Cisco Nexus GX Series terabit-scale switches

Product overview

Based on Cisco® Cloud Scale technology, the Cisco Nexus® 9300-GX switches are the next generation of fixed Cisco Nexus 9000 Series Switches. The platform introduces a fully backward-compatible 400G optical interface Quad Small Form-Factor Pluggable – Double Density (QSFP-DD) to transparently migrate existing data center fabrics from 40-Gbps and 100-Gbps speeds to 400 Gbps. The platform provides investment protection for customers, delivering highly flexible layer 2 and layer 3 scalability, and performance to meet the changing needs of virtualized data centers and automated cloud environments.

Cisco provides two modes of operation for Cisco Nexus 9000 Series Switches. Organizations can deploy Cisco Application Centric Infrastructure (Cisco ACI™) or Cisco Nexus switch environments (Cisco NX-OS mode).

The Cisco ACI solution is a holistic, intent-driven architecture with centralized automation and policy-based application profiles. It provides a robust, transport network for dynamic workloads and 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.

Designed for the programmable network, the Cisco NX-OS operating system automates configuration and management for customers who want to take advantage of the DevOps operation model and tool sets.

The platform hardware also enables collection of comprehensive Cisco Tetration Analytics™ telemetry information at line rate across all the ports without adding any latency to the packets or negatively affecting switch performance. In addition, the product is designed to support innovative technologies such as Streaming Statistics Export (SSX), enhancing the visibility into switch statistics right from the ASIC. Through this application, users can better understand network performance without any impact on the switch control plane or CPU.

Models

Table 1 summarizes the Cisco Nexus GX Series Switches.

Table 1. Cisco Nexus 9300 platform switches

Model	Description
Cisco Nexus 9316D Switch	16 x 400/100-Gbps QSFP-DD ports
Cisco Nexus 93600CD Switch	28 x 100/40-Gbps Quad Small Form-Factor Pluggable (QSFP28) and 8 x 400/100-Gbps QSFP-DD ports

Figure 1. Cisco Nexus 9316D Switch

Figure 2. Cisco Nexus 93600CD Switch

Specifications

Table 2 lists the specifications for the Cisco Nexus GX Series fixed switches.

Table 2. Cisco Nexus GX Series Cloudsec spine-and-leaf switch specifications

Item	Specifications	
Device	**N9K-C9316D-GX**	**N9K-C93600CD-GX**
Ports	• 16 x 400/100/40-Gbps QSFP-DD ports	• 28 x 100/40-Gbps QSFP28 ports and 8 x 400/100-Gbps QSFP-DD ports
Physical	• System memory: 16 GB NX-OS, 24 GB ACI • Solid-State Disk (SSD): 128 GB • USB: 1 port • RS-232 serial console ports: 1 • Management ports: 2 (1 x 10/100/1000BASE-T and 1 x 1-Gbps SFP+) • Broadwell-DE CPU: 4 cores • Dimensions (H x W x D): 3.38 x 17.37 x 22.27 in. (8.59 x 44.13 x 56.58 cm)	• System memory: 16 GB NX-OS, 24 GB ACI • Solid-State Disk (SSD): 128 GB • USB: 1 port • RS-232 serial console ports: 1 • Management ports: 2 (1 x 10/100/1000BASE-T and 1 x 1-Gbps SFP+) • Broadwell-DE CPU: 4 cores • Dimensions (H x W x D): 1.72 x 17.37 x 25.5 in. (4.37 x 44.13 x 64.8 cm)
Packet buffer	• 80 MB centralized buffer	• 80 MB centralized buffer
Cooling	• Fans: NXA-FAN-35CFM-PI and NXA-FAN-35CFM-PE • 5+1 redundancy • Port-side intake or port-side exhaust airflow direction • Hot swappable: Yes	• Fans: NXA-FAN-35CFM-PI and NXA-FAN-35CFM-PE • 5+1 redundancy • Port-side intake or port-side exhaust airflow direction • Hot swappable: Yes
Power	• AC: ◦ 1100 Watt (W) AC power supplies (up to 2) ◦ 1+1 redundancy ◦ 80 Plus Platinum-rated power supplies with efficiency of 90% or greater (20 to 100% load) ◦ Frequency: 50 to 60 Hz (AC) ◦ RoHS compliance: Yes ◦ Hot swappable: Yes ◦ Port-side intake or port-side exhaust options ◦ Typical power: 650W (AC) • DC: ◦ 1100 Watt (W) DC power supplies (up to 2) ◦ 1+1 redundancy ◦ 80 Plus Platinum-rated power supplies with efficiency of 90% or greater (20 to 100% load) • High-voltage AC/DC ◦ Power: 1200W AC, 930W DC[1], or 1200W HVAC/HVDC ◦ Input voltage: 100 to 240V* AC or –40 to –72V DC (minimum and maximum), –48 to –60V DC (nominal)	• AC: ◦ 1100W Watt (W) AC power supplies (up to 2) ◦ 1+1 redundancy ◦ 80 Plus Platinum-rated power supplies with efficiency of 90% or greater (20 to 100% load) ◦ Frequency: 50 to 60 Hz (AC) ◦ RoHS compliance: Yes ◦ Hot swappable: Yes ◦ Port-side intake or port-side exhaust options ◦ Typical power: 590W • DC: ◦ 1100 Watt (W) DC power supplies (up to 2) ◦ 1+1 redundancy ◦ 80 Plus Platinum-rated power supplies with efficiency of 90% or greater (20 to 100% load) • High-voltage AC/DC ◦ Power: 1100W AC, 930W DC[2], or 1200W HVAC/HVDC ◦ Input voltage: 100 to 240V* AC or –40 to –72V DC (minimum and maximum), –48 to –60V DC (nominal)

[1] 930W-DC PSU is supported in redundancy mode if 3.5W QSFP+ modules or passive QSFP cables are used and the system is used in a 40°C ambient temperature or less; for other optics or higher ambient temperatures, 930W-DC is supported with 2 PSUs in non-redundancy mode only.

[2] 930W-DC PSU is supported in redundancy mode if 3.5W QSFP+ modules or passive QSFP cables are used and the system is used in 40°C ambient temperature or less; for other optics or higher ambient temperatures, 930W-DC is supported with 2 PSUs in non-redundancy mode only.

Item	Specifications	
Environmental	• Operating temperature: 32 to 104°F (0 to 40°C) • Nonoperating (storage) temperature: -40 to 158°F • (-40 to 70°C) • Humidity: 5 to 85% (noncondensing) • Altitude: 0 to 13,123 ft (0 to 4000m)	• Operating temperature: 32 to 104°F (0 to 40°C) • Nonoperating (storage) temperature: -40 to 158°F • (-40 to 70°C) • Humidity: 5 to 85% (noncondensing) • Altitude: 0 to 13,123 ft (0 to 4000m)

Cisco Tetration overview

The platform hardware also enables collection of comprehensive Cisco Tetration Analytics™ telemetry information at line rate across all the ports without adding any latency to the packets or negatively affecting switch performance. This telemetry information is exported every 100 milliseconds by default directly from the switch's Application-Specific Integrated Circuit (ASIC). This information consists of three types of data:

- **Flow information -** This information contains information about endpoints, protocols, ports, when the flow started, how long the flow was active, etc.
- **Interpacket variation -** This information captures any inter-packet variations within the flow. Examples include variation in time to live (TTL), IP and Transmission Control Protocol (TCP) flags, payload length, etc.
- **Context details -** Context information is derived outside the packet header, including variation in buffer utilization, packet drops within a flow, association with tunnel endpoints, etc.

The Cisco Tetration Analytics platform consumes this telemetry data, and by using unsupervised machine learning and behavior analysis, it can provide outstanding pervasive visibility across everything in your data center in real time. By using algorithmic approaches, the Cisco Tetration Analytics platform provides deep application insights and interactions, enabling dramatically simplified operations, a zero-trust model, and migration of applications to any programmable infrastructure. To learn more, go to https://www.cisco.com/go/tetration.

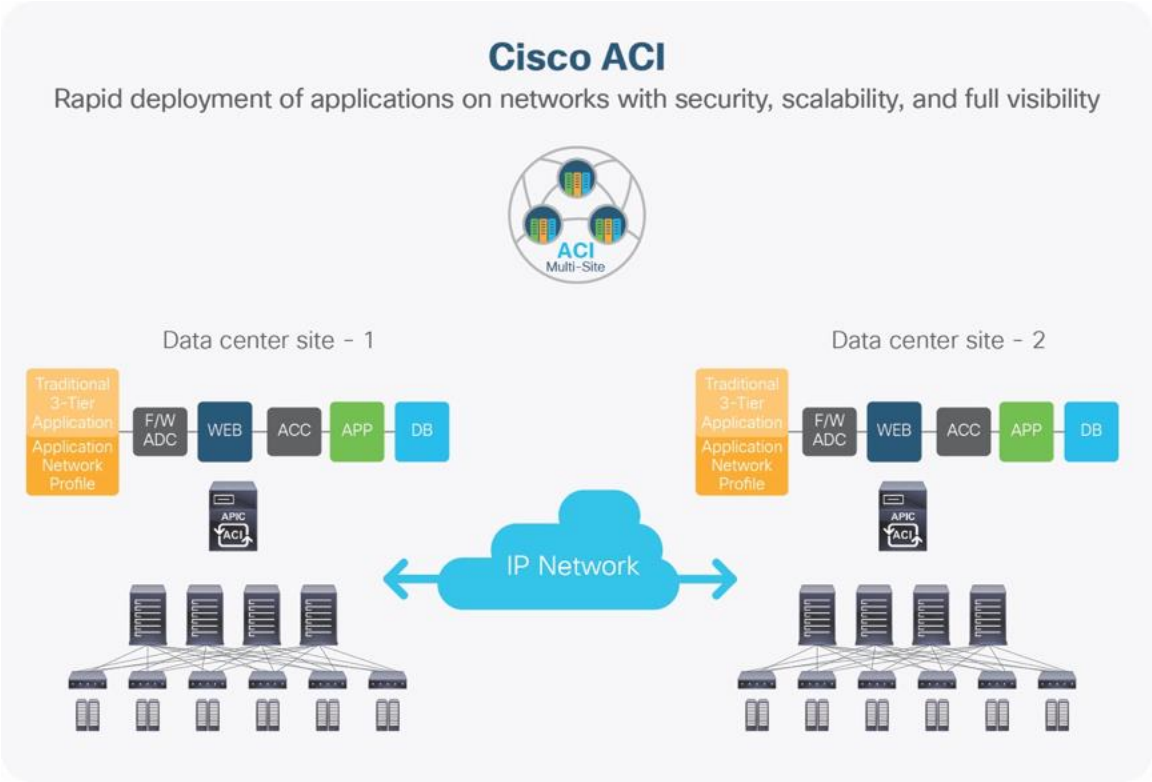
Cisco ACI overview

Cisco ACI is an industry-leading secure, open, and comprehensive Software-Defined Networking (SDN) solution. It radically simplifies, optimizes, and accelerates infrastructure deployment and governance and expedites the application deployment lifecycle. Cisco ACI provides policy-driven automation through an integrated underlay and overlay, is hypervisor-agnostic; and extends policy automation to any workload, including virtual machines, physical bare-metal servers, and containers.

Cisco ACI delivers an intent-based networking framework to enable agility in the data center. It captures higher-level business and user intent in the form of a policy and translates this intent into the network constructs necessary to dynamically provision the network, security, and infrastructure services. It uses a holistic systems-based approach, with tight integration between hardware and software and physical and virtual elements, an open ecosystem model, and innovative Cisco custom ASICs to enable unique business value for modern data centers. This unique approach uses a common, policy-based operating model across the network, drastically reducing the cost and complexity in operating your network.

Cisco "ACI Anywhere" is a comprehensive solution: with one intent, using any hypervisor, for any workload, in any location, and in any cloud. Cisco "ACI Anywhere" offers a set of capabilities that enable seamless connectivity between an on-premises data center, remote, small-scale data centers, and geographically dispersed multiple data centers under a single-pane-of-policy orchestration. In future, these capabilities will extend to public cloud as well.

Figure 3. Cisco ACI architectural building blocks



The Cisco Nexus GX Series also introduces support of single-chip ACI spine-and-leaf functionality to enable customers to use a given GX series device, either in ACI spine or ACI leaf deployment for fully flexible deployments.

Table 3. ACI support

Item	N9K-C9316D-GX	N9K-C93600CD-GX
ACI spine	Yes	Future
ACI leaf	Future	Yes

Cisco NX-OS Software overview

Cisco NX-OS is a purpose-built data center operating system designed for performance, resiliency, scalability, manageability, and programmability at its foundation. It provides a robust and comprehensive feature set that meets the demanding requirements of virtualization and automation in present and future data centers.

Cisco Nexus 9000 Series Switches use an enhanced version of NX-OS with a single binary image that supports every switch in the series, simplifying image management. The operating system is modular, with a dedicated process for each routing protocol, a design that isolates faults while increasing availability. In the event of a process failure, the process can be restarted without loss of state. The operating system supports hot and cold patching and online diagnostics.

Main features include:

- Virtual Extensible LAN (VXLAN)
  - The platform offers native line-rate VXLAN routing.
  - The Border Gateway Protocol (BGP) Ethernet Virtual Private Network (EVPN) control plane provides scalable multitenancy and host mobility (refer to VXLAN Network with MP-BGP EVPN Control Plane for more information).
- High availability
  - Virtual Port-Channel (vPC) technology provides layer 2 multipathing through the elimination of Spanning Tree Protocol (STP). It also enables fully utilized, bisectional bandwidth and simplified layer 2 logical topologies without the need to change the existing management and deployment models.
  - The 64-way equal-cost multipath (ECMP) routing enables the use of layer 3 fat-tree designs. This feature helps organizations prevent network bottlenecks, increase resiliency, and add capacity with little network disruption.
  - Advanced reboot capabilities include hot and cold patching.
- Purpose-built Cisco NX-OS Software operating system with comprehensive, proven innovations
  - Open programmability supports built-in DevOps automation tools such as Puppet, Chef, and Ansible.
  - Cisco NX-API supports a common programmatic approach across Cisco Nexus switches.
  - Power-On Auto Provisioning (POAP) enables touchless bootup and configuration of the switch, drastically reducing provisioning time.
  - Cisco Embedded Event Manager (EEM) and Python scripting enable automation and remote operations in the data center.
  - Advanced buffer monitoring reports real-time buffer use per port and per queue, which allows organizations to monitor traffic bursts and application traffic patterns.
  - Complete layer 3 unicast and multicast routing protocol suites are supported, including BGP, Open Shortest Path First (OSPF), Enhanced Interior Gateway Routing Protocol (EIGRP), Routing Information Protocol Version 2 (RIPv2), Protocol Independent Multicast Sparse Mode (PIM-SM), Source-Specific Multicast (SSM), and Multicast Source Discovery Protocol (MSDP).
  - Segment routing allows the network to forward Multiprotocol Label Switching (MPLS) packets and engineering traffic without Resource Reservation Protocol (RSVP) Traffic Engineering (TE). It provides a control-plane alternative for increased network scalability and virtualization.
  - Fibre Channel and Fibre Channel over Ethernet (FCoE[**]) N-Port Virtualization (NPV) support enables the network administrator to control domain IDs and points of management on a Fibre Channel network as it scales. This feature enables LAN and SAN converged networks on a lossless, reliable Ethernet network.
  - Network traffic monitoring with Cisco Nexus Data Broker builds simple, scalable, and cost-effective network Test Access Points (TAPs) and Cisco Switched Port Analyzer (SPAN) aggregation for network traffic monitoring and analysis.

The software packaging for the Cisco Nexus 9000 Series offers flexibility and a comprehensive feature set while being consistent with Cisco Nexus access switches. The default system software has a comprehensive layer 2 security and management feature set. To enable additional functions, including layer 3 IP unicast and IP multicast routing and Cisco Nexus Data Broker, you must install additional licenses. The licensing guide illustrates the software packaging and licensing available to enable advanced features. For a complete list of supported features, refer to Cisco Feature Navigator. Refer to the Cisco NX-OS Software release notes for feature support information.

Performance and scalability

Table 4 lists the performance and scalability specifications for the Cisco Nexus GX Series Switches.

Table 4. Performance and scalability specifications

Item	Cisco Nexus 9300-GX Series Switches
Maximum number of IPv4 Longest Prefix Match (LPM) routes**	896,000
Maximum number of IPv4 host entries**	896,000
Maximum number of MAC address entries**	256,000
Maximum number of multicast routes	32,000
Number of Interior Gateway Management Protocol (IGMP) snooping groups	Shipping: 8000 Maximum: 32,000
Maximum number of Access-Control-List (ACL) entries	Per slice of the forwarding engine: • 5000 ingress • 2000 egress • Max: 20,000 ingress, 8000 egress
Maximum number of VLANs	3967
Number of Virtual Routing and Forwarding (VRF) instances	Shipping: 1000 Maximum: 16,000
Maximum number of ECMP paths	64
Maximum number of port channels	512
Maximum number of links in a port channel	32
Number of active SPAN sessions	4
Maximum number of VLANs in Rapid per-VLAN Spanning Tree (RPVST) instances	3967
Maximum number of Hot-Standby Router Protocol (HSRP) groups	490
Maximum number of Multiple Spanning Tree (MST) instances	64
Flow-table size used for Cisco Tetration Analytics platform***	64,000
Number of Network Address Translation (NAT) entries	1023

More templates and greater scalability are on the roadmap. Refer to the Cisco Nexus 9000 Series Verified Scalability Guide for the latest, exact scalability numbers validated for specific software.

Regulatory standards compliance

Table 5 summarizes regulatory standards compliance for the platform.

Table 5. 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
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 **Note:** Cisco Nexus N9K-C9364C passes EMC Radiated Emissions standards in all configurations, with the only exception being if more than 40 pluggable optics of Cisco part number 10-3142-02 (or 10-3142-01) are used.
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 about the optical modules available and the minimum software release required for each supported optical module, visit: https://www.cisco.com/en/US/products/hw/modules/ps5455/products_device_support_tables_list.html.

Ordering information

Table 6 and Table 7 present ordering information for the Cisco Nexus GX Series switches.

Table 6. N93-C9316D-GX Ordering information

Part number	Product description
Hardware	
N9K-C9316D-GX	Nexus 9316D Spine switch with 16p 400/100G QSFP-DD
Fan options	
NXA-FAN-35CFM-PI	Nexus Fan, Nexus 2000, 3000, 9000 Single Fan, 35CFM, port side intake airflow
NXA-FAN-35CFM-PE	Nexus Fan, Nexus 2000, 3000, 9000 Single Fan, 35CFM, port side exhaust airflow
Power supply options	
NXA-PAC-1100W-PI2	Nexus AC 1100W PSU Spare - port side intake
NXA-PAC-1100W-PE2	Nexus AC 1100W PSU Spare - port side exhaust
NXA-PDC-1100W-PI	Nexus 1100W Platinum DC PS, port side intake
NXA-PDC-1100W-PE	Nexus 1100W Platinum DC PS, port side exhaust
NXA-PHV-1100W-PI	Nexus 1100W Platinum HV-AC-DC PS, port side intake
NXA-PHV-1100W-PE	Nexus 1100W Platinum HV-AC-DC PS, port side exhaust
Accessories	
N9K-C9300-RMK	Nexus 9000 Fixed Rack Mount Kit
N9K-C9300-ACK	Nexus 9000 Fixed Accessory Kit

Table 7. N93-C93600CD-GX Ordering information

Part number	Product description
Hardware	
N9K-C93600CD-GX	Nexus 9316D Spine and Leaf switch with 28p 100/40G QSFP28 and 8p 400/100G QSFP-DD
Fan options	
NXA-FAN-35CFM-PI	Nexus Fan, Nexus 2000, 3000, 9000 Single Fan, 35CFM, port side intake airflow
NXA-FAN-35CFM-PE	Nexus Fan, Nexus 2000, 3000, 9000 Single Fan, 35CFM, port side exhaust airflow
Power supply options	
NXA-PAC-1100W-PI2	Nexus AC 1100W PSU Spare - port side intake
NXA-PAC-1100W-PE2	Nexus AC 1100W PSU Spare - port side exhaust
NXA-PDC-1100W-PI	Nexus 1100W Platinum DC PS, port side intake
NXA-PDC-1100W-PE	Nexus 1100W Platinum DC PS, port side exhaust
NXA-PHV-1100W-PI	Nexus 1100W Platinum HV-AC-DC PS, port side intake
NXA-PHV-1100W-PE	Nexus 1100W Platinum HV-AC-DC PS, port side exhaust
Accessories	
N9K-C9300-RMK	Nexus 9000 Fixed Rack Mount Kit
N9K-C9300-ACK	Nexus 9000 Fixed Accessory Kit

Warranty

The Cisco Nexus 9300 platform switches have 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 range of professional, solution, and product support services for each stage of your Cisco Nexus 9300 platform deployment:

- Cisco Data Center Quick Start Service for Cisco Nexus 9000 Series Switches - This offering provides consulting services that include technical advice and assistance to help deploy Cisco Nexus 9000 Series Switches.
- Cisco Data Center Accelerated Deployment Service for Cisco Nexus 9000 Series Switches - This service delivers planning, design, and implementation expertise to bring your project into production. The service also provides recommended next steps, an architectural high-level design, and operation-readiness guidelines to scale the implementation to your environment.
- Cisco Migration Service for Cisco Nexus 9000 Series Switches - This service helps you migrate from Cisco Catalyst® 6000 Series Switches to Cisco Nexus 9000 Series Switches.
- Cisco product support – Our support service is available globally 24 hours a day, 7 days a week, for Cisco software and hardware products and technologies associated with Cisco Nexus 9000 Series Switches. Enhanced support options delivered by Cisco also include solution support for Cisco ACI, Cisco SMARTnet™ Service, and Cisco Smart Net Total Care®* Service.

  For more information, visit https://www.cisco.com/go/services.

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For more information

For more information about the Cisco Nexus 9000 Series and for the latest software release information and recommendations, visit https://www.cisco.com/go/nexus9000.

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