Cisco Nexus 9300 Series Leaf Switches for Cisco Application Centric Infrastructure

Product Overview

Cisco[®] Application Centric Infrastructure (ACI) in the data center is a holistic architecture with centralized automation and policy-based application profiles. Cisco ACI provides a robust transport network for today's dynamic workloads. Cisco ACI is built on a network fabric that combines time-tested protocols with new innovations to create a highly flexible, scalable, and resilient architecture of low-latency, high-bandwidth links. This fabric delivers a network that can support the most demanding and flexible data center environments.

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 the industry move to 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.

The Cisco ACI fabric consists of three major components:

- Cisco Application Policy Infrastructure Controller (APIC)
- Spine switches
- Leaf switches

These three components handle both the application of network policy and the delivery of packets. Cisco Nexus[®] 9000 Series Switches support Cisco ACI, and organizations can use them as spine or leaf switches to take full advantage of an automated, policy-based, systems management approach.

The Cisco Nexus 9300 Series ACI leaf switches consists of fixed-port switches designed for top-of-rack (ToR) and middle-of-row (MoR) deployment in data centers that support enterprise applications, service provider hosting, and cloud computing environments. Cisco Nexus 9300 series ACIleaf switches are Layer 2 and 3 nonblocking switches that support 10 and 40 Gigabit Ethernet and Fibre Channel over Ethernet (FCoE) capable switches with up to 2.56 terabits per second (Tbps) of internal bandwidth.

Models

Table 1 lists the Cisco Nexus 9300 series switches that support Cisco ACI.

Table 1.   Cisco Nexus 9300 Series Leaf Switches for Cisco ACI

Model	Description
Cisco Nexus 9332PQ Switch	32 x 40-Gbps QSFP+ ports
Cisco Nexus 9372PX Switch	48 x 1/10-Gbps SFP+ and 6 x 40-Gbps QSFP+ ports
Cisco Nexus 9372TX Switch	48 x 1/10GBASE-T and 6 x 40-Gbps QSFP+ ports
Cisco Nexus 9396PX Switch	48 x 1/10-Gbps SFP+ and upto 12 x 40-Gbps QSFP+ ports
Cisco Nexus 9396TX Switch	48 x 1/10-Gbps SFP+ and upto 12 x 40-Gbps QSFP+ ports
Cisco Nexus 93128TX Switch	96 x 1/10GBASE-T and upto 8 x 40-Gbps QSFP+ ports

The Cisco Nexus 9332PQ Switch is a 1-rack-unit (1RU) switch that supports 2.56 Tbps of bandwidth and over 1500 Mpps across 32 fixed 40-Gbps QSFP+ ports (Figure 1).

Figure 1. Cisco Nexus 9332PQ Switch

The Cisco Nexus 9372PX Switch is a 1RU switch that supports 1.44 Tbps of bandwidth and over 1150 Mpps across 48 fixed 10-Gbps SFP+ ports and 6 fixed 40-Gbps QSFP+ ports (Figure 2).

Figure 2. Cisco Nexus 9372PX Switch

The Cisco Nexus 9372TX Switch is a 1RU switch that supports 1.44 Tbps of bandwidth and over 1150 Mpps across 48 fixed 10-Gbps BASE-T ports and 6 fixed 40-Gbps QSFP+ ports (Figure 3).

Figure 3. Cisco Nexus 9372TX Switch

The Cisco Nexus 9396PX Switch is a 2-rack-unit (2RU) switch that supports 1.92 Tbps of bandwidth and over 1500 Mpps across 48 fixed 10-Gbps Enhanced Small Form-Factor Pluggable (SFP+) ports and an uplink module (Figure 8 & 9) that can support upto 12 fixed 40-Gbps Enhanced Quad SFP (QSFP+) ports (Figure 4).

Figure 4. Cisco Nexus 9396PX Switch

The Cisco Nexus 9396TX Switch is a 2RU switch that supports up to 1.92 Tbps of bandwidth and over 1500 Mpps across 48 fixed 1/10GBASE-T ports and an uplink module (Figure 8 & 9) that can support upto 12 fixed 40-Gbps Enhanced Quad SFP (QSFP+) ports (Figure 5).

Figure 5.   Cisco Nexus 9396TX Switch

The Cisco Nexus 93128TX Switch is a 3RU switch that supports 2.56 Tbps and over 1500 Mpps across 96 fixed 1/10GBASE-T ports and an uplink module (Figure 8 & 9) that can support upto 8 fixed 40-Gbps QSFP ports (Figure 6).

Figure 6.   Cisco Nexus 93128TX Switch

The 40-Gbps ports for the Cisco Nexus 9396PX, 9396TX and 93128TX are provided on an uplink module that can be serviced and replaced by the user. There are 2 uplinks modules available for Cisco Nexus 9300 leaf switches for Cisco ACI.

All the 9300 ACI leaf switches use dual- core 2.5 GHz x86 CPU with 64 GB SSDD and 16GB memory for enhanced network performance. With the Cisco Nexus 9000 Series, organizations can quickly and easily upgrade existing data centers to carry 40 Gigabit Ethernet to the spine through advanced and cost-effective optics that enables the use of existing 10 Gigabit Ethernet fiber (a pair of multimode fiber strands). Please visit the Cisco 40GBASE QSFP modules data sheet for more details.

Features and Benefits

The Cisco Nexus 9300 platform switches are high-density, nonblocking, low-power-consuming switches that are designed to work well in leaf-and-spine deployment in enterprise data centers, service provider facilities, and large virtualized and cloud computing environments.

The platform offers industry-leading density and performance and capabilities with flexible port configurations that can support existing copper and fiber cabling (Tables 2 and 3). With 1/10GBASE-T support, the platform can deliver 10 Gigabit Ethernet over existing copper, enabling a low-cost upgrade from Cisco Catalyst® 6500 Series Switches when used in an MoR or end-of-row (EoR) configuration.

Model	Cisco Nexus 9332PQ	Cisco Nexus 9372PX	Cisco Nexus 9372TX
Ports	32 QSFP+ ports	48 fixed 1/10-Gbps SFP+ and 6 QSFP+ ports	48 fixed 1/10GBASE-T and 6 QSFP+ ports
Supported speeds	40 Gigabit Ethernet	1/10 Gigabit Ethernet	100 Megabit Ethernet and 1/10 Gigabit Ethernet
40 Gigabit Ethernet uplink port	-	6 fixed QSFP+ ports	6 fixed QSFP+ ports
	The switch offers 25 MB additional packet buffer shared with all ports for more resilient operations		
Power supplies (up to 2)	650 watts (W) AC/930W DC	650W AC/930W DC	650W AC/930W DC
Typical power[*] (AC)	228W	210W	374.5W
Maximum power[*] (AC)	508W	537W	694W
Input voltage (AC)	100 to 240V	100 to 240V	100 to 240V
Input voltage (DC)	-48V to -60V	-48Vto -60V	-48V to -60V
Frequency (AC)	50 to 60 Hz	50 to 60 Hz	50 to 60 Hz
Fans	4	4	4
Physical (H x W x D)	1.72 x 17.3 x 22.5 in. (4.4 x 43.9 x 57.1 cm)	1.72 x 17.3 x 22.5 in. (4.4 x 43.9 x 57.1 cm)	1.72 x 17.3 x 22.5 in. (4.4 x 43.9 x 57.1cm)
Acoustics	49.1 dBA at 40% fan speed, 65.6 dBA at 70% fan speed, and 78.5 dB at 100% fan speed	48.5 dBA at 40% fan speed, 64.9 dBA at 70% fan speed, and 77.8 dB at 100% fan speed	48.6 dBA at 40% fan speed, 65.2 dBA at 70% fan speed, and 76.5 dB at 100% fan speed
RoHS compliance	Yes	Yes	Yes

Table 2.   Specifications for Cisco Nexus 9300 Series Leaf Switches for Cisco ACI

Model	Cisco Nexus 9396PX	Cisco Nexus 9396TX	Cisco Nexus 93128TX
Ports	48 fixed SPF+ ports	48 fixed 1/10GBASE-T ports	96 fixed 1/10GBASE-T ports
Supported Speeds	1/10 Gigabit Ethernet speeds	100 megabit and 1/10 Gigabit Ethernet speeds	100 megabit and 1/10 Gigabit Ethernet speeds
40 Gigabit Ethernet uplink module (required)	6 or 12 QFSP+ ports active through the uplink module	6 or 12 QFSP+ ports active through the uplink module	6 or 8 QSFP+ ports active through the uplink module
Power supplies (up to 2)	650 watts (W) AC 930W DC	650 watts (W) AC 930W DC	1200W AC 930W DC
Typical power[*] (AC)	204W		432W (1 Gbps) 568W (10 Gbps)
Maximum power[*] (AC)	455W		739W (1 Gbps) 853W (10 Gbps)
Input voltage (AC)	100 to 240V	100 to 240V	100 to 120V (maximum output: 800W) 200 to 240V (maximum output: 1200W)
Input voltage (DC)	-48V to -60V	-48Vto -60V	-48V to -60V
Frequency (AC)	50 to 60Hz	50 to 60Hz	47 to 63Hz
Fan Trays	3	3	3
Physical (H x W x D)	3.5 x 17.5 x 22.5 in. (8.9 x 44.5 x 57.1 cm)	3.5 x 17.5 x 22.5 in. (8.9 x 44.5 x 57.1 cm)	5.3 x 17.5 x 22.5 in. (13.3 x 44.5 x 57.1 cm)
Acoustics	68.3 dBA at 40% fan speed, 78.8 dBA at 70% fan speed, and 84.5 dB at 100% fan speed	68.3 dBA at 40% fan speed, 78.8 dBA at 70% fan speed, and 84.5 dB at 100% fan speed	71.4 dBA at 40% fan speed, 80.2 dBA at 70% fan speed, and 85.7 dB at 100% fan speed
RoHS compliance	Yes	Yes	Yes

[*] Typical/Max power number is based on input drawn from the power circuit. Power Supply number (Ex: 650W AC power supply: N9K-PAC-650W) is based on output rating towards the inside of the switch.

Table 3.   Features of Cisco Nexus 9300 Series Leaf Switches for Cisco ACI

| Feature	Benefit
Predictable high performance	Latency of 1 to 2 microseconds with up to 1.28 Tbps of bandwidth enables customers to build a robust switch fabric scaling from as few as 200 10-Gbps server ports to more than 200,000 10-Gbps server ports.
Increased integrated buffer space	Up to a total of 50 MB of integrated shared buffer space allows better management of speed mismatch between access and uplink ports.
Designed for availability	Hot-swappable, redundant power supplies and fan trays increase availability.
Flexible airflow configuration	Both port-side intake and port-side exhaust airflow configurations are supported.
CPU, SSD, Memory	Dual- core 2.5 GHz x86 CPU with 64 GB SSD and 16GB memory for enhanced network performance
Power efficiency	All Cisco Nexus 9000 Series power supplies are 80 Plus Platinum rated, providing at least 90% efficiency with 20% utilization.
Advanced optics	Cisco offers a pluggable 40 Gigabit Ethernet QSFP+ transceiver that enables customers to use existing 10 Gigabit Ethernet data center cabling to support 40 Gigabit Ethernet connectivity. This technology facilitates adoption of 40 Gigabit Ethernet with no cable infrastructure upgrade cost.

Power and Cooling

The switches are designed to adapt to any data center hot-aisle and cold-aisle configuration. The switches can be installed with ports facing the rear, simplifying cabling of server racks by putting the ports closest to the servers they support. The switches can be installed with the ports facing the front, simplifying the upgrade of existing racks of switches in which network cables are wired to the front of the rack. The two deployment modes support front-to-back cooling through a choice of power supplies and fan trays designed with opposite airflow directions, denoted by red and blue tabs (Figure 7).

The above two deploy modes are available with AC power supplies. Additionally, DC power supply UCSC-PSU-930WDC (port side intake) can be used for -48V to -60V DC deployments.

To enhance availability, the platform supports 1+1 redundant hot-swappable 80 Plus Platinum-certified power supplies and hot swappable 2+1 redundant fan trays.

Figure 7.   Cisco Nexus 9300 Platform Components
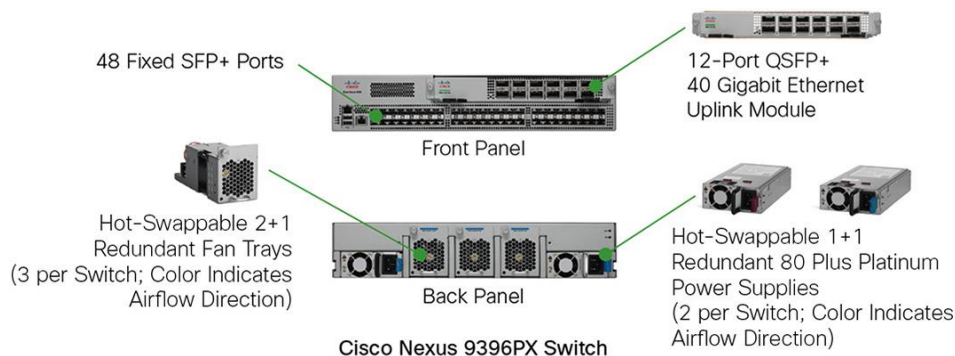
Cisco Nexus 9300 Series Uplink Module

The Cisco Nexus 9396PX, 9396TX and 93128TX platform requires an uplink module to be installed for normal switch operation that can be serviced and replaced by the user. There are two uplink module options.

The Cisco Nexus M6PQ uplink module provides up to six QSFP+ ports for 40 Gigabit Ethernet connectivity to spine-layer switches (Figure 8). The uplink module provides six active ports when installed in the Cisco Nexus 93128TX, 9396TX, and 9396PX.

Figure 8.   Cisco Nexus M6PQ 6-Port QSFP+ Uplink Card

The Cisco Nexus M12PQ uplink module provides up to 12 QSFP+ ports for 40 Gigabit Ethernet connectivity to spine-layer switches (Figure 9). The uplink module provides 8 active ports when installed in the Cisco Nexus 93128TX, and 12 active ports when installed in the Cisco Nexus 9396PX and 9396TX.

Figure 9.   Cisco Nexus M12PQ 12-Port QSFP+ Uplink Card

Cisco Nexus 9300 Series Leaf Switch Deployment Scenarios for Cisco ACI

Cisco Nexus 9300 series leaf switches along with Cisco Nexus 9000 Series spine switches enable an automated and policy-based Cisco ACI architecture (Figure 10). The high level of redundancy in leaf-and-spine architectures delivers increased availability with highly flexible workload placement.

Figure 10.   Cisco Nexus 9300 Series Leaf-and-Spine Architecture for Cisco ACI
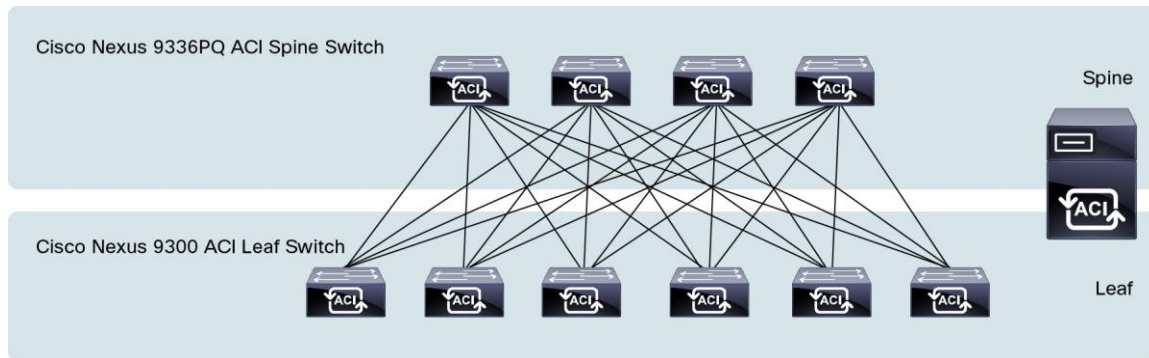
The Cisco Nexus 9300 series leaf switches can operate as data center ToR switches or as MoR and EoR data center access-layer switches deployed with or without Cisco fabric extender technology.

Software Requirements

The Cisco Nexus 9300 series leaf switch runs on Cisco ACI software on a 64-bit Linux kernel (Release 3.4.10) with a single binary image that supports both Cisco ACI spine modular switches (Cisco Nexus 9500 platform) and fixed-port switches (Cisco Nexus 9300 platform). The software image is based on Cisco ACI Release 11.0. The single image incorporates both the Linux kernel and Cisco ACI software so that the switch can be booted through a standard Linux kickstart process.

For the latest software release information and recommendations, please refer to the product bulletin at http://www.cisco.com/go/aci and Cisco Feature Navigator.

Environmental Properties

Table 4 lists the environmental properties of the Cisco Nexus 9300 platform switches, and Table 5 lists the weights of Cisco Nexus 9300 series switches.

Table 4.   Environmental Properties

Property	Cisco Nexus 9300 Platform
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)

Table 5.   Weight

Component	Weight
Cisco Nexus 9396PX without power supplies, fans, or uplink module	22.45 lb (10.2 kg)
Cisco Nexus 9396TX without power supplies, fans, or uplink module	22.45 lb (10.2 kg)
Cisco Nexus 9372PX without power supplies, fans	22.2 lb (10.1 kg)
Cisco Nexus 9372TX without power supplies, fans	22.6 lb (10.25 kg)
Cisco Nexus 9332PQ without power supplies, fans	22 lb (9.7 kg)
Cisco Nexus 93128TX without power supplies, fans, or uplink module	32.56 lb (14.8 kg)
650W AC power supply: N9K-PAC-650W/N9K-PAC-650W-B	2.42 lb (1.1 kg)
Fan tray 1: N9K-C9300-FAN1/N9K-C9300-FAN1-B	0.92 lb (0.4 kg)
1200W AC power supply: N9K-PAC-1200W/N9K-PAC-1200W-B	2.64 lb (1.2kg)
Fan tray 2: N9K-C9300-FAN2/N9K-C9300-FAN2-B	1.14 lb (0.5kg)
930W DC power supply	2.42 lb (1.1 kg)
Cisco Nexus M6PQ uplink module (1 per switch)	2.0 lbs/0.9 Kg)
Cisco Nexus M12PQ uplink module (1 per switch)	3.12 lb (1.4kg)

Regulatory Standards Compliance

Table 6 summarizes regulatory standards compliance for the Cisco Nexus 9300 platform.

Table 6.   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 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

Specification	Description
EMC: Emissions	● 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
RoHS	The product is RoHS-6 compliant with exceptions for leaded-ball grid-array (BGA) balls and lead press-fit connectors

Supported Optics pluggable

For details on the optics modules available and the minimum software release required for each supported optics module, visit http://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html.

Ordering Information

Table 7 presents ordering information for the Cisco Nexus 9300 platform. Note that you can order the Cisco Nexus 2000 Series Fabric Extenders either separately or along with the Cisco Nexus 9300 platform.

Table 7.   Ordering Information

Part Number	Product Description
Hardware	
N9K-C9396PX	Nexus 9300 with 48p 1/10G SFP+ and 12p 40G QSFP
N9K-C9396TX	Nexus 9300 with 48p 1/10G-T and 8p 40G QSFP
N9K-C93128TX	Nexus 9300 with 96p 1/10G-T and 8p 40G QSFP
N9K-C9372PX	Nexus 9300 with 48p 1/10G SFP+ and 6p 40G QSFP+
N9K-C9372TX	Nexus 9300 with 48p 1/10G-T and 6p 40G QSFP+
N9K-C9332PQ	Nexus 9300 with 32p 40G QSFP
N9K-M6PQ	Uplink Module for Nexus 9300, 6p 40G QSFP
N9K-M12PQ	Uplink Module for Nexus 9300, 12p 40G QSFP
N9K-PAC-650W	Nexus 9300 650W AC PS, Port-side Intake
N9K-PAC-650W-B	Nexus 9300 650W AC PS, Port-side Exhaust
N9K-PAC-1200W	Nexus 9300 1200W AC PS, Port-side Intake
N9K-PAC-1200W-B	Nexus 9300 1200W AC PS, Port-side Exhaust
UCSC-PSU-930WDC	930W DC PS, Port-side Intake
N9K-C9300-FAN2	Nexus 9300 Fan 2, Port-side Intake
N9K-C9300-FAN2-B	Nexus 9300 Fan 2, Port-side Exhaust
NXA-FAN-30CFM-F	Nexus 9332 & 9372 Fan, Forward airflow (Port-side Exhaust)
NXA-FAN-30CFM-B	Nexus 9332 & 9372 Fan, Reverse airflow (Port-side Intake)

Part Number	Product Description
Cisco APIC Leaf Software Licenses	
ACI-N9K-48X	ACI SW license for a 48p 1/10G Nexus 9K
ACI-N9K-96X	ACI SW license for a 96p 1/10G Nexus 9K
ACI-N9K-32Q	ACI SW license for a 32p 40G Nexus 9K
Cisco ACI Fabric Extender Software License	
ACI-F48X	ACI SW license for a 48p 1/10G Nexus 2K
ACI-F32X	ACI SW license for a 32p 1/10G Nexus 2K
ACI-F48G	ACI SW license for a 48p 1G Nexus 2K
Application-Centric Virtual Switch (AVS)	
ACI-AVS-48	ACI Software License for AVS: 48 Instances
ACI-AVS-96	ACI Software License for AVS: 96 Instances
Power Cords	
CAB-250V-10A-AR	AC Power Cord - 250V, 10A - Argentina (2.5 meter)
CAB-250V-10A-BR	AC Power Cord - 250V, 10A - Brazil (2.1 meter)
CAB-250V-10A-CN	AC Power Cord - 250V, 10A - PRC (2.5 meter)
CAB-250V-10A-ID	AC Power Cord - 250V, 10A, South Africa (2.5 meter)
CAB-250V-10A-IS	AC Power Cord - 250V, 10A - Israel (2.5 meter)
CAB-9K10A-AU	Power Cord, 250VAC 10A 3112 Plug, Australia (2.5 meter)
CAB-9K10A-EU	Power Cord, 250VAC 10A CEE 7/7 Plug, EU (2.5 meter)
CAB-9K10A-IT	Power Cord, 250VAC 10A CEI 23-16/VII Plug, Italy (2.5 meter)
CAB-9K10A-SW	Power Cord, 250VAC 10A MP232 Plug, SWITZ (2.5 meter)
CAB-9K10A-UK	Power Cord, 250VAC 10A BS1363 Plug (13 A fuse), UK (2.5 meter)
CAB-9K12A-NA	Power Cord, 125VAC 13A NEMA 5-15 Plug, North America (2.5 meter)
CAB-AC-L620-C13	North America, NEMA L6-20-C13 (2.0 meter)
CAB-C13-C14-2M	Power Cord Jumper, C13-C14 Connectors, 2 Meter Length (2 meter)
CAB-C13-C14-AC	Power cord, C13 to C14 (recessed receptacle), 10A (3 meter)
CAB-C13-CBN	Cabinet Jumper Power Cord, 250 VAC 10A, C14-C13 Connectors (0.7 meter)
CAB-IND-10A	10A Power cable for India (2.5 meter)
CAB-N5K6A-NA	Power Cord, 200/240V 6A North America (2.5 meter)
Accessories	
N9K-C9300-ACK	Nexus 9300 Accessory Kit
N9K-C9300-RMK	Nexus 9300 Rack Mount Kit
Software Release	
ACI-N9KDK9-11.0	Cisco Nexus 9500 or 9300 ACI Base Software Cisco NX-OS Software Release 11.0

Warranty

The Cisco Nexus 9300 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 9300 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 9300 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 and for the latest software release information and recommendations, please visit http://www.cisco.com/go/nexus9000.

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