

# Cisco Nexus 9500 Platform Application-Centric Infrastructure Switches

## Product Overview

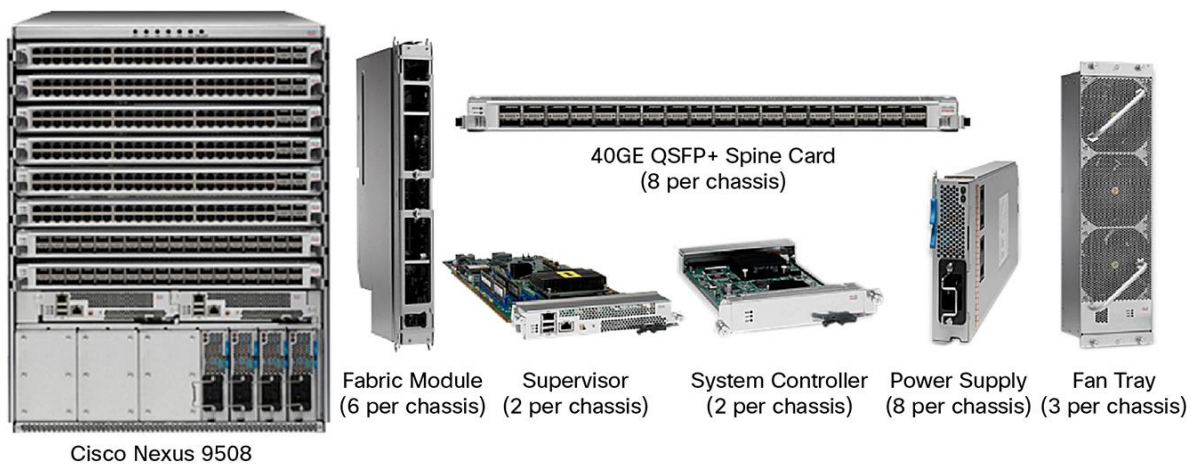
Changing application environments are creating new demands on the IT infrastructure that supports them. Application workloads deployed across a mix of virtualized and nonvirtualized server and storage infrastructures, require a network infrastructure that provides consistent connectivity, security, and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

- Application instances are created dynamically. Provisioning, modification, and removal of application network connectivity also need to be dynamic.
- Business units demand accelerated application deployments. IT departments must provide a shared IT infrastructure addresses time-to-market needs and 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 10 and 40 Gigabit Ethernet connectivity.

The Cisco Nexus<sup>®</sup> 9000 Series Switches include both modular and fixed-port switches that overcome these challenges with flexible, agile, low-cost, application-centric infrastructure (ACI).

The modular Cisco Nexus 9504 and 9508 Switches (Figure 1) are ACI spine devices enabled by nonblocking 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 9508 is a modular chassis that supports up to eight line cards, two supervisor modules, two chassis controllers, three fan trays, six fabric modules, and eight power supplies. The switch supports comprehensive Layer 2 and 3 functions on nonblocking 1, 10, and 40 Gigabit Ethernet ports (Table 1).

**Table 1.** Cisco Nexus 9500 Platform Features and Benefits


Capability	Benefit
<b>Predictable high performance</b>	The switch delivers up to 30 Tbps of nonblocking performance with latency of less than 5 microseconds, enabling data center customers to build a robust network fabric that can scale from as few as 200 10 Gigabit Ethernet server ports to more than 200,000 10 Gigabit Ethernet server ports.
<b>Nonblocking, high-density 1 and 10 Gigabit Ethernet configuration</b>	The Cisco Nexus 9500 platform helps organizations transition from existing 1 Gigabit Ethernet Cisco Catalyst® 6500 Series Switches server access designs to 10 Gigabit Ethernet server access designs with the same port density.
<b>Nonblocking, high-density 10 and 40 Gigabit Ethernet configuration</b>	The Cisco Nexus 9000 Series helps organizations transition from 1 and 10 Gigabit Ethernet infrastructure to 10 and 40 Gigabit Ethernet infrastructure to support the increased bandwidth demands of scale-out, multinode application environments.
<b>Advanced optics</b>	Cisco offers a pluggable 40 Gigabit Ethernet QSFP+ bidirectional transceiver that enables customers to use their existing 10 Gigabit Ethernet data center cabling to support 40 Gigabit Ethernet connectivity. This allows adoption of 40 Gigabit Ethernet without cable infrastructure upgrade costs.
<b>Highly available, scalable, and robust solution</b>	All major components are redundant, including supervisors, system controllers, power supplies, and fan trays. The switch line cards use a mix of merchant and Cisco application-specific integrated circuits (ASICs) to produce a low-complexity, low-cost design. All 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.
<b>Chassis designed for 2 to 3 future generations of line cards</b>	The flexible and efficient chassis design has 100 percent headroom 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.
<b>Power efficiency</b>	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 Gigabit Ethernet port is less than 14W.

## Cisco Nexus 9500 Platform Components

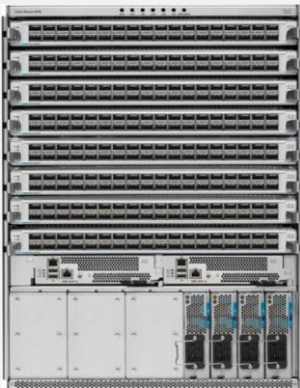
### Cisco Nexus 9500 Chassis Platform for ACI Deployments

The Cisco Nexus 9500 platform enables scalable Application Centric Infrastructure deployments. Customers can choose from four or eight slot chassis options (Table 2) to build ACI spine to fit their deployment scale. Cisco Nexus 9500 Switch Platform for ACI Deployment

**Table 2.** Cisco Nexus 9500 Switch Platform for ACI Deployment

<p><b>N9K-C9504: 4 Payload Slot Chassis</b></p> 	<ul style="list-style-type: none"> <li>• Supports up to 4 Linecards</li> <li>• Up to 4 power supplies</li> <li>• Up to 6 fabric modules</li> <li>• Up to 2 system controller</li> <li>• Up to 2 supervisor</li> <li>• Up to 3 fan trays</li> </ul>
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**N9K-C9508: 8 Payload Slot Chassis**



- Supports up to 8 Linecards
- Up to 8 power supplies
- Up to 6 fabric modules
- Up to 2 system controller
- Up to 2 supervisor
- Up to 3 fan trays

**Cisco Nexus 9500 Platform Line Cards for 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 ACI-Enabled Line Card

**N9K-X9736PQ: 40 Gigabit Ethernet ACI Spine Line Card**



- 36-port 40 Gigabit Ethernet QSFP+ line card
- Nonblocking
- Requires 6 fabric modules
- Designed for use in an ACI spine switch role
- Works only in ACI mode
- Cannot mix with line cards other than Cisco Nexus 9700 series line cards in the same chassis
- Supported in 8-slot chassis

**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. The Cisco Nexus 9500 platform supports up to six fabric modules, each of which provides up to 10.24-Tbps line-rate packet forwarding capacity (Table 4). 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.

**Table 4.** Cisco Nexus 9500 Line Cards and Fabric Modules

Part Number	Description	Required Fabric Modules
N9K-X9736PQ	Cisco Nexus 9500 platform ACI spine line card, 36p 40-Gbps QSFP aggregation line card (nonblocking)	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. Two supervisors are available to provide deployment options:

Supervisor A: 4-Core, 1.8GHz x86 CPU, 16 GB of RAM and 64 GB solid state drive (SSD)

Supervisor B: 6-Core, 2.2GHz x86 CPU, 24 GB of RAM and 256 GB solid state drive (SSD)

Either supervisor can be used in NX-OS deployments, but Supervisor B provides additional compute and storage for enhanced performance. Redundant supervisors need to be of 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. The 3000W AC power supply is 80 Plus Platinum rated, providing more than 90 percent efficiency across typical workloads.

The additional four power supply slots are not needed with existing line cards but offer headroom to support higher-bandwidth line cards in the future.

## 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.

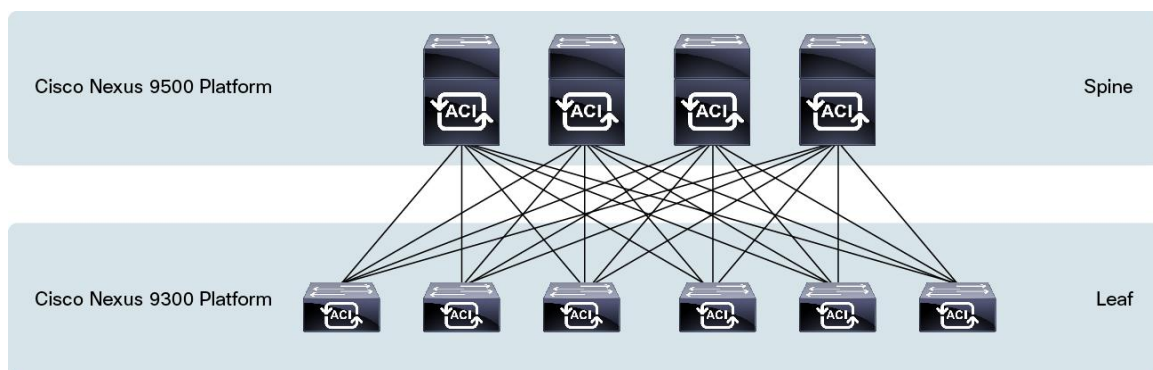
## Deployment Scenarios

### 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 <http://www.cisco.com/go/aci>.

The Cisco Nexus 9500 platform with merchant+ ASIC technology forms the leaf 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 NX-OS Software for Cisco Nexus 9000 Series Switches is a purpose-built operating system designed for data center-class performance, resiliency, scalability, manageability, and programmability. It provides a robust and comprehensive feature set that meets the demanding requirements of virtualization and automation in present and future data centers. The Cisco NX-OS Software for Cisco Nexus 9000 Series Switches works in two modes:

- Cisco ACI deployment
- Cisco NX-OS deployment

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 ACI Software	Chassis	ACI-N9KDK9-11.0	Cisco Nexus 9500 or 9300 ACI Base Software 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

[http://www.cisco.com/en/US/products/hw/modules/ps5455/products\\_device\\_support\\_tables\\_list.html](http://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html).

## Power Supply

Table 6 lists the properties of the Cisco Nexus 9500 platform power supplies.

**Table 6.** Power Supply Properties

AC Power Supply Properties	Cisco Nexus 9500 Platform
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
Front-to-back airflow power supply	Yes

## Environment

Table 7 lists the environmental properties of the Cisco Nexus 9500 platform.

**Table 7.** Environmental Properties

Property	Cisco Nexus 9500 Platform
<b>Physical (H x W x D)</b>	
<ul style="list-style-type: none"> <li>• Cisco Nexus 9504</li> <li>• Cisco Nexus 9508</li> </ul>	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)
<b>Operating temperature</b>	32 to 104°F (0 to 40°C)
<b>Nonoperating (storage) temperature</b>	-40 to 158°F (-40 to 70°C)
<b>Humidity</b>	5 to 95% (noncondensing)
<b>Altitude</b>	0 to 13,123 ft (0 to 4000m)

## Weight and Typical Power

Table 8 lists the weight and typical power consumption of the Cisco Nexus 9500 platform.

**Table 8.** Weight and Power Consumption

Component	Weight	Typical Power	Maximum Power
<b>Chassis</b>			
<ul style="list-style-type: none"> <li>• Cisco Nexus 9504 chassis</li> <li>• Cisco Nexus 9508 chassis</li> </ul>	84 lb (38.2kg) 150 lb (68.2 kg)	-	-
<b>Cisco Nexus 3000W AC power supply (8 maximum)</b>	6.16 lb (2.8 kg)	-	-
<b>Fan trays (3 maximum)</b>			
<ul style="list-style-type: none"> <li>• Cisco Nexus 9504</li> <li>• Cisco Nexus 9508</li> </ul>	6.38 lb (2.9 kg) 8.25 lb (3.7 kg)	95W 176W	137W 250W
<b>Fabric modules (6 maximum)</b>			
<ul style="list-style-type: none"> <li>• Cisco Nexus 9504</li> <li>• Cisco Nexus 9508</li> </ul>	5.76 lb (2.6 kg) 9.59 lb (4.4 kg)	95W 176W	131W 251W
<b>Supervisor (2 maximum)</b>			
<ul style="list-style-type: none"> <li>• SUP-A</li> <li>• SUP-B</li> </ul>	4.84 lb (2.2 kg) 6.00 lb (2.72 kg)	69W 75W	80W 90W
<b>System controller (2 maximum)</b>	1.91 lb (0.9 kg)	13W	25W
<b>Cisco Nexus X9736PQ:</b> 36-port 40 Gigabit Ethernet QSFP+ ACI spine line card	11.20 lb (5.08 kg)	197W	211W

## Regulatory Standards Compliance

Table 9 summarizes regulatory standards compliance for the Cisco Nexus 9500 platform.

**Table 9.** Regulatory Standards Compliance: Safety and EMC

Specification	Description
<b>Regulatory compliance</b>	Products should comply with CE Markings according to directives 2004/108/EC and 2006/95/EC
<b>Safety</b>	<ul style="list-style-type: none"> <li>• UL 60950-1 Second Edition</li> <li>• CAN/CSA-C22.2 No. 60950-1 Second Edition</li> <li>• EN 60950-1 Second Edition</li> <li>• IEC 60950-1 Second Edition</li> <li>• AS/NZS 60950-1</li> <li>• GB4943</li> </ul>

Specification	Description
<b>EMC: Emissions</b>	<ul style="list-style-type: none"> <li>• 47CFR Part 15 (CFR 47) Class A</li> <li>• AS/NZS CISPR22 Class A</li> <li>• CISPR22 Class A</li> <li>• EN55022 Class A</li> <li>• ICES003 Class A</li> <li>• VCCI Class A</li> <li>• EN61000-3-2</li> <li>• EN61000-3-3</li> <li>• KN22 Class A</li> <li>• CNS13438 Class A</li> </ul>
<b>EMC: Immunity</b>	<ul style="list-style-type: none"> <li>• EN55024</li> <li>• CISPR24</li> <li>• EN300386</li> <li>• KN 61000-4 series</li> </ul>
<b>RoHS</b>	The product is RoHS-6 compliant with exceptions for leaded-ball grid-array (BGA) balls and lead press-fit connectors.

## Ordering Information

Table 10 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 10.** Ordering Information

Part Number	Product Description
<b>Hardware</b>	
<b>N9K-C9504-B2</b>	Nexus 9504 Chassis Bundle with 1 Sup-A, 3 PS, 2 SC, 3 Fan Trays, 6 Fabric Modules
<b>N9K-C9504</b>	Nexus 9504 Chassis with 4 line card slots
<b>N9K-C9508-B2</b>	Nexus 9508 Chassis Bundle with 1 Sup-A, 3 PS, 2 SC, 3 Fan Trays, 6 Fabric Modules
<b>N9K-C9508</b>	Nexus 9508 Chassis with 8 line card slots
<b>N9K-X9736PQ</b>	Nexus 9500 ACI Spine line card, 36p 40G QSFP line card (non-blocking)
<b>N9K-SUP-A</b>	Nexus 9500 4-Core Supervisor
<b>N9K-SUP-B</b>	Nexus 9500 6-Core Supervisor
<b>N9K-SC-A</b>	Nexus 9500 System Controller
<b>N9K-PAC-3000W-B</b>	Nexus 9500 3000W AC PS, Port Side Intake
<b>N9K-C9508-FM</b>	Fabric Module for Nexus 9508 chassis
<b>N9K-C9508-FAN</b>	Fan Tray for Nexus 9508 chassis
<b>Software</b>	
<b>N95-LAN1K9</b>	Enhanced L3 including full OSPF, EIGRP, BGP, VXLAN
<b>DCNM-LAN-N95-K9</b>	DCNM license for Nexus 9500 Series
<b>Power Cords</b>	
<b>CAB-AC-16A-AUS</b>	Power Cord, 250V AC, 16A, Australia C19
<b>CAB-AC-2500W-EU</b>	Power Cord, 250Vac 16A, Europe
<b>CAB-AC-2500W-INT</b>	Power Cord, 250Vac 16A, INTL
<b>CAB-AC-2500W-ISRL</b>	Power Cord, 250VAC, 16A, Israel
<b>CAB-AC-2500W-US1</b>	Power Cord, 250Vac 16A, straight blade NEMA 6-20 plug, US
<b>CAB-AC-C6K-TWLK</b>	Power Cord, 250Vac 16A, twist lock NEMA L6-20 plug, US
<b>CAB-AC16A-CH</b>	16A AC Power Cord For China
<b>CAB-ACS-16</b>	AC Power Cord (Swiss) 16A

Part Number	Product Description
<b>CAB-C19-CBN</b>	Cabinet Jumper Power Cord, 250 VAC 16A, C20-C19 Connectors
<b>CAB-L520P-C19-US</b>	NEMA L5-20 to IEC-C19 6ft US
<b>Accessories</b>	
<b>N9K-C9500-RMK=</b>	Nexus 9500 Rack Mount Kit for Nexus 9508
<b>N9K-C9500-ACK=</b>	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 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 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.

## For More Information

For more information about the Cisco Nexus 9000 Series, please visit <http://www.cisco.com/go/nexus9000>.



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