable 28 (QSFP28) line card • Every QSFP28 supports 1x100-, 2x50-, 1x40-, 4x25-, 4x10-, and 1x1/10-Gigabit Ethernet
N9K-X9736C-FX: 100-Gigabit Ethernet Line Card 	<ul style="list-style-type: none"> • 36-port 100-Gigabit Ethernet Quad Small Form-Factor Pluggable 28 (QSFP28) line card • Every QSFP28 supports 1x100-, 2x50-, 1x40-, 4x25-, 4x10-, and 1x10-Gigabit Ethernet • Ports 1 – 28 support 1 Gigabit Ethernet
N9K-X9732C-FX: 100-Gigabit Ethernet Line Card 	<ul style="list-style-type: none"> • 32-port 100-Gigabit Ethernet Quad Small Form-Factor Pluggable 28 (QSFP28) line card • Every QSFP28 supports 1x100-, 2x50-, 1x40-, 4x25-, 4x10-, and 1x1/10-Gigabit Ethernet • Supports 4+1 FM redundancy
N9K-X9736C-EX: 100-Gigabit Ethernet Line Card 	<ul style="list-style-type: none"> • 36-port 100-Gigabit Ethernet Quad Small Form-Factor Pluggable 28 (QSFP28) line card • Every QSFP28 supports 1x100-, 2x50-, 1x40-, 4x25-, 4x10-, and 1x1/10-Gigabit Ethernet
10/25-Gbps Fiber Line Cards	
N9K-X97160YC-EX: 1/10/25-Gigabit Ethernet Access-Layer and 10/40/100-Gigabit Ethernet Aggregation-Layer Line Card 	<ul style="list-style-type: none"> • 48-port 1-, 10-, and 25-Gigabit Ethernet SFP+ and 4-port 40/100-Gigabit Ethernet QSFP28 line card
10-Gbps copper line cards	
N9K-X9788TC-FX: 1/10 Gigabit Ethernet BaseT Access-Layer and 40/100 Gigabit Ethernet Aggregation-Layer Line Card 	<ul style="list-style-type: none"> • 48-port 100-Megabit and 1/10-Gigabit Ethernet BASE-T and 4-port 40/100-Gigabit Ethernet QSFP28 line card

Line Card/Features	Cisco NX-OS	Cisco ACI [®] spine	MACSec	CloudSec	N+1 FM redundancy
X9732C-EX	Yes	Yes	No	No	No
X9736C-FX	Yes	Yes	Yes	Yes (Ports: 28 – 36)	No
X9732C-FX	Yes	No	Yes	No	Yes
X9736C-EX	Yes	No	No	No	No

Line Card/Features	Cisco NX-OS	Cisco ACI [®] spine	MACSec	CloudSec	N+1 FM redundancy
X9716oYC-EX	Yes	No	No	No	No
X9788TC-FX	Yes	No	No	No	No

Table 2. Cisco Nexus 9500 Cloud-Scale Line Card Specifications

Line card/FM	FM required for max bandwidth	FM required for N+1 redundancy	Performance	Packet buffer
X9732C-EX	4	N/A	6.4 Tbps 10.23 bpps	160 MB
X9736C-FX	5*	N/A	7.2 Tbps 11.50 bpps	160 MB
X9732C-FX	4	5 [#]	6.4 Tbps 10.23 bpps	160 MB
X9736C-EX	4	N/A	6.4 Tbps 10.23 bpps	160 MB
X9716oYC-EX	4	N/A	3.2 Tbps 5.11 bpps	80 MB
X9788TC-FX	4	N/A	1.76 Tbps 13.1 bpps	80MB

* To achieve max bandwidth with 5 fabric modules and X9736C-FX cards, the line cards in the chassis must only be the X9736C-FX cards. The X9736C-FX cards supports up to 3.2Tbps when mixed with other line cards and 4 fabric modules.

To achieve N+1 fabric module redundancy with 5 fabric modules and X9732C-FX cards, the line cards in the chassis must only be the X9732C-FX cards.

Cisco Nexus 9500 Cloud-Scale Platform Fabric Modules and Performance

The Cisco Nexus 9500 platform is designed as a Clos fabric that interconnects each line card directly with each rear-mounted fabric module. Each cloud-scale fabric module provides 800 Gbps of bandwidth to each slot in a chassis. All traffic between the line cards is load balanced across all fabric modules, providing optimal bandwidth distribution within the chassis. This load-balancing capability provides enhanced system reliability and redundancy. The switch continues to operate even in the event of a loss of a fabric module, albeit at a lower capacity, as the remaining fabric modules continue to provide switching capacity to the line cards.

Table 3. Cisco Nexus 9500 Cloud-Scale Line Cards and Fabric Modules Compatibility

Line card/FM	C9504-FM-E	C9508-FM-E C9508-FM-E2	C9516-FM-E	C9516-FM-E2
X9732C-EX	Cisco ACI spine & Cisco NX-OS	Cisco ACI spine & Cisco NX-OS	Cisco NX-OS	Cisco ACI spine & Cisco NX-OS
X9736C-FX	Cisco ACI spine & Cisco NX-OS	Cisco ACI spine & Cisco NX-OS	Cisco NX-OS	Cisco ACI spine & Cisco NX-OS
X9732C-FX	Cisco NX-OS	Cisco NX-OS	Cisco NX-OS	Cisco NX-OS

Line card/FM	C9504-FM-E	C9508-FM-E C9508-FM-E2	C9516-FM-E	C9516-FM-E2
X9736C-EX	Cisco NX-OS	Cisco NX-OS	Cisco NX-OS	Cisco NX-OS
X9716oYC-EX	Cisco NX-OS	Cisco NX-OS	Cisco NX-OS	Cisco NX-OS
X9788TC-FX	Cisco NX-OS	Cisco NX-OS	Cisco NX-OS	Cisco NX-OS

The Cisco Nexus 9500 Cloud Scale line cards support several forwarding templates to efficiently allocate onboard memory for varying deployment scenarios.

Table 4. Cisco Nexus 9500 Cloud-Scale Line Cards: Product Specifications – Performance and Scale

	Cisco Nexus 9500 Series cloud-scale line cards (X9732C-EX, X9736C-EX, X9716oYC-EX)	Cisco Nexus 9500 Series cloud-scale line cards (X9736C-FX, X9732C-FX, X9788TC-FX)
Number of Longest Prefix Match (LPM) route entries	IPv4: up to 1 million IPv6: 1900 to 500,000 (based on prefix length)	IPv4: up to 2 million IPv6: 1,900 to 1 million (based on prefix length)
Number of IP host entries	IPv4: up to 1 million IPv6: up to 16,000	IPv4: up to 2 million IPv6: up to 32,000
Number of MAC address entries	Up to 512,000	Up to 512,000
Number of multicast routes	Up to 32,000	Up to 64,000
Number of Interior Gateway Management Protocol (IGMP) snooping groups	With VPC: 4000 to 32,000 Without VPC: 8000 to 32,000	With VPC: 4000 to 32,000 Without VPC: 8000 to 32,000
Number of VLANs	Up to 4096	Up to 4096
Number of Virtual Routing and Forwarding (VRF) instances	Up to 16,000	Up to 16,000
Number of port channels	Up to 512	Up to 512
Number of port channel links	Up to 32	Up to 32
Number of Equal Cost Multipath (ECMP) paths	Up to 64	Up to 64
Number of active Cisco Switched Port Analyzer (SPAN) sessions	4 to 32	4 to 32
Number of Multiple Spanning Tree (MST) instances	Up to 64	Up to 64
Number of Rapid per-VLAN Spanning Tree (RPVST) instances	Up to 4000	Up to 4000
Number of Hot Standby Router Protocol (HSRP) groups	Up to 490	Up to 490
Number of tunnel endpoints	Up to 10,000	Up to 10,000

	Cisco Nexus 9500 Series cloud-scale line cards (X9732C-EX, X9736C-EX, X9716oYC-EX)	Cisco Nexus 9500 Series cloud-scale line cards (X9736C-FX, X9732C-FX, X9788TC-FX)
(VTEP) and VXLAN physical servers per VLAN		

Supported Optics Modules

Each Cisco Nexus 9500 cloud-scale line card supports an extensive set of optic modules. The Cisco Transceiver Compatibility page (<https://www.cisco.com/c/en/us/support/interfaces-modules/transceiver-modules/products-device-support-tables-list.html>) provides the complete compatibility details.

Mechanical Specifications

Table 5. Cisco Nexus 9500 Cloud-Scale Line Cards: Product Specifications – Mechanical

	X9732C-EX	X9736C-FX	X9732C-FX	X9736C-EX	X9716oYC-EX	X9788TC-FX
Weight	12.13 lb 5.5 kg	14.38 lb 6.5 kg	15 lb 6.8 kg	14.77 lb 6.7 kg	12.75 lb 5.78 kg	13 lb 5.9 kg
Typical power	430 W	607 W	520 W	632 W	415 W	513 W
Maximum power	720 W	720 W	840 W	792 W	516 W	684 W
Mean Time Between Failure (MTBF) hours	481,470	420,050	429,090	476,970	580,050	429,630
Hot swappable	Yes	Yes	Yes	Yes	Yes	Yes
Airflow	Port-side intake	Port-side intake	Port-side intake	Port-side intake	Port-side intake	Port-side intake

Table 6. Cisco Nexus 9500 Cloud-Scale Fabric Modules: Product Specifications – Mechanical

	NgK-C9504-FM-E	NgK-C9508-FM-E	NgK-C9508-FM-E2	NgK-C9516-FM-E	NgK-C9516-FM-E2
Total capacity	3200 Gbps	6400 Gbps	6400 Gbps	12,800 Gbps	12,800 Gbps
Capacity (per slot)	800 Gbps	800 Gbps	800 Gbps	800 Gbps	800 Gbps
Maximum flow size	100 Gbps	100 Gbps	100 Gbps	50 Gbps	100 Gbps
Weight	6.6 lb (2.98 kg)	11.6 lb (5.28 kg)	10.94 lb (5.0 kg)	22.7 lb (10.3 kg)	20.31 lb (9.21 kg)
Typical power	234 W	455 W	266 W	980 W	439 W
Maximum power	313 W	570 W	420 W	1320 W	900 W
MTBF hours	829,890	653,420	642,820	363,100	515,870
Hot swappable	Yes	Yes	Yes	Yes	Yes

	N9K-C9504-FM-E	N9K-C9508-FM-E	N9K-C9508-FM-E2	N9K-C9516-FM-E	N9K-C9516-FM-E2
Airflow	Port-side intake	Port-side intake	Port-side intake	Port-side intake	Port-side intake

Note:

This data sheet specifies hardware capabilities only. Please refer to Cisco ACI or Cisco NX-OS software release notes and appropriate feature documentation for more details.

Regulatory Standards Compliance

Table 7. 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
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: Emissions	<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
RoHS	The product is RoHS-6 compliant with exceptions for leaded-Ball Grid-Array (BGA) balls and lead press-fit connectors.

Ordering Information

Table 8. Cisco Nexus 9500 Cloud-Scale Line Cards: Ordering Information

Part Number	Product Description
N9K-X9732C-EX	Cisco Nexus 9500 32p 100G QSFP cloud-scale line card

Part Number	Product Description
N9K-X9732C-EX=	Cisco Nexus 9500 32p 100G QSFP cloud-scale line card (Spare)
N9K-X9736C-FX	Cisco Nexus 9500 36p 100G QSFP cloud-scale line card
N9K-X9736C-FX=	Cisco Nexus 9500 36p 100G QSFP cloud-scale line card (Spare)
N9K-X9732C-FX	Cisco Nexus 9500 32p 100G QSFP cloud-scale line card
N9K-X9732C-FX=	Cisco Nexus 9500 32p 100G QSFP cloud-scale line card (Spare)
N9K-X9736C-EX	Cisco Nexus 9500 36p 100G QSFP cloud-scale line card
N9K-X9736C-EX=	Cisco Nexus 9500 36p 100G QSFP cloud-scale line card (Spare)
N9K-X9716oYC-EX	Cisco Nexus 9500 48p 1/10/25G SFP+ plus 4p 100G QSFP cloud-scale line card
N9K-X9716oYC-EX=	Cisco Nexus 9500 48p 1/10/25G SFP+ plus 4p 100G QSFP cloud-scale line card (Spare)
N9K-X9788TC-FX	Cisco Nexus 9500 48p 1/10G BaseT plus 4p 100G QSFP cloud-scale line card
N9K-X9788TC-FX=	Cisco Nexus 9500 48p 1/10G BaseT plus 4p 100G QSFP cloud-scale line card (Spare)

Table 9. Cisco Nexus 9500 Cloud-Scale Fabric Modules Ordering INFORMATION

Part Number	Product Description
N9K-C9504-FM-E	Cisco Nexus 9500 4-slot 800Gbps cloud-scale fabric module (100G flows)
N9K-C9504-FM-E=	Cisco Nexus 9500 4-slot 800Gbps cloud-scale fabric module (100G flows) (Spare)
N9K-C9508-FM-E	Cisco Nexus 9500 8-slot 800Gbps cloud-scale fabric module (100G flows)
N9K-C9508-FM-E=	Cisco Nexus 9500 8-slot 800Gbps cloud-scale fabric module (100G flows) (Spare)
N9K-C9516-FM-E	Cisco Nexus 9500 16-slot 800Gbps cloud-scale fabric module (50G flows)
N9K-C9516-FM-E=	Cisco Nexus 9500 16-slot 800Gbps cloud-scale fabric module (50G flows) (Spare)
N9K-C9508-FM-E2	Cisco Nexus 9500 8-slot 800Gbps cloud-scale fabric module (100G flows)
N9K-C9508-FM-E2=	Cisco Nexus 9500 8-slot 800Gbps cloud-scale fabric module (100G flows) (Spare)
N9K-C9516-FM-E2	Cisco Nexus 9500 16-slot 800Gbps cloud-scale fabric module (100G flows)
N9K-C9516-FM-E2=	Cisco Nexus 9500 16-slot 800Gbps cloud-scale fabric module (100G flows) (Spare)

Warranty

The Cisco Nexus 9500 platform has a 1-year limited hardware warranty. The warranty includes hardware replacement with a 10-day turnaround from receipt of a Return Materials Authorization (RMA).

Service and Support

Cisco offers a wide range of services to help accelerate your success in deploying and optimizing the Cisco Nexus 9500 platform in your data center. These innovative Cisco Services offerings are delivered through a unique combination of people, processes, tools, and partners and are focused on helping you increase operational 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 Nexus 9500 platform switch.

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 Nexus 9000 Series, please visit <https://www.cisco.com/go/nexus9000>.

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