

Cisco Nexus 6004 Extensible Fixed (EF) Switch

Cisco Nexus 6000 Series Switches Product Overview

In today's data centers, virtualization deployments have become commonplace, and this trend is growing rapidly with the availability of 10 Gigabit Ethernet servers at attractive prices. Increased adoption of 10 Gigabit Ethernet servers coupled with applications using higher bandwidth is accelerating the need for dense 10 and 40 Gigabit Ethernet switching. Moreover, data center architectures are evolving to accommodate customers seeking to build large-scale nonblocking fabrics to support different applications, creating heavy east-west or north-south traffic. Leaf-and-spine layer designs using high-density and low-latency switches lead to flatter network architectures, allowing connections that scale from hundreds to more than 10,000 servers with large bisectonal bandwidth and helping ensure low-latency fabric with a low hop count.

Cisco Nexus[®] 6000 Series Switches, part of the Cisco[®] Unified Fabric offering, increase architectural flexibility and scalability, helping enable agile virtualized and cloud deployments. The platform runs the industry-leading Cisco NX-OS Software operating system, providing customers with features and capabilities that are widely deployed throughout the world.

The new Cisco Nexus 6000 Series brings high-density 10 and 40 Gigabit Ethernet in energy-efficient compact form-factor switches. With a robust integrated Layer 2 and Layer 3 feature set, the Cisco Nexus 6000 Series provides a versatile platform that you can deploy in multiple scenarios - direct-attach 10 and 40 Gigabit Ethernet access and high-density Cisco fabric extender aggregation deployments, leaf-and-spine architectures, and compact aggregation deployments - to build scalable Cisco Unified Fabric in the data center. Cisco Nexus 6000 Series architectures can adapt to increasing bandwidth demands with low power and a compact space profile, providing capital expenditures (CapEx) and operating expenses (OpEx) savings.

Cisco Nexus 6000 Series products use the same set of Cisco application-specific integrated circuits (ASICs) and a single software image across the products within the family, thereby offering feature consistency and operation simplicity. Cisco Nexus 6000 Series Switches support robust Layer 2 and Layer 3 functions, industry-leading fabric extender architecture with Cisco Nexus 2200 platform fabric extenders, Cisco Nexus B22 Blade Fabric Extender, In-Service Software Upgrade (ISSU), and Cisco FabricPath. Operation efficiency and programmability are enhanced on the Cisco Nexus 6000 Series through advanced analytics, PowerOn Auto Provisioning (POAP), and Python and Tool Command Language (Tcl) script.

Cisco Nexus 6004 Switch Overview

The Cisco Nexus 6004 Switch, the first switch in the Cisco Nexus 6000 Series, is a critical component of the Cisco Unified Data Center architecture, complementing the existing Cisco Nexus Family of switches. The Cisco Nexus 6004 extends the industry-leading innovations and versatility of the Cisco Nexus 5000 Series purpose-built 10 Gigabit Ethernet data center-class switches. In addition, the Cisco Nexus 6004 offers the industry's highest 10 and 40 Gigabit Ethernet and Fibre Channel over Ethernet (FCoE) port density in a compact energy-efficient form factor, with integrated Layer 2 and Layer 3 features at wire speed and low latency of approximately 1 microsecond for any packet size. With a choice of front-to-back or back-to-front airflow options, the switch is designed for a broad range of traditional data center and large-scale virtualized cloud deployments. It runs the industry-leading

Cisco NX-OS Software operating system, offering features and capabilities that are widely deployed throughout the world.

The Cisco Nexus 6004 (Figure 1) is a four-rack-unit (4RU) 10 and 40 Gigabit Ethernet switch offering wire-speed performance for up to ninety-six 40 Gigabit Ethernet ports or three hundred eighty-four 10 Gigabit Ethernet ports (using Quad Small Form-Factor Pluggable [QSFP] breakout cables) for Ethernet and FCoE traffic with an overall throughput of 7.68 terabits per second (Tbps). The Cisco Nexus 6004 also supports 1 Gigabit connectivity using QSFP to SFP or Enhanced SFP (SFP+) adapters, offering customers additional flexibility. The Cisco Nexus 6004 offers eight line-card expansion module (LEM) slots to support a total of 96 ports of 40 Gbps throughput in a fully populated system. The Cisco Nexus 6004, through its extensible architecture, provides customers with a low-cost entry point for small-scale deployments. Each LEM supports 12 ports of 40 Gigabit Ethernet in a QSFP form factor. Each 40 Gigabit Ethernet port can also be split into four line-rate 10 Gigabit Ethernet ports using QSFP breakout cables. Thus, the Cisco Nexus 6004 chassis along with the LEMs offers incredible flexibility for scaling deployments, making it the only fully extensible fixed 10 and 40 Gigabit Ethernet platform in the industry.

The Cisco Nexus 6004 as a high-density 10 and 40 Gigabit Ethernet and FCoE platform can be deployed in multiple scenarios - direct-attach 10 and 40 Gigabit Ethernet server-access and high-density fabric extender aggregation deployments, leaf-and-spine architectures, and compact aggregation deployments - to build a scalable Cisco Unified Fabric across a diverse set of physical and virtual server environments in data centers.

Figure 1. Cisco Nexus 6004 Switch



Expansion Module Options for Cisco Nexus 6004 Switches

The Cisco Nexus 6004 platform is equipped with expansion modules that you can use to offer multiple interface options with the base of the chassis.

The Cisco Nexus 6004 supports eight expansion modules that are all hot-swappable. Each expansion module provides 12 ports of 40-Gbps Gigabit Ethernet and FCoE ports using a QSFP interface. With all eight expansion modules installed, the Cisco Nexus 6004 delivers 96 ports of QSFP or 384 ports of 10 Gigabit Ethernet (SFP+) using the breakout cables. The expansion module for the Cisco Nexus 6004 is shown in Figure 2.

Figure 2. 12-Port 40-Gbps Line-Card Expansion Module



Efficient Transceiver and Cabling Options

The Cisco Nexus 6004 platform supports a wide variety of 10 and 40 Gigabit Ethernet connectivity options using Cisco 40GBASE QSFP and breakout cable options.

Table 1 lists the supported transceiver and cable options.

Table 1. Cisco Nexus 6004 Transceiver Support Matrix

Cisco SFP	Description
QSFP-40G-SR4	40GBASE-SR4 QSFP module (multimode fiber [MMF] at 100m)
QSFP-40G-CSR4	40GBASE Extended CSR4 QSFP module (MMF at 300m)
QSFP-4x10G-AC7M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ direct-attach breakout cables, 7m, active
QSFP-4x10G-AC10M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ direct-attach breakout cables, 10m, active
QSFP-H40G-CU1M	Cisco 40GBASE-CR4 QSFP+ direct-attach copper cable, 1m, passive
QSFP-H40G-CU3M	Cisco 40GBASE-CR4 QSFP+ direct-attach copper cable, 3m, passive
QSFP-H40G-CU5M	Cisco 40GBASE-CR4 QSFP+ direct-attach copper cable, 5m, passive
QSFP-H40G-ACU7M	Cisco 40GBASE-CR4 QSFP+ direct-attach copper cable, 7m, active
QSFP-H40G-ACU10M	Cisco 40GBASE-CR4 QSFP+ direct-attach copper cable, 10m, active
QSFP-4SFP10G-CU1M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ passive direct-attach copper transceiver assemblies, 1m
QSFP-4SFP10G-CU3M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ passive direct-attach copper transceiver assemblies, 3m
QSFP-4SFP10G-CU5M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ passive direct-attach copper transceiver assemblies, 5m
QSFP-40GE-LR4	Cisco 40GBASE-LR4 QSFP+ transceiver module for single-code fiber (SMF), duplex LC connector
QSFP-4SFP10G-CU1M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ passive direct-attach copper transceiver assemblies, 1m
QSFP-4SFP10G-CU3M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ passive direct-attach copper transceiver assemblies, 3m
QSFP-4SFP10G-CU5M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ passive direct-attach copper transceiver assemblies, 5m
CVR-QSFP-SFP10G-	Cisco 40GBASE QSFP to SFP+ and SFP adapter (QSA) for 1G (GLC-T, SX/LH) and 10G-LR connectivity

The high bandwidth of 10 and 40 Gigabit Ethernet poses challenges to transmissions that are met by the transceiver and cabling options supported by the Cisco Nexus 6004.

The platform supports an innovative Twinax copper cabling solution that connects to standard QSFP connectors for in-rack use, and optical cabling for longer cable runs (Table 2).

- For in-rack or adjacent-rack cabling, the Cisco Nexus 6004 supports QSFP+ direct-attach 40 Gigabit Ethernet copper cables, an innovative solution that integrates transceivers with Twinax cables into an energy-efficient, low-cost, and low-latency solution. QSFP+ direct-attach 40 Gigabit Ethernet Twinax copper cables use only 1.5 watts (W) of power per transceiver and introduce less than 0.1 microsecond of latency per link.
- For longer cable runs, the Cisco Nexus 6004 supports multimode, short-reach optical QSFP transceivers. These optical transceivers use approximately 1.5W per transceiver and have a latency of less than 0.1 microsecond.

Table 2. Cisco Nexus 6004 Support for QSFP Direct-Attach 40 Gigabit Ethernet Copper for In-Rack Cabling, and Direct-Attach Breakout Cable for Optical Solutions for Longer Connections (Ethernet Only)

Connector (Media)	Cable	Distance	Maximum Power Consumption	Transceiver Latency (Link)
QSFP CU copper	Twinax	1m	~1.5W	~0.1 microsecond
		3m		
		5m		
QSFP ACU copper	Active Twinax	7m	~1.5W	~0.1 microsecond
		10m		
QSFP SR4 MMF	MMF (OM3)	100m	~1.5W	~0.1 microsecond
	MMF (OM4)	150m		
QSFP CSR4 MMF	MMF (OM3)	300m	~1.5W	~0.1 microsecond
	MMF (OM4)	400m		
QSFP LR4	SMF	10 km	~3.5W	~0.1 microsecond

Features and Benefits

The comprehensive feature set of the Cisco Nexus 6004 makes it well suited to meet the challenging demands of virtualized and cloud-based deployments. The Cisco Nexus 6004 is designed with Cisco high-performance ASICs and is an excellent switch to use to integrate and connect the virtual environment to the high-performance servers in the data center. The Cisco Nexus 6004 is an excellent platform for direct-attach 10 and 40 Gigabit Ethernet server-access and high-density fabric extender aggregation deployments, leaf-and-spine architectures, and compact aggregation deployments for building scalable Cisco Unified Fabric in data centers. This platform can be deployed in the middle of row or at the end of row in the data center.

The Cisco Nexus 6004, with its scalable architecture, provides investment protection by allowing deployments to scale up to 96 ports of 40 Gigabit Ethernet interfaces. In 10 Gigabit Ethernet optimized environments, the Cisco Nexus 6004 can scale up to 384 ports of 10 Gigabit Ethernet interfaces. The combination of high port density, lossless Ethernet, wire-speed performance, and very low latency makes the switch platform well suited for meeting the growing demand for 40 Gigabit Ethernet while supporting a common Ethernet-based fabric in physical and virtual data center deployments. The Cisco Nexus 6004 delivers scalable performance, intelligence, and a broad set of features to address the needs of data center networks. The primary features of the Cisco Nexus 6004 include:

- **Optimization for virtualization and cloud deployments:** Data centers today must meet the demanding challenges of virtualization and cloud-based computing. High-performance servers deployed in the cloud can support many more virtual machines and workloads than ever before. The requirement to deploy new servers on demand puts additional strain on the network fabric. The Cisco Nexus 6004 solves this problem by providing scalability and performance, making this platform excellent for meeting both current and future needs.
- **Density and resiliency:** Built for today's data centers, the switches are designed just like the servers they support. Ports and power connections are at the rear, close to server ports, helping keep cable lengths as short and efficient as possible and delivering benefits traditionally offered on blade servers to rack servers as well. Hot-swappable power and fan modules are accessible from the front panel, where status lights offer an at-a-glance view of switch operation. Front-to-back or back-to-front cooling is consistent with server designs, supporting efficient data center hot- and cold-aisle designs. Serviceability is enhanced with all customer-replaceable units accessible from the front panel.

The use of QSFP ports increases flexibility, enabling use of a range of interconnect solutions, including copper Twinax cable for short runs and fiber for long runs.

- **Energy efficiency:** The Cisco Nexus 6004 helps data centers operate within their space, power, and cooling parameters while reducing their carbon footprints. The switch power supplies can maintain 90 percent efficiency at load conditions of as low as 25 percent utilization, allowing them to use power efficiently while still being appropriately sized to support full system load conditions.
- **Low latency:** The Cisco Nexus 6004 with cut-through switching supports approximately 1 microsecond of port-to-port latency for any packet size with features enabled.
- **Intelligent Switched Port Analyzer (SPAN) and Encapsulated SPAN (ERSPAN):** SPAN and ERSPAN are used for troubleshooting and robust monitoring of traffic. The SPAN and ERSPAN features in the Cisco Nexus 6004 are nondisruptive because only extra bandwidth capacity is used for SPAN and ERSPAN traffic. SPAN and ERSPAN traffic is categorized as best effort, and in the event of link congestion, SPAN and ERSPAN traffic is dropped first. Enhancements include a more efficient allocation of bandwidth to SPAN and ERSPAN traffic, through which any fabric bandwidth not used for data traffic can be allocated to SPAN and ERSPAN traffic. The Cisco Nexus 6004 can support up to 31 line-rate SPAN and ERSPAN sessions.
- **Flexible buffer management:** The Cisco Nexus 6004 supports a 25-MB packet buffer shared by every 3 ports of 40 Gigabit Ethernet or 12 ports of 10 Gigabit Ethernet. Of the 25-MB buffer, 16 MB are used for ingress buffering, and 9 MB are used for egress buffering. The Cisco Nexus 6004 supports allocation of buffers as shared, dedicated, or shared plus dedicated. The flexible buffer management capability of the Cisco Nexus 6004 allows dynamic tuning of the shared and dedicated buffer size if congestion occurs.
- **Multicast enhancements:** The Cisco Nexus 6004 supports line-rate Layer 2 and Layer 3 multicast throughput for all frame sizes. It offers optimized multicast replication through the fabric and at the egress point. The large buffers allow absorption of bursty traffic. In hardware, 32,000 multicast routes and Internet Group Management Protocol (IGMP) snooping tables are supported. Multicast enhancements include flow-based hashing for multicast traffic over PortChannels and enhanced bidirectional Protocol Independent Multicast (BiDiR PIM) support. The Cisco Nexus 6004 also supports IP-based forwarding for IGMP snooping.
- **Future support for Dynamic Fabric Automation (DFA):** The Cisco Nexus 6004 with support for DFA helps customers simplify, automate, and optimize their data center networks. The Cisco Nexus 6004 with DFA provides the flexibility to deploy 10 and 40 Gigabit Ethernet leaf-and-spine fabric, which helps reduce provisioning times and improve data center orchestration and maintenance times to help organizations manage network growth.

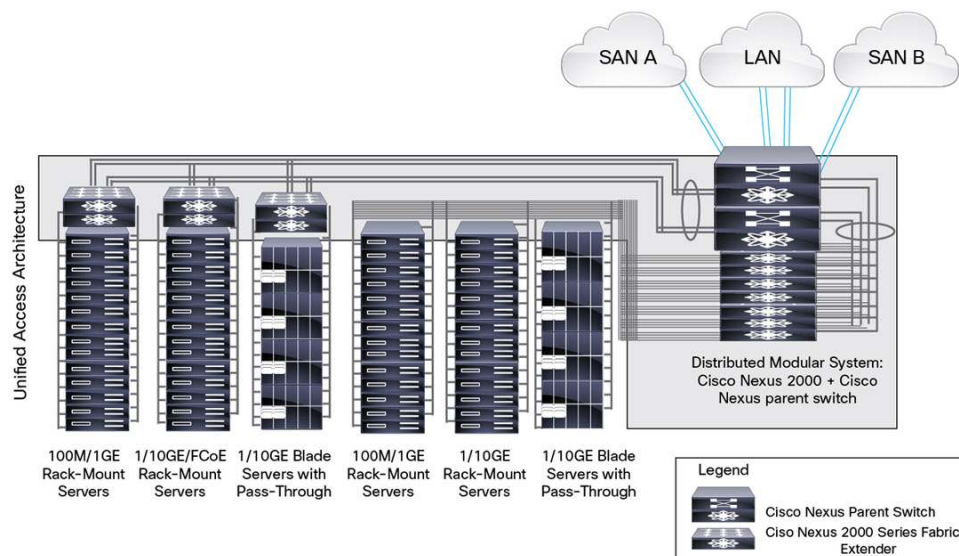
Applications

The Cisco Nexus 6004 supports numerous application scenarios, making the switch a versatile data center option, as explained in the following sections.

Unified Access Architecture: High-Density Fabric Extender Aggregator

Cisco Fabric Extender Technology (FEX Technology) enables you to build a single, modular fabric that extends from Cisco Nexus switches to Cisco Unified Computing System™ (Cisco UCS®) servers to adapters (Cisco Adapter FEX) and to virtual machines (Cisco Data Center Virtual Machine FEX [VM-FEX]). Cisco FEX Technology is based on the emerging IEEE 802.1br standard. Designing the network using Cisco FEX Technology provides flexibility, reduced cabling infrastructure, and a single point of management, helping organizations scale the network. Cisco Nexus 2200 platform fabric extenders can be single or dual connected (using enhanced virtual PortChannels [EvPCs]) to two upstream Cisco Nexus 6004 Switches (Figure 3). Servers or the end host can connect to single or dual Cisco Nexus 2200 platform fabric extenders using network-interface-card (NIC) teaming when the parent Cisco Nexus 6004 is EvPC enabled.

Figure 3. Sample Unified Access Deployment Scenario Supporting 2304 1 or 10 Gigabit Ethernet Servers with a Single Pair of Access-Layer Switches and a Single Point of Management



Following are some of the common Cisco Nexus 2200 platform and Cisco Nexus 6000 Series deployment options:

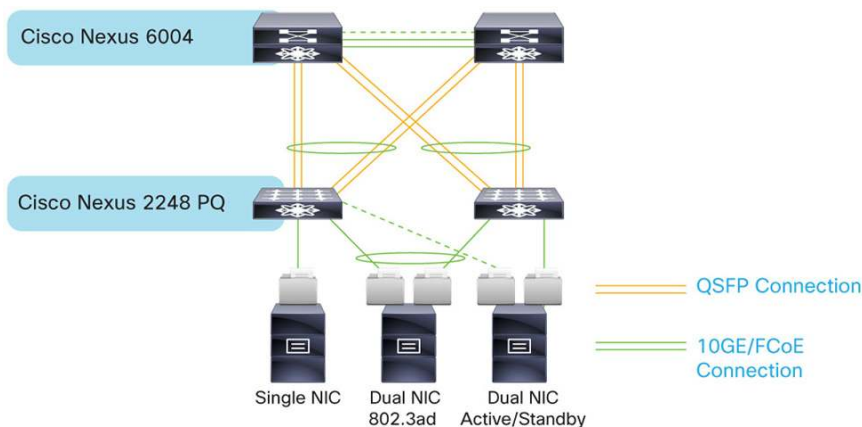
- Rack servers with 100 Megabit Ethernet, Gigabit Ethernet, or 10 Gigabit Ethernet NICs; the fabric extender can be physically located at the top of the rack, and the Cisco Nexus 6000 Series Switch can reside in the middle or at the end of the row, or the fabric extender and the Cisco Nexus 6000 Series Switch can both reside at the end or middle of the row
- Mixed 1 and 10 Gigabit Ethernet environments in which rack servers are running at either speed in the same rack or in adjacent racks
- 10 Gigabit Ethernet and FCoE deployments, using servers with converged network adapters (CNAs) for unified fabric environments with the Cisco Nexus 2232PP 10GE Fabric Extender
- 1 and 10 Gigabit Ethernet BASE-T server connectivity with ease of migration from 1 to 10GBASE-T and effective reuse of structured cabling

- 1 and 10 Gigabit Ethernet blade servers with pass-through blades
- Low-latency, high-performance computing environments
- Virtualized access

In addition to the previously mentioned fabric extender deployment options, the Cisco Nexus 6004 with high-density 10 and 40 Gigabit Ethernet support provides unique value as a high-density fabric extender aggregation platform. A few sample scenarios follow:

- In conjunction with the Cisco Nexus 2248PQ 10GE Fabric Extender (Figure 4), a 10 Gigabit Ethernet fabric extender with four 40 Gigabit Ethernet uplinks to the Cisco Nexus 6004 can be used as a high-density 10 Gigabit Ethernet switching system, consolidating more than 2304 10 Gigabit Ethernet connections in a single management plane. Moreover, this solution provides the highest 10 Gigabit Ethernet server density available, with a low oversubscription ratio.

Figure 4. Cisco Nexus 2248PQ Connected to Cisco Nexus 6004 Using QSFP Links



- In conjunction with the Cisco Nexus 2232PP 10 Gigabit Ethernet fabric extender, the Cisco Nexus 6004 can be used as a high-density 10 Gigabit Ethernet switching system, consolidating more than 768 10 Gigabit Ethernet connections in a single management plane.
- A variety of blade fabric extender options can be aggregated into a Cisco Nexus 6004 using 10 Gigabit Ethernet, providing a single-point-of-management benefit to blade server deployments.
- In conjunction with the Cisco Nexus 2248TP Gigabit Ethernet fabric extender, the Cisco Nexus 6004 can be used as a high-density 1 Gigabit Ethernet switching system, consolidating 2304 1 Gigabit Ethernet connections in a single management plane.

Table 3 lists the fabric extenders that the Cisco Nexus 6004 supports. Please refer to the Cisco Nexus 2200 platform data sheets and release notes for more information about the products.

Table 3. Cisco Nexus 2000 Series Fabric Extenders Supported with Cisco Nexus 6004

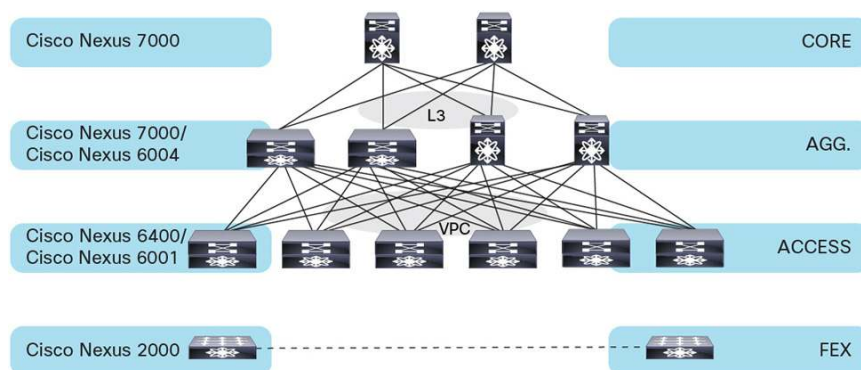
Description	Specification
Cisco Nexus 2248PQ	Forty-eight 1 and 10 Gigabit Ethernet SFP+ host interfaces and four 40 Gigabit Ethernet (sixteen 10 Gigabit Ethernet SFP+) network interfaces
Cisco Nexus 2242TP	Twenty-four 100/1000BASE-T host interfaces and two 10 Gigabit Ethernet fabric interfaces (SFP+)
Cisco Nexus 2248TP	Forty-eight 100/1000BASE-T host interfaces and four 10 Gigabit Ethernet fabric interfaces (SFP+)
Cisco Nexus 2248TP-E	Forty-eight 100/1000BASE-T host interfaces and four 10 Gigabit Ethernet fabric interfaces (SFP+) (32-MB shared buffer)

Description	Specification
Cisco Nexus 2232PP	Thirty-two 1 and 10 Gigabit Ethernet and FCoE host interfaces (SFP+) and eight 10 Gigabit Ethernet and FCoE fabric interfaces (SFP+)
Cisco Nexus 2232TM	Thirty-two 1 and 10 Gigabit Ethernet BASE-T host interfaces and eight 10 Gigabit Ethernet (SFP+) uplink modules
Cisco Nexus 2232TM-E	Thirty-two 1 and 10 Gigabit Ethernet BASE-T host interfaces and eight 10 Gigabit Ethernet (SFP+) uplink modules (for lower power consumption and improved bit error rate [BER])
Cisco Nexus B22HP	Sixteen 1 and 10 Gigabit Ethernet BASE-KR internal host interfaces and eight 10 Gigabit Ethernet fabric (SFP+) network interfaces
Cisco Nexus B22F	Sixteen 10 Gigabit Ethernet BASE-KR internal host interfaces and eight 10 Gigabit Ethernet fabric (SFP+) network interfaces
Cisco Nexus B22DELL	Sixteen 1 and 10 Gigabit Ethernet BASE-KR internal host interfaces and eight 10 Gigabit Ethernet fabric (SFP+) network interfaces

Compact Aggregation

Data center designs are increasingly moving toward less oversubscription, starting from the server access layer. Moreover, growth of 10 Gigabit Ethernet server deployments is accelerating the need for top-of-rack (ToR) solutions that can provide 40 Gigabit Ethernet uplink capabilities to meet the oversubscription requirement. The Cisco Nexus 6004 with high-density 40 Gigabit Ethernet ports is well suited as a compact aggregation platform for ToR switches with 40 Gigabit Ethernet uplinks (Figure 5).

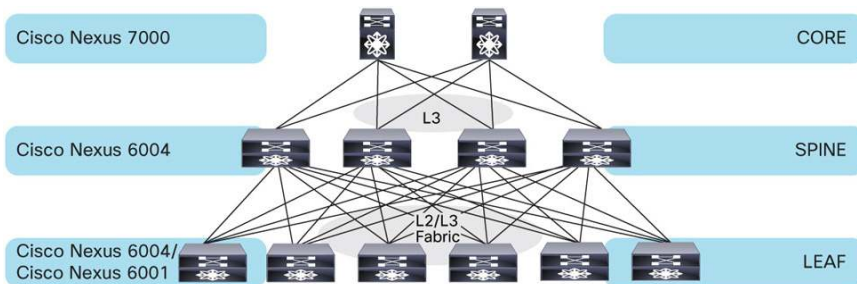
Figure 5. Scalable Data Center Access and Aggregation Using Cisco Nexus 6000 Series



Large-Scale Fabric (Layer 2 and Layer 3): Leaf-and-Spine Architecture

Data center architectures are evolving to accommodate customers seeking to build large-scale nonblocking fabrics to support different applications, promoting heavy east-west or north-south traffic. The Cisco Nexus 6004 is well suited as a leaf or spine node in a Layer 2 or Layer 3 fabric design. Leaf-and-spine layer designs using high-density and low-latency switches lead to flatter network architectures, allowing connections that scale from hundreds to more than 10,000 servers with large bisectonal bandwidth. The leaf-and-spine design helps ensure low-latency fabric with a low hop count. The spine switches create a nonblocking, low-latency fabric, forwarding packets between leaves. The leaf switches provide connectivity to servers. Use of a highly meshed architecture helps ensure the highest possible network availability with little effect on customer traffic if a failure occurs. The Cisco Nexus 6004 can be deployed as a Layer 2 or Layer 3 spine or leaf switch (Figure 6), providing high design flexibility.

Figure 6. Cisco Nexus 6004 as a Leaf or Spine Switch in a Large-Scale Layer 2 or Layer 3 Fabric



Multihop FCoE

Cisco Unified Fabric combines data center and storage networks to deliver a single high-performance, highly available, and scalable network. The Cisco Nexus 6004 can support end-to-end data center convergence from server to storage by delivering multihop FCoE capability in the data center. The FCoE function complements the existing FCoE function on the Cisco Nexus 5500 platform. With this broad selection of standards-based FCoE switches, Cisco Unified Fabric supports both the access and core network layers, supporting all storage traffic (FCoE, Small Computer System Interface over IP [iSCSI], and network-attached storage [NAS]) over simplified infrastructure based on lossless 10 and 40 Gigabit Ethernet. The Cisco Nexus 6004 is the first switch in the industry to provide 40 Gigabit Ethernet FCoE support, surpassing the 16-Gbps Fibre Channel capability (Figure 7 and Figure 8).

Figure 7. Cisco Nexus 6004 as 40-Gbps FCoE Aggregation Device

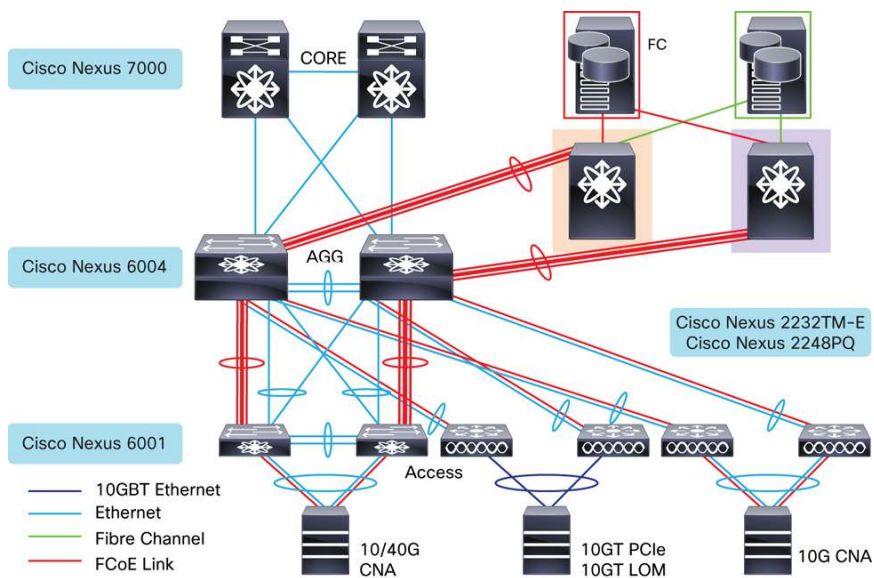
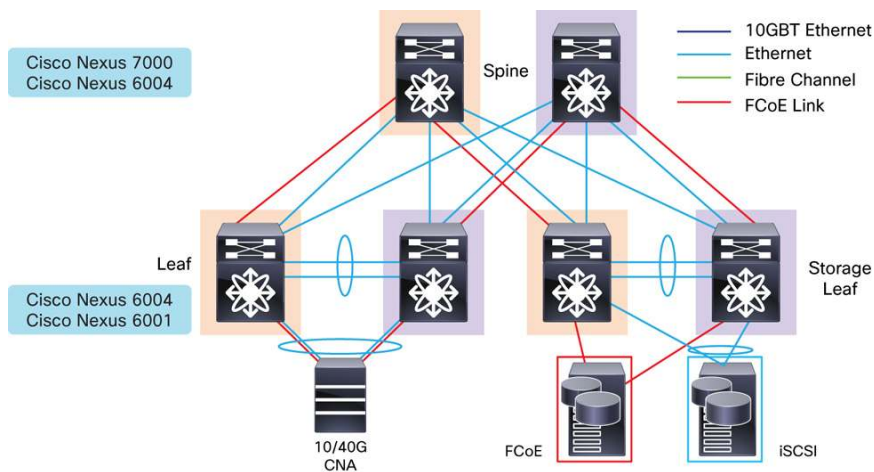


Figure 8. Cisco Nexus 6004 in 10 and 40 Gigabit Ethernet FabricPath SAN

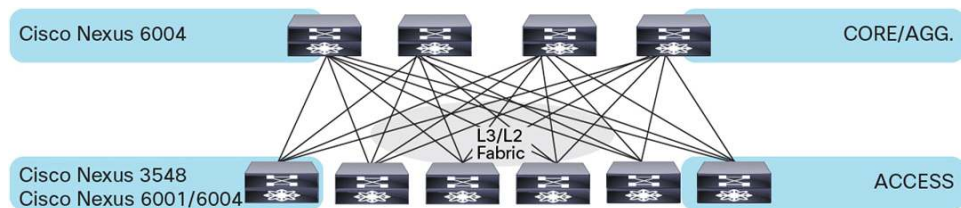


High-Performance Computing and High-Frequency Trading

The Cisco Nexus 6004 can be deployed as a high-density access-layer switch to consolidate a large number of 10 and 40 Gigabit Ethernet servers when the deployment calls for a small number of hops from the server to the upstream network to reduce latency (Figure 9). The Cisco Nexus 6004 has the highest density of 10 and 40 Gigabit Ethernet ports per rack unit currently available, approximately 1 microsecond of latency port to port for any packet size, integrated line-rate Layer 2 and Layer 3 features with scalability, and integrated data analytics with programmability. It also addresses the needs of high-performance computing (HPC) and high-frequency trading (HFT) environments, for which InfiniBand solutions lack management visibility and performance for bulk data transfers across traditional applications.

The capability of the Cisco Nexus 6004 to function in all these capacities helps protect investment in the data center with a deployment model in which additional features can be enabled as the need arises.

Figure 9. Cisco Nexus 6004 in HPC and HFT Deployment



Product Architecture

The Cisco Nexus 6000 Series is built on two custom ASICs: a unified crossbar fabric and a unified port controller. Depending on the 10 and 40 Gigabit Ethernet and FCoE port density, each Cisco Nexus 6000 Series Switch contains a single or multiple unified crossbar fabric ASICs. Multiple unified port controllers are used to support fixed ports and expansion modules within the switch.

Each unified port controller handles three 40-Gbps or twelve 10-Gbps ports and provides packet processing capabilities such as forwarding, buffering, and queuing decisions for each frame. The cut-through characteristic of the architecture provides low latency for both 10 and 40 Gbps at 1 microsecond independent of the frame size. The unified crossbar fabric is a single-stage, nonblocking crossbar providing connectivity and arbitration between the unified port controllers to access the fabric. The Cisco Nexus 6000 Series offers superior performance by implementing quality of service (QoS)-aware buffering, queuing, and scheduling for unicast and multicast traffic.

Cisco NX-OS Software Overview

The Cisco NX-OS operating system is specifically built for the data center and is designed for performance, resiliency, scalability, manageability, and programmability at its foundation. Cisco NX-OS provides a robust and comprehensive feature set that can meet the demanding requirements of virtualization and automation in present and future data centers. Cisco's enhanced fabric solution allows smooth integration of virtual and physical devices onto a unified network. In addition to providing a robust and comprehensive feature set that meets Ethernet and storage networking requirements, Cisco provides the capability for you to harness and tap into the comprehensive feature service set of the operating system to create unique innovation that meets the needs of customized solutions. Additionally, with the MIBs, native XML interface, and a command-line interface (CLI) like that of Cisco IOS® Software, the management of Cisco NX-OS devices is dramatically simplified.

Cisco NX-OS Software Features and Benefits

- **Software compatibility:** Cisco NX-OS Software Release 6.0 interoperates with Cisco products running any variant of the Cisco IOS Software operating system. Cisco NX-OS 6.0 also interoperates with any networking operating system that conforms to the networking standards listed as supported in this data sheet.
- **Common software throughout the data center:** Cisco NX-OS simplifies the data center operating environment and provides a unified operating system designed to run all areas of the data center network, including the LAN, SAN, and Layer 4 through 7 network services.
- **Modular software design:** Cisco NX-OS is designed to support distributed multithreaded processing on symmetric multiprocessors (SMPs), multicore CPUs, and distributed line-card processors. You can offload computationally intensive tasks, such as hardware table programming, to dedicated processors distributed across the line cards. Cisco NX-OS modular processes are instantiated on demand, each in a separate protected memory space. Thus, processes are started and system resources allocated only when a feature is enabled. The modular processes are governed by a real-time preemptive scheduler that helps ensure the timely processing of critical functions.
- **Enhanced virtual PortChannel (vPC):** The vPC feature allows one end of a PortChannel to be split across a pair of Cisco Nexus 5000 Series Switches. vPC provides Layer 2 multipathing through the elimination of Spanning Tree Protocol blocked ports in dual-homed connections. vPC enables fully used bisectonal bandwidth and simplified Layer 2 logical topologies without the need to change the existing management and deployment models. The vPC feature is further enhanced so that edge devices can connect to the

Cisco Nexus 2000 Series Fabric Extenders using vPC, and the Cisco Nexus 2000 Series Fabric Extenders can connect to Cisco Nexus 5000 Series Switches using vPC at the same time.

- Cisco FabricPath: Cisco FabricPath provides the simplicity and fabric efficiency to easily deploy new virtualized services into a cloud-based environment. New virtual and physical servers can be added to the network with the simplicity and mobility of the Layer 2 network without the deficiencies of traditional Spanning Tree Protocol.

Cisco FabricPath is a set of multipath Ethernet technologies that combine the reliability and scalability benefits of Layer 3 routing with the flexibility of Layer 2 networks, enabling IT to build massively scalable data centers. Cisco FabricPath offers a topology-based Layer 2 routing mechanism that provides an equal-cost multipath (ECMP) forwarding model. Cisco FabricPath implements an enhancement that solves the MAC address table scalability problem characteristic of switched Layer 2 networks. Furthermore, Cisco FabricPath supports vPC+, a technology similar to vPC that allows redundant interconnection of the existing Ethernet infrastructure to Cisco FabricPath without using Spanning Tree Protocol. Benefits introduced by the Cisco FabricPath technology include:

- Operational simplicity: Cisco FabricPath embeds an autodiscovery mechanism that does not require any additional platform configuration. By offering Layer 2 connectivity, the “VLAN anywhere” characteristic simplifies provisioning and offers workload flexibility across the network.
 - High resiliency and performance: Because Cisco FabricPath is a Layer 2 routed protocol, it offers stability, scalability, and optimized resiliency along with network failure containment.
 - Massively scalable fabric: By building a forwarding model on 16-way ECMP routing, Cisco FabricPath helps prevent bandwidth bottlenecks and allows organizations to add capacity dynamically, without network disruption.
 - Multiple-topology support: Cisco FabricPath provides support for two distinct topologies, providing VLAN localization and reuse in the network.
- Automation: Cisco NX-OS provides the power-on provisioning that enables transparent autoconfiguration of devices. Custom Python scripts can be created that are specific to your environment. The software provides intelligence and flexibility to support device-aware provisioning of configurations.
 - Programmatic XML interface: Based on the NETCONF industry standard, the Cisco NX-OS XML interface provides a consistent API for devices, enabling rapid development and creation of tools to enhance the network.
 - Simple Network Management Protocol (SNMP): Cisco NX-OS complies with SNMPv1, v2, and v3. An extensive collection of MIBs is supported.
 - Role-based access control (RBAC): With RBAC, Cisco NX-OS enables administrators to limit access to switch operations by assigning roles to users. Administrators can customize access and restrict it to the users who require it.

Cisco NX-OS Software Packaging for Cisco Nexus 6004 Series

The software packaging for the Cisco Nexus 6004 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 and base-level Layer 3 feature set. To enable advanced Layer 3 IP Unicast and IP Multicast routing functions, you must install additional licenses. Table 4 lists the software packaging and licensing available to enable various advanced features.

Table 4. Software Packaging and Licensing

License	Chassis Based or Port Based	Part Number	Supported Features
Cisco Nexus 6004 Layer 3 Base Software License	Chassis	N6K-BAS1K9	Static routing, Routing Information Protocol Version 2 (RIPv2), Open Shortest Path First Version 2 (OSPFv2), Enhanced Interior Gateway Routing Protocol (EIGRP) stub, Hot-Standby Router Protocol (HSRP), Virtual Router Redundancy Protocol (VRRP), Interior Gateway Management Protocol Versions 2 and 3 (IGMPv2 and v3), Protocol-Independent Multicast Version 2 (PIMv2) (sparse mode), routed access control list (ACL), and unicast Reverse Path Forwarding (uRPF); OSPF scalability is limited to 256 dynamically learned routes
Cisco Nexus 6004 Layer 3 Enterprise (LAN) Software License	Chassis	N6004-LAN1K9	Advanced Layer 3 features: Full EIGRP, OSPF, Border Gateway Protocol (BGP), and Virtual Route Forwarding Lite (VRF-Lite)
Cisco Nexus 6004 FCoE NPV License	Chassis	N6K-FNPV-SSK9	FCoE N-Port Virtualizer (NPV) features supported on Cisco Nexus 6000 Series
Cisco Nexus 6004 Enhanced Layer 2 Software License	Chassis	N6004-EL2-SSK9	Cisco FabricPath supported on Cisco Nexus 6000 Series
Cisco Nexus 6000 VM-FEX Software License	Chassis	N6K-VMFEXK9	Cisco Data Center VM-FEX supported on Cisco Nexus 6000 Series
Cisco Nexus 6004 Software Bundle	Chassis/Ports	N6004-SBUN-P1-L	LAN, Enhanced Layer 2, Layer 3 Basic, Layer 3 Advanced, Cisco Data Center Network Manager (DCNM) LAN, Cisco Data Center VM-FEX, and Fibre Channel and FCoE storage features
Cisco Nexus 6004 Software Bundle Chassis	Chassis	N6004-SBUN-P1	LAN, Enhanced Layer 2, Layer 3 Basic, Layer 3 Advanced, Cisco DCNM LAN and SAN, Cisco Data Center VM-FEX, and Fibre Channel and FCoE storage features per chassis
Cisco Nexus 6004 Storage Protocols Services License: 16 ports of 10 Gigabit Ethernet or 4 ports of 40 Gigabit Ethernet	Port	N6004-4Q-SSK9	Fibre Channel and FCoE and FCoE NPV features supported on any 16 ports of 10 Gigabit Ethernet or 4 ports of 40 Gigabit Ethernet
Cisco Nexus 6000 Storage Protocols Services License: 48 ports of 10 Gigabit Ethernet or 12 ports of 40 Gigabit Ethernet	Port	N6004-12Q-SSK9	Fibre Channel and FCoE and FCoE NPV features supported on any 48 ports of 10 Gigabit Ethernet or 12 ports of 40 Gigabit Ethernet

Cisco Prime Data Center Network Manager

Cisco Prime™ Data Center Network Manager (DCNM) provides LAN and SAN management capabilities for the Cisco Nexus and Cisco MDS 9000 Families of switches. Cisco Prime DCNM provides a GUI that reduces OpEx compared to traditional CLI methods and allows efficient control, monitoring, and provisioning of operations and troubleshooting of your Cisco NX-OS-based devices. Highlights include:

- Cisco Unified Fabric visibility and topology display with VMware vSphere integration shows connectivity from the virtual machine to the VMware ESX host to the switch and storage array.
- Event aggregation and filtering avoids information overload and helps you quickly identify network problems.
- Deployment wizards and user-modifiable templates help you implement best practices.
- RBAC secures devices and provides appropriate delegation.
- Integrated domain dashboards, health monitoring, reporting, change tracking, and user auditing provide comprehensive management capabilities.
- Trend monitoring of ports and traffic allow you to optimize your existing resources and anticipate new resource requirements.

Specifications

Table 5 lists the specifications for the Cisco Nexus 6004.

Note: Please check software release notes for feature support information.

Table 5. Product Specifications

Performance
<ul style="list-style-type: none">• Cisco Nexus 6004: Layer 2 and Layer 3 hardware forwarding at 7.68 Tbps• Support for up to 256,000 MAC addresses• Low-latency of ~1 microsecond using cut-through forwarding for predictable, consistent traffic latency regardless of packet size, traffic pattern, or features enabled on 10 and 40 Gigabit Ethernet interfaces• 25-MB buffer per three 40 Gigabit Ethernet QSFP interfaces• Line-rate traffic throughput on all ports
Interfaces
<ul style="list-style-type: none">• Cisco Nexus 6004: Up to 96 40 Gigabit Ethernet and FCoE ports through the use of 8 expansion modules• 12-port 40 Gigabit Ethernet and FCoE expansion module• 10 Gigabit Ethernet interface through QSFP breakout cable• 1 Gigabit Ethernet interface through a QSFP to SFP and SFP+ adapter (QSA)• Extension through the Cisco Nexus 2200 platform
Layer 2 Features
<ul style="list-style-type: none">• Layer 2 switch ports and VLAN trunks• IEEE 802.1Q VLAN encapsulation• Support for up to 4000 VLANs• Support for up to 4000 ACLs• Rapid Per-VLAN Spanning Tree Plus (PVRST+; IEEE 802.1w compatible)• Multiple Spanning Tree Protocol (MSTP; IEEE 802.1s) instances: 64 instances• Spanning Tree PortFast• Spanning Tree root guard• Spanning Tree Bridge Assurance• Cisco EtherChannel technology (up to 16 ports per EtherChannel)• Cisco vPC technology• vPC configuration synchronization• vPC Shutdown• Link Aggregation Control Protocol (LACP): IEEE 802.3ad• Advanced PortChannel hashing based on Layer 2, 3, and 4 information• Jumbo frames on all ports (up to 9216 bytes)• Pause frames (IEEE 802.3x)• Storm control (unicast, multicast, and broadcast)• Private VLANs• Private VLAN over trunks (isolated and promiscuous)• Private VLANs over vPC and EtherChannels• VLAN remapping• Cisco FabricPath• EvPC and vPC+ with Cisco FabricPath• Cisco Adapter FEX• Cisco Data Center VM-FEX• Support for up to 48 fabric extenders (Layer 2) with each Cisco Nexus 6004 Switch

Layer 3 Features

- Layer 3 interfaces: Routed ports on Cisco Nexus 6004 platform interfaces, switched virtual interface (SVI), PortChannels, subinterfaces, and PortChannel subinterfaces
- Support for up to 32,000 IPv4 and 8000 IPv6 host prefixes
- Support for up to 8000 multicast routes (IPv4)
- Support for up to 8000 IGMP snooping groups*
- Support for 4000 VRF entries
- Support for up to 4096 VLANs
- Equal-Cost Multipathing (ECMP) up to 64 ways
- 4000 flexible ACL entries
- Routing protocols: Static, RIPv2, EIGRP, OSPFv2, and BGP
- IPv6 routing protocols: Static, OPFv3, BGPv6, and EIGRPv6
- IPv6 VRF-Lite
- BFD support: OSPFv2, BGPv4, EIGRP, and VRF
- vPC+ routing protocol peering
- Policy-based routing (IPv4 and IPv6)
- HSRP and VRRP
- IP-directed broadcast
- ACL: Routed ACL with Layer 3 and 4 options to match ingress and egress ACLs
- Multicast: PIMv2 sparse mode, Source-Specific Multicast (SSM), BiDir PIM, Multicast Source Discovery Protocol (MSDP), IGMPv2 and v3, and Multicast VLAN Registration (MVR)
- VRF: VRF-Lite (IP VPN); VRF-aware unicast; and BGP-, OSPF-, RIP-, and VRF-aware multicast
- uRFP with ACL; strict and loose modes
- Jumbo frame support (up to 9216 bytes)
- Support for up to 24 fabric extenders on each Cisco Nexus 6004

QoS

- Layer 2 IEEE 802.1p (class of service [CoS])
- 8 unicast queues and 8 multicast queues per port
- Per-port QoS configuration
- CoS trust
- Port-based CoS assignment
- Modular QoS CLI (MQC) compliance: IPv4 and IPv6
- ACL-based QoS classification (Layers 2, 3, and 4)
- Flexible TCAM carving
- MAC address and Address Resolution Protocol (ARP) hardware carving
- MQC CoS marking
- Per-port virtual output queuing
- CoS-based egress queuing
- Egress strict-priority queuing
- Egress port-based scheduling: Weighted Round Robin (WRR)
- Control Plan Policing (CoPP): IPv4 and IPv6

Security

- Ingress ACLs (standard and extended) on Ethernet and virtual Ethernet ports
- Standard and extended Layer 2 ACLs: MAC address, protocol type, etc.
- Standard and extended Layer 3 to 4 ACLs: IPv4 and IPv6, Internet Control Message Protocol (ICMP and ICMPv6), TCP, User Datagram Protocol (UDP), etc.
- Ingress policing
- VLAN-based ACLs (VACLs)
- Port-based ACLs (PACLs)
- Named ACLs
- Optimized ACL distribution
- ACLs on virtual terminals (VTYs)
- ACL logging (IPv4 only)
- Dynamic Host Configuration Protocol (DHCP) snooping with Option 82
- Dynamic ARP Inspection
- IP source guard

- DHCP relay: Up to 32 destinations
- Ethernet port security
- IPv6 router ACL (RACL), PACL, and VACL
- iSCSI type-length-value (TLV) element

High-Availability Features

- ISSU for Layer 2
- Hot-swappable field-replaceable power supplies, fan modules, and expansion modules
- N+1 or N+N power redundancy
- N+1 fan module redundancy

Management

- Switch management using 10-, 100-, and 1000-Mbps management or console ports
- CLI-based console to provide detailed out-of-band management
- In-band switch management
- Port-based locator and beacon LEDs
- Configuration synchronization
- Module preprovisioning
- Configuration rollback
- Secure Shell (SSH) Protocol Version 2 (SSHv2)
- Telnet
- Authentication, authorization, and accounting (AAA)
- AAA with RBAC
- RADIUS
- TACACS+
- Syslog (8 servers)
- Embedded packet analyzer
- SNMPv1, v2, and v3 (IPv4 and IPv6)
- Enhanced SNMP MIB support
- XML (NETCONF) support
- Remote monitoring (RMON)
- Advanced Encryption Standard (AES) for management traffic
- Unified username and passwords across CLI and SNMP
- Microsoft Challenge Handshake Authentication Protocol (MS-CHAP)
- Digital certificates for management between switch and RADIUS server
- Cisco Discovery Protocol Versions 1 and 2
- RBAC
- SPAN on physical, PortChannel, and VLAN
- ERSPAN
- Ingress and egress packet counters per interface
- Network Time Protocol (NTP)
- Cisco Generic Online Diagnostics (GOLD)
- Comprehensive bootup diagnostic tests
- Cisco Embedded Event Manager (EEM)
- Call Home feature
- Smart Call Home feature
- Default interface
- Cisco Fabric Manager
- Cisco DCNM
- CiscoWorks LAN Management Solution (LMS)

Data Center Bridging

- CEE- and IEEE-compliant policy feature card (PFC; per-priority pause frame support)
- PFC link distance support: 300m
- CEE-compliant Data Center Bridging Exchange (DCBX) Protocol
- CEE- and IEEE-compliant Enhanced Transmission Selection (ETS)

FCoE Features (Requires Storage Services License)

- T11 standards-compliant FCoE (FC-BB-5)
- T11 FCoE Initialization Protocol (FIP) (FC-BB-5)
- Any 10 or 40 Gigabit Ethernet port configurable as FCoE
- SAN administration separate from LAN administration
- Fibre Channel forwarding (FCF)
- Fibre Channel enhanced port types: VE, TE, and VF
- Direct attachment of FCoE targets
- Fabric Device Management Interface (FDMI)
- Fibre Channel ID (FCID) persistence
- Distributed device alias services
- In-order delivery
- Port tracking
- Cisco FCoE NPV technology
- N-port identifier virtualization (NPIV)
- Fabric services: Name server, registered state change notification (RSCN), login services, and name-server zoning
- Per-VSAN fabric services
- Cisco Fabric Services
- Diffie-Hellman Challenge Handshake Authentication Protocol (DH-CHAP) and Fibre Channel Security Protocol (FC-SP)
- Distributed device alias services
- Host-to-switch and switch-to-switch FC-SP authentication
- Fabric Shortest Path First (FSPF)
- Standard zoning
- Enhanced zoning
- Cisco Fabric Analyzer
- Cisco Data Center Network Manager (DCNM) - SAN
- Storage Management Initiative Specification (SMI-S)
- Boot from SAN over vPC and EvPC
- FCP
- VSAN trunking
- Fabric Device Management Interface (FDMI)
- Fibre Channel ID (FCID) persistence
- Distributed device alias services
- In-order delivery
- Port tracking
- Cisco NPV technology
- Fabric binding for Fibre Channel
- Port security
- Fibre Channel traceroute
- Fibre Channel ping
- Fibre Channel debugging

SNMP MIBs

Generic MIBs

- SNMPv2-SMI
- CISCO-SMI
- SNMPv2-TM
- SNMPv2-TC
- IANA-ADDRESS-FAMILY-NUMBERS-MIB
- IANAifType-MIB
- IANAiprouteprotocol-MIB
- HCNM-TC
- CISCO-TC
- SNMPv2-MIB
- SNMP-COMMUNITY-MIB
- SNMP-FRAMEWORK-MIB

- SNMP-NOTIFICATION-MIB
- SNMP-TARGET-MIB
- SNMP-USER-BASED-SM-MIB
- SNMP-VIEW-BASED-ACM-MIB
- CISCO-SNMP-VACM-EXT-MIB

Layer 3 MIBs

- UDP-MIB
- TCP-MIB
- OSPF-MIB
- BGP4-MIB
- CISCO-HSRP-MIB

Ethernet MIBs

- CISCO-VLAN-MEMBERSHIP-MIB
- CISCO-Virtual-Interface-MIB
- CISCO-VTP-MIB

Configuration MIBs

- ENTITY-MIB
- IF-MIB
- CISCO-ENTITY-EXT-MIB
- CISCO-ENTITY-FRU-CONTROL-MIB
- CISCO-ENTITY-SENSOR-MIB
- CISCO-FLASH-MIB
- CISCO-SYSTEM-MIB
- CISCO-SYSTEM-EXT-MIB
- CISCO-IP-IF-MIB
- CISCO-IF-EXTENSION-MIB
- CISCO-SERVER-INTERFACE-MIB
- CISCO-NTP-MIB
- CISCO-IMAGE-MIB
- CISCO-IMAGE-CHECK-MIB
- CISCO-IMAGE-UPGRADE-MIB
- CISCO-CONFIG-COPY-MIB
- CISCO-ENTITY-VENDORTYPE-OID-MIB
- CISCO-BRIDGE-MIB

Monitoring MIBs

- DIFFSERV-DSCP-TC
- NOTIFICATION-LOG-MIB
- DIFFSERV-MIB
- CISCO-CALLHOME-MIB
- CISCO-SYSLOG-EXT-MIB
- CISCO-PROCESS-MIB
- RMON-MIB
- CISCO-RMON-CONFIG-MIB
- CISCO-HC-ALARM-MIB
- LLDP MIB

Security MIBs

- CISCO-AAA-SERVER-MIB
- CISCO-AAA-SERVER-EXT-MIB
- CISCO-COMMON-ROLES-MIB
- CISCO-COMMON-MGMT-MIB
- CISCO-RADIUS-MIB
- CISCO-SECURE-SHELL-MIB
- TCP/IP MIBs
- INET-ADDRESS-MIB

<ul style="list-style-type: none"> • TCP-MIB • CISCO-TCP-MIB • UDP-MIB • IP-MIB • CISCO-IP-PROTOCOL-FILTER-MIB • CISCO-DNS-CLIENT-MIB • CISCO-PORTSECURITY- MIB
Miscellaneous MIBs
<ul style="list-style-type: none"> • START-MIB • CISCO-LICENSE-MGR-MIB • CISCO-FEATURE-CONTROL-MIB • CISCO-CDP-MIB • CISCO-RF-MIB • CISCO-ETHERNET-FABRIC-EXTENDER-MIB • CISCO-BRIDGE-MIB • CISCO-FCOE-MIB • CISCO-PORTCHANNEL-MIB • Cisco-zs-MIB
Standards
Industry Standards
<ul style="list-style-type: none"> • IEEE 802.1D: Spanning Tree Protocol • IEEE 802.1p: CoS prioritization • IEEE 802.1Q: VLAN tagging • IEEE 802.1Qaz: Enhanced transmission selection • IEEE 802.1Qbb: Per-priority pause • IEEE 802.1s: Multiple VLAN instances of Spanning Tree Protocol • IEEE 802.1w: Rapid reconfiguration of Spanning Tree Protocol • IEEE 802.3: Ethernet • IEEE 802.3ad: LACP with fast timers • IEEE 802.3ae: 10 Gigabit Ethernet • SFF 8431 SFP+ CX1 support • RMON
Physical Specifications
QSFP Optics
<ul style="list-style-type: none"> • Cisco Nexus 6004 supports 40 Gigabit Ethernet QSFP+ optics

Power Supply

Table 6 lists the power supply properties of the Cisco Nexus 6004.

Table 6. Power Supply Properties

AC Power Supply Properties	Cisco Nexus 6004
Typical operating power	2800W
Maximum power	3300W
Input voltage	94 to 240 VAC
Frequency	47 to 63 Hz
Efficiency	98% (50 to 100% load)
RoHS compliance	Yes
Hot-swappable	Yes
Heat dissipation	11260 BTU/hr (3300W)
Front-to-back air flow power supply (port-side exhaust airflow)	Yes
Back-to-front air flow power supply (port-side intake airflow)	Yes

Environment

Table 7 lists the environmental properties of the Cisco Nexus 6004.

Table 7. Environmental Properties

Property	Cisco Nexus 6004
Physical (H x W x D)	6.97 x 17.3 x 30 in. (17.7 x 43.9 x 76.2 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 10,000 ft (0 to 3000m)

Weight

Table 8 lists the weight of the Cisco Nexus 6004 Switch.

Table 8. Weight

Component	Weight
Cisco Nexus 6004 with three 1100W power supplies, two expansion modules, and four fan modules	111 lb or 50.3 kg
Cisco Nexus 6004 with three 1100W power supplies and four fan modules	100 lb or 45.3 kg

Software Requirements

The Cisco Nexus 6004 supports Cisco NX-OS Software Release 6.0 and later. Cisco NX-OS interoperates with any networking operating system, including Cisco IOS Software, that conforms to the networking standards mentioned in this data sheet.

For the latest software release information and recommendations, please refer to the product bulletin at <http://www.cisco.com/go/nexus6000>.

Regulatory Standards Compliance

Table 9 summarizes regulatory standards compliance for the Cisco Nexus 6004.

Table 9. 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

Specification	Description
EMC: Immunity	<ul style="list-style-type: none"> • CNS13438 Class A • EN55024 • CISPR24 • EN300386 • KN 61000-4 series
RoHS	The product is compliant with RoHS 6 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 6004. Note that you can order the Cisco Nexus 2200 platform fabric extenders either separately or along with the Cisco Nexus 6004 Switch.

Table 10. Ordering Information

Part Number	Description
Chassis	
N6004-B-24Q	Nexus 6004 EF chassis 24 x 40GE Ports/FCoE Bundle; 6PSU, 4 FAN
Fan Modules	
N6K-C6004-FAN-F	Cisco Nexus 6004 Fan Module, Front-to-Back, port side exhaust Airflow
N6K-C6004-FAN-F=	Cisco Nexus 6004 Fan Module, Front-to-Back, port side exhaust Airflow, spare
N6K-C6004-FAN-B=	Cisco Nexus 6004 Fan Module, Back-to-Front, port side intake Airflow, spare
Power Supplies	
N55-PAC-1100W	Cisco Nexus 5500/6000 PSU module, (port side exhaust airflow) 100-240VAC 1100W
N55-PAC-1100W=	Cisco Nexus 5500/6000 PSU module, (port side exhaust airflow) 100-240VAC 1100W, Spare
N55-PAC-1100W-B	Cisco Nexus 5500/6000 PSU module, port side intake (back to front) airflow 100-240VAC 1100W
N55-PAC-1100W-B=	Cisco Nexus 5500/6000 PSU module, port side intake (back to front) airflow 100-240VAC 1100W, Spare
N55-PDC-1100W	Cisco Nexus 5500/6000 PSU module, DC 1100W
N55-PDC-1100W=	Cisco Nexus 5500/6000 PSU module, DC 1100W, Spare
Miscellaneous	
N6K-C6004-M-BLNK	Nexus 6004 Blank Module Cover
N6K-C6004-M-BLNK=	Nexus 6004 Blank Module Cover, spare
N6K-PS-BLANK	Nexus 6004 Power Supply Blank Cover
N6K-PS-BLANK=	Nexus 6004 Power Supply Blank Cover, spare
Software	
N6KUK9-602N1.1	Nexus 6000 Base OS Software Rel 6.0(2)N1(1)
N6KUK9-602N1.2	Nexus 6000 Base OS Software Rel 6.0(2)N1(2)
N6KUK9-602N1.2=	Nexus 6000 Base OS Software Rel 6.0(2)N1(2), spare
N6KUK9-602N1.2a	Nexus 6000 Base OS Software Rel 6.0(2)N1(2a)
N6KUK9-602N1.2a=	Nexus 6000 Base OS Software Rel 6.0(2)N1(2a), spare
N6KUK9-602N2.1	Nexus 6000 Base OS Software Rel 6.0(2)N2(1)
N6KUK9-602N2.1=	Nexus 6000 Base OS Software Rel 6.0(2)N2(1), spare
Expansion Modules	
N6004-M12Q	Nexus 6004 Module 12Q 40GE Ethernet/FCoE
N6004-M12Q=	Nexus 6004 Module 12Q 40GE Ethernet/FCoE, Spare
N6004-M12Q	Nexus 6004 EF Chassis Module 12Q 40GE Ethernet/FCoE
N6004-M12Q=	Nexus 6004 EF Chassis Module 12Q 40GE Ethernet/FCoE, Spare

Part Number	Description
Cables and Optics	
QSFP-40G-SR4	40GBASE-SR4 QSFP module, (multi-mode fiber, MMF at 100m)
QSFP-40G-CSR4	40GBASE Extended CSR4 QSFP module, (multi-mode fiber, MMF at 300m)
QSFP-40G-LR4	Cisco 40GBASE-LR4 QSFP+ transceiver module for SMF, duplex LC connector
QSFP-4x10G-AC7M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ direct-attach breakout cable, 7-meter, active
QSFP-4x10G-AC10M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ direct-attach breakout cable, 10-meter, active
QSFP-H40G-CU1M	Cisco 40GBASE-CR4 QSFP+ direct-attach copper cable, 1-meter, passive
QSFP-H40G-CU3M	Cisco 40GBASE-CR4 QSFP+ direct-attach copper cable, 3-meter, passive
QSFP-H40G-CU5M	Cisco 40GBASE-CR4 QSFP+ direct-attach copper cable, 5-meter, passive
QSFP-H40G-ACU7M	Cisco 40GBASE-CR4 QSFP+ direct-attach copper cable, 7-meter, active
QSFP-H40G-ACU10M	Cisco 40GBASE-CR4 QSFP+ direct-attach copper cable, 10-meter, active
QSFP-4SFP10G-CU1M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ passive direct-attach copper transceiver assembly, 1 meter
QSFP-4SFP10G-CU3M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ passive direct-attach copper transceiver assembly, 3 meter
QSFP-4SFP10G-CU5M	Cisco 40GBASE-CR4 QSFP+ to 4 10GBASE-CU SFP+ passive direct-attach copper transceiver assembly, 5 meter
CVR-QSFP-SFP10G=	Cisco 40GBASE QSFP to SFP+/SFP Adapter (QSA) for 1G (GLC-T, SX/LH and 10G-LR connectivity)
Power Cords	
CAB-250V-10A-AR	AC Power Cord - 250V, 10A - Argentina (2.5 meter)
CAB-9K10A-AU	Power Cord, 250VAC 10A 3112 Plug, Australia (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-9K10A-EU	Power Cord, 250VAC 10A CEE 7/7 Plug, EU (2.5 meter)
CAB-IND-10A	10A Power cable for India (2.5 meter)
CAB-250V-10A-IS	AC Power Cord - 250V, 10A - Israel (2.5 meter)
CAB-9K10A-IT	Power Cord, 250VAC 10A CEI 23-16/II Plug, Italy (2.5 meter)
CAB-250V-10A-ID	AC Power Cord - 250V, 10A, South Africa(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-250V/13A	North America, NEMA L6-20 250V/20A plug-IEC320/C13 receptacle (2.0 meter)
CAB-N5K6A-NA	Power Cord, 200/240V 6A North America (2.5 meter)
CAB-C13-CBN	Cabinet Jumper Power Cord, 250 VAC 10A, C14-C13 Connectors (0.7 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)
Accessory Kit	
N6K-C6004-ACC-KIT	Nexus 6004 Chassis Accessory Kit
N6K-C6004-ACC-KIT=	Nexus 6004 Chassis Accessory Kit, spare

Warranty

The Cisco Nexus 6004 Switch 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 6004 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 Smart Call Home service capability, which offers proactive diagnostics and real-time alerts on your Cisco Nexus 6004. 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

- Cisco Nexus 6000 Series Switches: <http://www.cisco.com/go/nexus6000>
- Cisco Nexus 2000 Series Fabric Extenders: <http://www.cisco.com/go/nexus2000>
- Cisco NX-OS Software: <http://www.cisco.com/go/nxos>




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