

Cisco Nexus 9500 Platform Switches for Cisco Application Centric Infrastructure

Product Overview

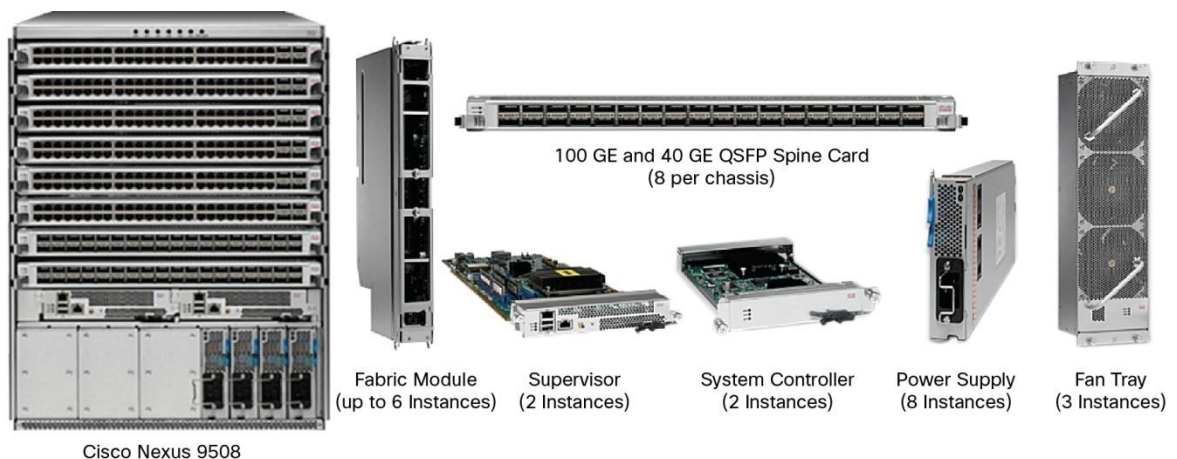
Changing application environments are creating new demands on the IT infrastructure that supports them. With application workloads deployed across a mix of virtualized and nonvirtualized server and storage infrastructure, you require a network infrastructure that provides consistent connectivity, security, and visibility across a range of bare-metal, virtualized, and cloud computing environments. For example:

- Application instances are created dynamically, so provisioning, modification, and removal of application network connectivity also need to be dynamic.
- Business units demand accelerated application deployments, so IT departments must provide a shared IT infrastructure that addresses time-to-market needs and provides a positive Return On Investment (ROI).
- When organizations deploy a mix of custom, open-source, and off-the-shelf commercial applications, IT departments must manage security and Quality of Service (QoS) for environments that support multitenancy.
- Applications are transitioning to a less monolithic, scale-out, multinode model. The IT infrastructure that supports this model must scale with the speed of business and support both 1, 10, 25, 40, 50 and 100 Gigabit Ethernet connectivity.

The Cisco Nexus[®] 9000 Series Switches include both modular and fixed-port switches that overcome these challenges with flexible, agile, low-cost Cisco[®] Application Centric Infrastructure (Cisco ACI[™]).

The modular Cisco Nexus 9504, 9508, and 9516 Switches (Figure 1) are Cisco ACI spine devices enabled by nonblocking 100 and 40 Gigabit Ethernet line cards, supervisors, system controllers, and power supplies.

Figure 1. Cisco Nexus 9508 ACI Components



Organizations can use ACI to take full advantage of an automated, policy-based, systems management approach.

Cisco Nexus 9500 Platform Features and Benefits

The Cisco Nexus 9500 platform is a modular chassis that supports up to 16 line cards, 2 supervisor modules, 2 chassis controllers, 3 fan trays, 6 fabric modules, and 10 power supplies in ACI mode. The switch supports comprehensive Layer 2 and 3 functions on nonblocking 40 and 100 Gigabit Ethernet ports for ACI spine (Table 1).


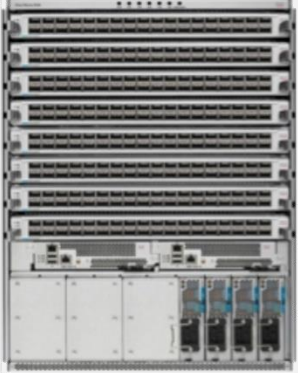
Table 1. Cisco Nexus 9500 Platform Features and Benefits

Capability	Benefit
Nonblocking, high-density 40 and 100 Gigabit Ethernet spine configuration	The Cisco Nexus 9000 Series helps organizations transition from 1 and 10 Gigabit Ethernet infrastructure to 40 and 100 Gigabit Ethernet fabric infrastructure to support the increased bandwidth demands of scale-out, multinode application environments.
Highly available, scalable, and robust solution	All major components are redundant, including supervisors, system controllers, power supplies, and fan trays. Buffer memory is integrated into the forwarding ASICs, avoiding the need for a large number of external memory modules. All transceivers are pluggable to support the highest possible Mean Time Between Failure (MTBF) for the switch.
Chassis designed for 2 to 3 future generations of line cards	The flexible and efficient chassis design for future expansion with the capability to support more bandwidth and cooling, and twice the number of power supplies needed to support today's maximum configuration.
Power efficiency	The Cisco Nexus 9500 platform is the first switch chassis designed without a midplane. Line cards and fabric modules connect directly. This design approach provides optimal front-to-back airflow and helps the switch operate using less power. In addition, all Cisco Nexus 9000 Series power supplies are 80 Plus Platinum rated. The typical power consumption per 10 Gigabit Ethernet port is less than 3.5 watts (W). The typical power consumption of each 40 and 100 Gigabit Ethernet port is less than 14W and 22W respectively.

Cisco Nexus 9500 Platform Components for Cisco ACI Deployments

The Cisco Nexus 9500 platform enables scalable Cisco ACI deployments. Customers can choose from 4-, 8-, or 16-slot chassis options to build a Cisco ACI spine to fit their deployment scale (Table 2).

Table 2. Cisco Nexus 9500 Platform for Cisco ACI Deployment

<p>N9K-C9504: 4-Slot Chassis</p> 	<ul style="list-style-type: none"> • Up to 4 spine line cards • Up to 4 power supplies • Up to 6 fabric modules • Up to 2 system controllers • Up to 2 supervisors • Up to 3 fan trays
<p>N9K-C9508: 8-Slot Chassis</p> 	<ul style="list-style-type: none"> • Up to 8 spine line cards • Up to 8 power supplies • Up to 6 fabric modules • Up to 2 system controllers • Up to 2 supervisors • Up to 3 fan trays

N9K-C9516: 16-Slot Chassis






- Up to 16 spine line cards
- Up to 10 power supplies
- Up to 6 fabric modules
- Up to 2 system controllers
- Up to 2 supervisors
- Up to 3 fan trays

Cisco Nexus 9500 Platform Line Cards for Cisco ACI Deployments

The Cisco Nexus 9500 platform supports a nonblocking 40 Gigabit Ethernet line card for the spine (Table 3).

Table 3. Cisco Nexus 9500 Platform Line Card for Cisco ACI

<p>N9K-X9736C-FX: 100 Gigabit Ethernet Line Card</p> 	<ul style="list-style-type: none"> • 36-port 100 Gigabit Ethernet Quad Small Form-Factor Pluggable 28 (QSFP28) line card • Designed for use in a Cisco ACI spine switch role • Powered by Cisco's Cloudscale Smart Buffer, L2 Encryption and Tetratlon Technology • Line rate for 170 Byte+ packet sizes • Supports both NX-OS and ACI modes • Supported in 4, 8, and 16 slot chassis • Requires 4 100-Gbps fabric modules (N9K-C950X-FM-E or N9K-C9516-FM-E2) for 3.2T backplane connectivity • Compatible with N9K-C9504-FM-E, N9K-C9508-FM-E, and N9K-C9516-FM-E2
<p>N9K-X9732C-EX: 100 Gigabit Ethernet Line Card</p> 	<ul style="list-style-type: none"> • 32-port 100 Gigabit Ethernet Quad Small Form-Factor Pluggable 28 (QSFP28) line card • Designed for use in a Cisco ACI spine switch role • Powered by Cisco's Cloudscale Technology • Line rate for all packet sizes • Supports both NX-OS and ACI modes • Supported in 4, 8, and 16 slot chassis • Requires 4 100-Gbps fabric modules (N9K-C950X-FM-E or N9K-C9516-FM-E2) for maximum bandwidth • Compatible with N9K-C9504-FM-E, N9K-C9508-FM-E, and N9K-C9516-FM-E2
<p>N9K-X9736PQ: 40 Gigabit Ethernet Cisco ACI Spine Line Card</p> 	<ul style="list-style-type: none"> • 36-port 40 Gigabit Ethernet QSFP+ line card • Designed for use in a Cisco ACI spine switch role • Line rate for all packet sizes • Works only in Cisco ACI mode • Supported in 4-, 8-, and 16- slot chassis • Requires 6 40-Gbps fabric modules (N9K-C950X-FM) for maximum bandwidth fabric modules • Cannot mix with non N9K-X9736PQ in the same chassis • Compatible with N9K-C9504-FM and N9K-C9508-FM, and N9K-C9516-FM

Cisco Nexus 9500 Platform Fabric Modules

The Cisco Nexus 9500 platform uses a Clos fabric design that interconnects the line cards with rear-mounted fabric modules. Cloudscale Technology powered N9K-C95xx-FM-E enables 100 Gigabit Ethernet spine deployments. All fabric cards are directly connected to all line cards. With load balancing across fabric cards, the architecture achieves optimal bandwidth distribution within the chassis. See Table 4 for linecard and fabric module compatibility information.

Table 4. Cisco Nexus 9500 Line Cards and Fabric Modules

Part Number	Description	Compatible Fabric Module	Maximum Supported Fabric Modules
N9K-X9736C-FX	Cisco Nexus 9500 platform Cisco ACI spine line card; 36p 100-Gbps QSFP28 line card (nonblocking)	N9K-C9504-FM-E N9K-C9508-FM-E N9K-C9516-FM-E2	4
N9K-X9732C-EX	Cisco Nexus 9500 platform Cisco ACI spine line card; 32p 100-Gbps QSFP28 line card (nonblocking)	N9K-C9504-FM-E N9K-C9508-FM-E N9K-C9516-FM-E2	4
N9K-X9736PQ	Cisco Nexus 9500 platform Cisco ACI spine line card; 36p 40-Gbps QSFP+ line card (nonblocking)	N9K-C9504-FM N9K-C9508-FM N9K-C9516-FM	6

Cisco Nexus 9500 Platform Supervisor Module

A pair of redundant supervisor modules manages all switch operations using a state-synchronized active-standby model. The supervisor accepts an external clock and supports management through multiple ports, including two USB ports, a serial console, and a 10/100/1000-Mbps network port. Following supervisors are available to provide deployment options:

- Supervisor B+: 6-core, 12 thread, 1.9-GHz x86 CPU, with 32 GB of RAM and 256-GB solid-state disk drive
- Supervisor B: 6-core, 12 thread, 2.2-GHz x86 CPU, with 24 GB of RAM and 256-GB solid-state disk drive
- Supervisor A+: 4-core, 8 thread, 1.8-GHz x86 CPU, with 16 GB of RAM and 64-GB solid-state disk drive
- Supervisor A: 2-core, 4 thread, 1.8-GHz x86 CPU, with 16 GB of RAM and 64-GB solid-state disk drive

Either supervisor can be used in ACI deployments, but Supervisor B+ provides additional computing and storage for enhanced performance. Redundant supervisors need to be of the same type within a chassis.

Cisco Nexus 9500 Platform System Controller

A pair of redundant system controllers offloads chassis management functions from the supervisor modules. The controllers are responsible for managing power supplies and fan trays and are central points for the Gigabit Ethernet Out-of-Band Channels (EOBCs) between the supervisors, fabric modules, and line cards.

Cisco Nexus 9500 Platform Power Supply

The Cisco Nexus 9500 platform supports up to 10 hot-swappable, front-panel-accessible power supplies. A fully loaded chassis can operate with two 3000W AC power supplies. N+1 and N+N redundancy modes are supported depending on the chassis configuration. The power supplies are 80 Plus Platinum rated, providing more than 90 percent efficiency across typical workloads.

Three power supplies are available to provide deployment options:

- N9K-PAC-3000W-B Cisco Nexus 9500 platform 3000W standard 200-to-240 VAC power supply with port-side intake
- N9K-PDC-3000W-B: Cisco Nexus 9500 platform 3000W standard –48 to –60 VDC power supply with port-side intake
- N9K-PUV-3000W-B Cisco Nexus 9500 platform 3000W universal high-voltage AC/DC power supply with port-side intake

Cisco Nexus 9500 Platform Fan Trays

Three hot-swappable fan trays support front-to-back cooling. Each fan tray covers two fabric modules and can be removed for access.

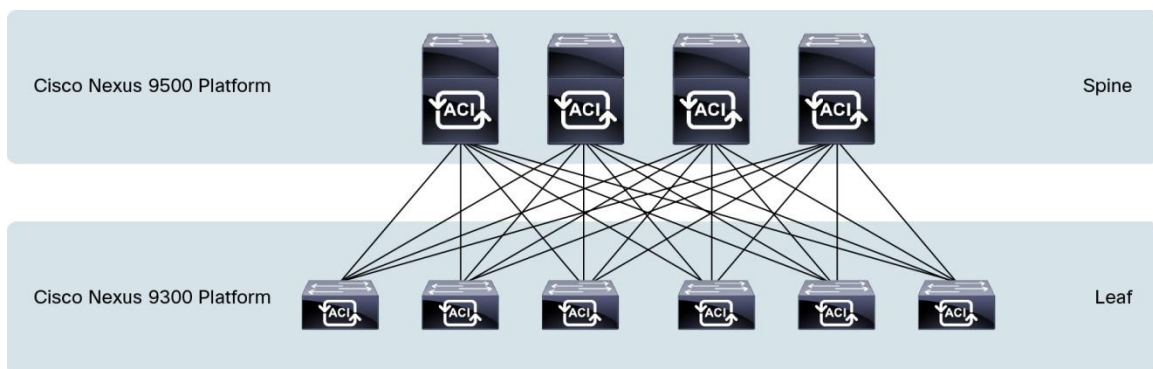
Deployment Scenarios

Cisco ACI Leaf-and-Spine Architecture

Cisco Application Centric Infrastructure is a holistic architecture with centralized automation and policy-based application profiles. The Cisco ACI fabric is designed from the foundation to support emerging industry demands while maintaining a migration path for architecture already in place. The fabric is designed to support management automation, programmatic policy, and dynamic “workload-anywhere” models. The Cisco ACI fabric accomplishes this with a combination of hardware, policy-based control systems, and software closely coupled to provide advantages not possible in other models. For additional details, please visit <https://www.cisco.com/go/aci>.

The Cisco Nexus 9500 platform with Cisco ASIC technology forms the spine in these architectures (Figure 2). The Layer 3 capabilities established by both the Cisco Nexus 9500 and 9300 platforms enable the two to be used with equal-cost multipath (ECMP) routing to accelerate the flow of traffic and reduce reconvergence time in the event of a failure. The degree of redundancy in leaf-and-spine architecture delivers increased availability with a high level of flexibility in workload placement.

Figure 2. Cisco Nexus 9500 Platform in a Leaf-and-Spine Architecture



Cisco Nexus 9000 Series Software Overview

The Cisco ACI image enables the Cisco ACI spine-and-leaf architecture on the Cisco Nexus 9500 platform. Powered with the OpFlex-enabled Cisco Application Policy Infrastructure Controller (APIC) and other open controllers such as OpenStack, this deployment model supports dramatic reduction in time-to-service delivery, automated network provisioning, and real-time telemetry correlation between the virtual and physical infrastructure.

Table 5 lists the software packaging and licensing available for the Cisco 9500 platform.

Table 5. Software Packaging and Licensing

Packaging	Chassis Based	Part Number	Supported Features
Cisco Nexus 9500 platform Cisco ACI software	Chassis	ACI-N9KDK9-11.0	Cisco Nexus 9500 or 9300 platform Cisco ACI base software and Cisco NX-OS Software Release 11.0

Supported Pluggable Optics

For details about the various optical modules and the minimum software release required for each of the supported optical modules, visit

https://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html.

Power Supply

Tables 6, 7 and 8 list the properties of the Cisco Nexus 9500 platform power supplies.

Table 6. N9K-PAC-3000W-B Power-Supply Properties

AC Power-Supply Properties	
Power	3000W AC
Input voltage	200 to 240 VAC
Frequency	50 to 60 Hz
Efficiency	90% or greater (20 to 100% load)
RoHS compliance	Yes
Hot swappable	Yes
Port side intake airflow power supply	Yes

Table 7. N9K-PDC-3000W-B DC Power-Supply Properties

DC Power-Supply Properties	
Power	3000W
Input voltage	-48V to -60 VDC (nominal) -40V to -72 VDC (min – max)
Frequency	–
Efficiency	90% or greater (20 to 100% load)
RoHS compliance	Yes
Hot swappable	Yes
Port side intake airflow power supply	Yes

Table 8. N9K-PUV-3000W-B Universal High Voltage AC/DC Power-Supply Properties

AC Power-Supply Properties	
Power	3000W AC
Input voltage	200 to 277 VAC or 240 to 380 VDC (nominal) 192 to 400 VDC (min – max)
Frequency	47 to 63 Hz
Efficiency	90% or greater (20 to 100% load)
RoHS compliance	Yes
Hot swappable	Yes
Port side intake airflow power supply	Yes

Environment

Table 9 lists the environmental properties of the Cisco Nexus 9500 platform.

Table 9. Environmental Properties

Property	Cisco Nexus 9500 Platform
Physical (H x W x D)	
<ul style="list-style-type: none"> • Cisco Nexus 9504 • Cisco Nexus 9508 • Cisco Nexus 9516 	12.25 x 17.50 x 33.15 in. (31.1 x 44.50 x 84.20 cm) 22.70 x 17.50 x 30.00 in. (57.78 x 44.50 x 76.20 cm) 36.70 x 17.50 x 31.76 in. (93.41 x 44.50 x 80.67 cm)
Operating temperature	32 to 104°F (0 to 40°C)
Nonoperating (storage) temperature	-40 to 158°F (-40 to 70°C)
Humidity	5 to 95% (noncondensing)
Altitude	0 to 13,123 ft (0 to 4000m)

Weight and Typical Power

Table 10 lists the weight and typical power consumption of the Cisco Nexus 9500 platform.

Table 10. Weight and Power Consumption

Component	Weight	Typical Power	Maximum Power
Chassis			
<ul style="list-style-type: none"> • Cisco Nexus 9504 chassis • Cisco Nexus 9508 chassis • Cisco Nexus 9516 chassis 	84 lb (38.2 kg) 150 lb (68.2 kg) 192 lb (87.3 kg)	-	-
Power supply			
<ul style="list-style-type: none"> • N9K-PAC-3000W-B • N9K-PDC-3000W-B • N9K-PUV-3000W-B 	6.16 lb (2.8 kg) 6.4 lb (2.9 kg) 5.9 lb (2.7 kg)	-	-
Fan tray (3 maximum)			
<ul style="list-style-type: none"> • Cisco Nexus 9504 • Cisco Nexus 9508 • Cisco Nexus 9516 	6.38 lb (2.9 kg) 8.25 lb (3.7 kg) 10.10 lb (4.6 kg)	95W 176W 330W	137W 250W 450W
Fabric module (6 maximum)			
<ul style="list-style-type: none"> • N9K-C9504-FM-E • N9K-C9508-FM-E • N9K-C9516-FM-E2 • N9K-C9504-FM • N9K-C9508-FM • N9K-C9516-FM 	6.60 lb (2.98 kg) 11.60 lb (5.28 kg) 20.31 lb (9.21 kg) 5.76 lb (2.6 kg) 9.59 lb (4.4 kg) 11.50 lb (5.2 kg)	234W 455W 439W 95W 176W 330W	313W 570W 780W 131W 251W 504W
Supervisor (2 maximum)			
<ul style="list-style-type: none"> • SUP-A+ • SUP-B+ • SUP-A • SUP-B 	5.2 lb (2.37 kg) 5.3 lb (2.39 kg) 4.84 lb (2.2 kg) 6.00 lb (2.72 kg)	39W 47W 69W 75W	80W 80W 80W 90W
System controller (2 maximum)	1.91 lb (0.9 kg)	13W	25W
Cisco Nexus X9736C-FX: 36-port 100/40 Gigabit Ethernet QSFP28 line card	14.6 lb (6.2 kg)	607W	1000W
Cisco Nexus X9732C-EX: 32-port 100/40 Gigabit Ethernet QSFP28 line card	12.13 lb (5.5 kg)	430W	720W
Cisco Nexus X9736PQ: 36-port 40 Gigabit Ethernet QSFP+ Cisco ACI spine line card	11.20 lb (5.08 kg)	197W	211W

Regulatory Standards Compliance

Table 11 summarizes regulatory standards compliance for the Cisco Nexus 9500 platform.

Table 11. 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 12 presents ordering information for the Cisco Nexus 9500 platform. The Cisco Nexus 2200 platform fabric extenders can be ordered separately or with the Cisco Nexus 9500 platform.

Table 12. Ordering Information

Part Number	Product Description
Hardware	
N9K-C9504-B2	Nexus 9504 Chassis Bundle with 1 Sup-A, 3 PS, 2 SC, 3 Fan Trays, 6 Fabric Modules for N9K-X9736PQ deployments
N9K-C9504-B3-E	Nexus 9504 Chassis Bundle with 1 Sup-A, 3 PS, 2 SC, 3 Fan Trays, 4 Fabric Modules for N9K-X9732C-EX/N9K-X9736C-FX deployments
N9K-C9504	Nexus 9504 Chassis with 4 line card slots
N9K-C9508-B2	Nexus 9508 Chassis Bundle with 1 Sup-A, 3 PS, 2 SC, 3 Fan Trays, 6 Fabric Modules for N9K-X9736PQ deployments
N9K-C9508-B3-E	Nexus 9508 Chassis Bundle with 1 Sup-A, 3 PS, 2 SC, 3 Fan Trays, 4 Fabric Modules for N9K-X9732C-EX/N9K-X9736C-FX deployments
N9K-C9508	Nexus 9508 Chassis with 8 line card slots
N9K-C9516-B2	Nexus 9516 Chassis Bundle with 1 Sup-A, 3 PS, 2 SC, 3 Fan Trays, 6 Fabric Modules for N9K-X9736PQ deployments
N9K-C9516	Nexus 9516 Chassis with 16 linecard slots
N9K-X9736C-FX	Nexus 9500 ACI Spine line card, 36p 100G QSFP linecard (3.2T Backplane)
N9K-X9732C-EX	Nexus 9500 ACI Spine line card, 32p 100G QSFP linecard (non-blocking)
N9K-X9736PQ	Nexus 9500 ACI Spine line card, 36p 40G QSFP line card (non-blocking)

Part Number	Product Description
N9K-SUP-A+	Nexus 9500 4-Core Supervisor
N9K-SUP-B+	Nexus 9500 6-Core Supervisor
N9K-SUP-A	Nexus 9500 4-Core Supervisor
N9K-SUP-B	Nexus 9500 6-Core Supervisor
N9K-SC-A	Nexus 9500 System Controller
N9K-PAC-3000W-B	Nexus 9500 3000W AC PS, Port Side Intake
N9K-PDC-3000W-B	Nexus 9500 3000W DC PS, Port Side Intake
N9K-PUV-3000W-B	Nexus 9500 3000W Universal high voltage AC/DC PS, Port Side Intake
N9K-C9504-FM-E	Fabric Module for Nexus 9504 chassis with 100G ACI spine support
N9K-C9504-FM	Fabric Module for Nexus 9504 chassis with 40G ACI spine support
N9K-C9504-FAN	Fan Tray for Nexus 9504 chassis
N9K-C9508-FM-E	Fabric Module for Nexus 9508 chassis 100G ACI spine support
N9K-C9508-FM	Fabric Module for Nexus 9508 chassis with 40G ACI spine support
N9K-C9508-FAN	Fan Tray for Nexus 9508 chassis
N9K-C9516-FM	Fabric Module for Nexus 9516 chassis with 40G ACI spine support
N9K-C9516-FM-E2	Fabric Module for Nexus 9516 chassis 100G ACI spine support
N9K-C9516-FAN	Fan Tray for Nexus 9516 chassis
Accessories	
N9K-C9500-RMK=	Nexus 9500 Rack Mount Kit for Nexus 9508 and 9516
N9K-C9504-RMK=	Nexus 9500 Rack Mount Kit for Nexus 9504
N9K-C9500-ACK=	Nexus 9500 Accessory Kit

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. The innovative Cisco Services offerings are delivered through a unique combination of people, processes, tools, and partners and are focused on helping you increase operation efficiency and improve your data center network. 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 Smart Net Total Care™ 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 capability, which offers proactive diagnostics and real-time alerts on your Cisco Nexus 9500 platform.

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

Financing to Help You Achieve Your Objectives

Cisco Capital® financing can help you acquire the technology you need to achieve your objectives and stay competitive. We can help you reduce Capital Expenditures (CapEx), accelerate your growth, and optimize your investment dollars and ROI. Cisco Capital financing gives you flexibility in acquiring hardware, software, services, and complementary third-party equipment. And you have just one predictable payment. Cisco Capital financing is available in more than 100 countries. [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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