

Cisco Nexus 3232C Switch

Product Overview

The Cisco Nexus[®] 3232C Switch is a low latency, dense, high-performance, power-efficient, 100-Gbps switch designed for the data center. This compact, 1-rack-unit (1RU) model offers wire-rate Layer 2 and 3 switching on all ports with latency of 450ns. It is a member of the Cisco Nexus 3200 platform and runs the industry-leading Cisco[®] NX-OS Software operating system, providing customers with comprehensive features and functions that are widely deployed. The comprehensive programmability features help enable organizations to run today's applications while also preparing them for demanding and changing application needs such as big data, cloud, and virtualization. The Cisco Nexus 3232C supports both forward and reverse (port-side exhaust and port-side intake) airflow schemes with AC and DC power inputs.

The Cisco Nexus 3232C (Figure 1) is a Quad Small Form-Factor Pluggable (QSFP) switch with 32 QSFP28 ports. Each QSFP28 port can operate at 10, 25, 40, 50, and 100 Gbps, up to a maximum of 128 x 25-Gbps ports¹.

Figure 1. Cisco Nexus 3232C Switch



Main Benefits

The Cisco Nexus 3232C provides the following:

- **Wire-rate Layer 2 and 3 switching on all ports²**, with up to 6.4 terabits per second (Tbps) and up to 3.3 billion packets per second (bps)
- **Robust programmability**, with support for Cisco NX-API, Linux containers, XML and JavaScript Object Notation (JSON) APIs, the OpenStack plug-in, Python, and Puppet and Chef configuration and automation tools
- **High performance and scalability** with a four-core CPU, 8 GB of DRAM, and 16 Mb of dynamic buffer allocation, making the switch excellent for massively scalable data centers and big data applications
- **Flexibility**
 - The QSFP28 port can be configured to work as 4 x 25-Gbps ports, offering deployment flexibility, with up to a maximum of 128 x 25-Gbps ports.
 - Both fiber and copper cabling solutions are available for 10-, 25-, 40-, 50-, and 100-Gbps connectivity, including active optical cable (AOC) and direct-attached cable (DAC).

¹ 50-Gbps break-out switch coming soon with software release

² Wire rate on all ports for packets greater than 200 bytes

- **High availability**
 - Virtual PortChannel (vPC) technology provides Layer 2 multipathing through the elimination of Spanning Tree Protocol. It also enables fully utilized bisectonal 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 allows organizations to prevent network bottlenecks, increase resiliency, and add capacity with little network disruption.
 - Advanced reboot capabilities include hot and cold patching and fast reboot capabilities.
 - The switch uses hot-swappable power-supply units (PSUs) and fans.
- **Purpose-built NX-OS operating system with comprehensive, proven innovations**
 - 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 utilization per port and per queue, which allows organizations to monitor traffic bursts and application traffic patterns.
 - EtherAnalyzer is a built-in packet analyzer for monitoring and troubleshooting control-plane traffic and is based on the popular Wireshark open-source network protocol analyzer.
 - Complete Layer 3 unicast and multicast routing protocol suites are supported, including Border Gateway Protocol (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).

Configuration

The Cisco Nexus 3232C has the following configuration:

- 32 fixed 100 Gigabit Ethernet QSFP28 ports
- Locator LED
- Environment LED
- Status LED
- Dual redundant power supplies
- Redundant (3+1) fans
- Lane-selected LED
- One 10/100/1000-Mbps management port
- One RS-232 serial console port
- Two USB ports

Transceiver and Cabling Options

The Cisco Nexus 3232C has 32 QSFP28 ports. QSFP28 technology allows a smooth transition from 40 to 100 Gigabit Ethernet infrastructure in data centers. Each of the Cisco Nexus 3232C Switch's QSFP28 ports can operate in either native 100 Gigabit Ethernet mode or 4 x 25 Gigabit Ethernet mode. This switch supports both fiber and copper cabling solutions for these two modes.

For low-cost cabling, copper-based 40-Gbps Twinax cables can be used, and for longer cable reaches, short-reach optical transceivers are excellent. Connectivity can be established from the QSFP28 ports to 10 Gigabit Ethernet switches or hosts using a splitter cable that has an Enhanced QSFP (QSFP+) transceiver on one end and four SFP+ transceivers on the other end. Similar capability can be achieved on the fiber solution by using QSFP+ SR4 transceivers on both ends and procuring third-party fiber splitter MPO-to-LC cables. Table 1 lists the transceiver types supported.

Table 1. Cisco Nexus 3232C QSFP28 Transceiver Support Matrix

Part Number	Description
QSFP-100G-AOC (1m-30m)	QSFP 100-Gbps to QSFP 100-Gbps AOC: 1, 2, 3, 5, 7, 10, 15, 20, 25, and 30m
QSFP-100G-CU (1m-5m)	QSFP 100-Gbps to QSFP 100-Gbps copper DAC: 1, 2, 3, and 5m
QSFP-4SFP25G-CU (1m-5m)	QSFP 100-Gbps to 4 x SFP 25-Gbps passive copper breakout cable: 1, 2, 3, and 5m
QSFP-100G-SR4-S	100GBASE SR4 transceiver module with MPO-12 connector, multimode fiber up to 100m
QSFP-100G-LR4-S	100GBASE LR4 transceiver module for single-mode fiber (SMF) with LC connector, 10km
QSFP-100G-CWDM4-S	100GBASE CWDM4 transceiver module for single-mode fiber (SMF) with LC connector, 2km
QSFP-100G-PSM4-S	100GBASE PSM4 transceiver module with MPO-12 connector, single-mode fiber up to 500m

The Cisco Nexus 3232C supports 100, 40 and 10 Gigabit Ethernet optics. Please refer to latest compatibility matrix for information about all supported optics:

- 100 Gigabit Ethernet compatibility matrix:
http://www.cisco.com/c/en/us/td/docs/interfaces_modules/transceiver_modules/compatibility/matrix/100GE_Tx_Matrix.html
- 40 Gigabit Ethernet compatibility matrix:
http://www.cisco.com/c/en/us/td/docs/interfaces_modules/transceiver_modules/compatibility/matrix/40GE_Tx_Matrix.html
- 10 Gigabit Ethernet compatibility matrix:
http://www.cisco.com/c/en/us/td/docs/interfaces_modules/transceiver_modules/compatibility/matrix/10GE_Tx_Matrix.html

For more information about the transceiver types, see http://www.cisco.com/en/US/products/hw/modules/ps5455/prod_module_series_home.html.

Cisco NX-OS Software Benefits

NX-OS is a data center-class operating system built with modularity, resiliency, and serviceability at its foundation. NX-OS helps ensure continuous availability and sets the standard for mission-critical data center environments. The self-healing and highly modular design of NX-OS makes zero-impact operations a reality and enables exceptional operation flexibility.

Focused on the requirements of the data center, NX-OS provides a robust and comprehensive feature set that meets the networking requirements of present and future data centers. With an XML interface and a command-line interface (CLI) like that of Cisco IOS® Software, NX-OS provides state-of-the-art implementations of relevant networking standards as well as a variety of true data center-class Cisco innovations.

Table 2 summarizes that benefits that NX-OS offers. Table 3 lists NX-OS packages available for the Cisco Nexus 3232C.

Table 2. Benefits of Cisco NX-OS Software

Feature	Benefit
Common software throughout the data center: NX-OS runs on all Cisco data center switch platforms (Cisco Nexus 9000, 7000, 6000, 5000, 4000, and 3000 Series Switches; Cisco Nexus 1000V Switches; and Cisco Nexus 2000 Series Fabric Extenders).	<ul style="list-style-type: none"> • Simple data center operating environment • End-to-end Cisco Nexus and NX-OS fabric • No retraining necessary for data center engineering and operations teams
Software compatibility: NX-OS interoperates with Cisco products running any variant of Cisco IOS Software and also with any networking OS that conforms to the networking standards listed as supported in this data sheet.	<ul style="list-style-type: none"> • Transparent operation with existing network infrastructure • Open standards • No compatibility concerns
Modular software design: NX-OS is designed to support distributed multithreaded processing. 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. A real-time preemptive scheduler that helps ensure timely processing of critical functions governs the modular processes.	<ul style="list-style-type: none"> • Robust software • Fault tolerance • Increased scalability • Increased network availability
Troubleshooting and diagnostics: NX-OS is built with unique serviceability functions to enable network operators to take early action based on network trends and events, enhancing network planning and improving network operations center (NOC) and vendor response times. Cisco Smart Call Home and Cisco Online Health Management System (OHMS) are some of the features that enhance the serviceability of NX-OS.	<ul style="list-style-type: none"> • Quick problem isolation and resolution • Continuous system monitoring and proactive notifications • Improved productivity of operations teams
Ease of management: NX-OS provides a programmatic XML interface based on the NETCONF industry standard. The NX-OS XML interface provides a consistent API for devices. NX-OS also provides support for Simple Network Management Protocol (SNMP) Versions 1, 2, and 3 MIBs. In addition NX-API and Linux Bash are now supported.	<ul style="list-style-type: none"> • Rapid development and creation of tools for enhanced management • Comprehensive SNMP MIB support for efficient remote monitoring
Role-based access control (RBAC): With RBAC, 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.	<ul style="list-style-type: none"> • Tight access control mechanism based on user roles • Improved network device security • Reduction in network problems arising from human errors

Table 3. Cisco NX-OS Software Packages Available for Cisco Nexus 3232C*

Packaging	Chassis Based	Part Number	Supported Features
Cisco Nexus 3232c Enhanced Layer 3 license	Chassis	N3K-LAN1K9	Layer 3 including full OSPF, EIGRP, BGP, and VXLAN**

* Nexus 3232C uses Nexus 9000 Licensing scheme. Please refer to http://www.cisco.com/c/en/us/td/docs/switches/datacenter/sw/nx-os/licensing/guide/b_Cisco_NX-OS_Licensing_Guide/b_Cisco_NX-OS_Licensing_Guide_chapter_01.html#con_24753

** VXLAN will be supported in future release

Product Specifications

Table 4 lists the specifications for the Cisco Nexus 3232C.

Table 4. Specifications

Description	Specification	
Physical	<ul style="list-style-type: none"> • 1RU fixed form-factor switch • 32 QSFP28 ports; each supports native 100 Gigabit Ethernet and 4 x 25 Gigabit Ethernet modes • 2 redundant power supplies • 4 redundant (3+1) fans • Management, console, and USB flash-memory ports 	
Performance	<ul style="list-style-type: none"> • 6.4-Tbps switching capacity • Forwarding rate of up to 3.3 bpps • Line-rate traffic throughput (both Layer 2 and 3) on all ports • Configurable maximum transmission unit (MTU) of up to 9216 bytes (jumbo frames) 	
Hardware tables and scalability	Number of MAC addresses	40,000
	Number of VLANS	4096
	Number of spanning-tree instances	<ul style="list-style-type: none"> • RSTP: 512 • MSTP: 64
	Number of ACL entries	<ul style="list-style-type: none"> • 6000 ingress • 1000 egress
	Routing table	<ul style="list-style-type: none"> • Maximum number of longest-prefix-match (LPM) routes: 128,000 • Maximum number of IP host entries: 72,000 • Maximum number of MAC address entries: 136,000 • Maximum number of Layer 3 multicast entries: 64,000
	Number of EtherChannels	256 (with vPC)
	Latency	~450ns**
	Number of ports per EtherChannel	32
	Buffer size	16 MB shared
	System memory	8 GB
	Boot-flash memory	64 GB
	Power	Frequency
Power-supply types		<ul style="list-style-type: none"> • AC (forward and reverse airflow)
Typical operating power		205 watts (W)
Maximum power		402W
AC PSUs		<ul style="list-style-type: none"> • Input voltage • Frequency • Efficiency
Power-supply efficiency		89 to 91% at 220V
Typical heat dissipation		700 BTU/hr
Maximum heat dissipation		1371 BTU/hr
Cooling	<ul style="list-style-type: none"> • Forward and reverse airflow schemes <ul style="list-style-type: none"> ◦ Forward airflow: Port-side exhaust (air enters through fan tray and power supplies and exits through ports) ◦ Reverse airflow: Port-side intake (air enters through ports and exits through fan tray and power supplies) • Redundant fans • Hot swappable (must swap within 1 minute) 	

Description	Specification	
Sound	Measured sound power (maximum)	<ul style="list-style-type: none"> • Fan speed: 40% duty cycle • Fan speed: 70% duty cycle • Fan speed: 100% duty cycle
		<ul style="list-style-type: none"> • 66.1 dBA • 70.6 dBA • 76.9 dBA
Environment	Dimensions (height x width x depth)	1.72 x 17.3 x 22.4 in. (4.4 x 43.9 x 56.8 cm)
	Weight	22.2 lb (10.06 kg)
	Temperature: Operating	32 to 104°F (0 to 40°C)
	Temperature: Storage	-40 to 158°F (-40 to 70°C)
	Relative humidity: Operating	<ul style="list-style-type: none"> • 10 to 85% noncondensing • Up to 5 days at maximum (85%) humidity • Recommend ASHRAE data center environment
	Relative humidity: Storage	5 to 95% noncondensing
	Altitude	0 to 10,000 ft (0 to 3000m)

Denotes ASIC capabilities; please refer to Cisco Nexus 3000 Series Verified Scalability Guide documentation for exact scalability numbers validated for specific software releases:

http://www.cisco.com/en/US/products/ps11541/products_installation_and_configuration_guides_list.html.

** Latency for Switch only.

Software Features

Please refer to the latest release notes for a list of software features supported by the Cisco Nexus 3200 platform:

<http://www.cisco.com/c/en/us/support/switches/nexus-3000-series-switches/products-release-notes-list.html>.

Standards

Table 5 lists management standards supported by the Cisco Nexus 3200 platform.

Table 5. Management and Standards Support

Description	Specification	
MIB support	Generic MIBs <ul style="list-style-type: none"> • SNMPv2-SMI • CISCO-SMI • SNMPv2-TM • SNMPv2-TC • IANA-ADDRESS-FAMILY-NUMBERS-MIB • IANAifType-MIB • IANAiprouteprotocol-MIB • HCNUM-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 • CISCO-CLASS-BASED-QOS-MIB Ethernet MIBs <ul style="list-style-type: none"> • CISCO-VLAN-MEMBERSHIP-MIB • LLDP-MIB • IP-MULTICAST-MIB Configuration MIBs <ul style="list-style-type: none"> • ENTITY-MIB 	Monitoring MIBs <ul style="list-style-type: none"> • NOTIFICATION-LOG-MIB • CISCO-SYSLOG-EXT-MIB • CISCO-PROCESS-MIB • RMON-MIB • CISCO-RMON-CONFIG-MIB • CISCO-HC-ALARM-MIB Security MIBs <ul style="list-style-type: none"> • CISCO-AAA-SERVER-MIB • CISCO-AAA-SERVER-EXT-MIB • CISCO-COMMON-ROLES-MIB • CISCO-COMMON-MGMT-MIB • CISCO-SECURE-SHELL-MIB Miscellaneous MIBs <ul style="list-style-type: none"> • CISCO-LICENSE-MGR-MIB • CISCO-FEATURE-CONTROL-MIB • CISCO-CDP-MIB • CISCO-RF-MIB Layer 3 and Routing MIBs <ul style="list-style-type: none"> • UDP-MIB • TCP-MIB • OSPF-MIB • BGP4-MIB • CISCO-HSRP-MIB

Description	Specification
	<ul style="list-style-type: none"> ● IF-MIB ● CISCO-ENTITY-EXT-MIB ● CISCO-ENTITY-FRU-CONTROL-MIB ● CISCO-ENTITY-SENSOR-MIB ● CISCO-SYSTEM-MIB ● CISCO-SYSTEM-EXT-MIB ● CISCO-IP-IF-MIB ● CISCO-IF-EXTENSION-MIB ● CISCO-NTP-MIB ● CISCO-IMAGE-MIB ● CISCO-IMAGE-UPGRADE-MIB
Standards	<ul style="list-style-type: none"> ● IEEE 802.1D: Spanning Tree Protocol ● IEEE 802.1p: CoS Prioritization ● IEEE 802.1Q: VLAN Tagging ● IEEE 802.1s: Multiple VLAN Instances of Spanning Tree Protocol ● IEEE 802.1w: Rapid Reconfiguration of Spanning Tree Protocol ● IEEE 802.3z: Gigabit Ethernet ● IEEE 802.3ad: Link Aggregation Control Protocol (LACP) ● IEEE 802.3ae: 10 Gigabit Ethernet ● IEEE 802.1ab: LLDP ● IEEE 1588-2008: Precision Time Protocol (Boundary Clock)
RFC	<p>BGP</p> <ul style="list-style-type: none"> ● RFC 1997: BGP Communities Attribute ● RFC 2385: Protection of BGP Sessions with the TCP MD5 Signature Option ● RFC 2439: BGP Route Flap Damping ● RFC 2519: A Framework for Inter-Domain Route Aggregation ● RFC 2545: Use of BGPv4 Multiprotocol Extensions ● RFC 2858: Multiprotocol Extensions for BGPv4 ● RFC 3065: Autonomous System Confederations for BGP ● RFC 3392: Capabilities Advertisement with BGPv4 ● RFC 4271: BGPv4 ● RFC 4273: BGPv4 MIB: Definitions of Managed Objects for BGPv4 ● RFC 4456: BGP Route Reflection ● RFC 4486: Subcodes for BGP Cease Notification Message ● RFC 4724: Graceful Restart Mechanism for BGP ● RFC 4893: BGP Support for Four-Octet AS Number Space ● RFC 5549: BGP Ipv4 NLRIs with an IPv6 next hop <p>OSPF</p> <ul style="list-style-type: none"> ● RFC 2328: OSPF Version 2 ● RFC 3101: OSPF Not-So-Stubby-Area (NSSA) Option ● RFC 3137: OSPF Stub Router Advertisement ● RFC 3509: Alternative Implementations of OSPF Area Border Routers ● RFC 3623: Graceful OSPF Restart ● RFC 4750: OSPF Version 2 MIB <p>RIP</p> <ul style="list-style-type: none"> ● RFC 1724: RIPv2 MIB Extension ● RFC 2082: RIPv2 MD5 Authentication ● RFC 2453: RIP Version 2 ● IP Services ● RFC 768: User Datagram Protocol (UDP) ● RFC 783: Trivial File Transfer Protocol (TFTP) ● RFC 791: IP ● RFC 792: ICMP ● RFC 793: TCP ● RFC 826: ARP ● RFC 854: Telnet ● RFC 959: FTP

Description	Specification
	<ul style="list-style-type: none"> • RFC 1027: Proxy ARP • RFC 1305: Network Time Protocol (NTP) Version 3 • RFC 1519: Classless Interdomain Routing (CIDR) • RFC 1542: BootP Relay • RFC 1591: Domain Name System (DNS) Client • RFC 1812: IPv4 Routers • RFC 2131: DHCP Helper • RFC 2338: VRRP <p>IP Multicast</p> <ul style="list-style-type: none"> • RFC 2236: Internet Group Management Protocol, version 2 • RFC 3376: Internet Group Management Protocol, Version 3 • RFC 3446: Anycast Rendezvous Point Mechanism Using PIM and MSDP • RFC 3569: An Overview of SSM • RFC 3618: Multicast Source Discovery Protocol (MSDP) • RFC 4601: Protocol Independent Multicast - Sparse Mode (PIM-SM): Protocol Specification (Revised) • RFC 4607: Source-Specific Multicast for IP • RFC 4610: Anycast-RP using PIM • RFC 5132: IP Multicast MIB

Regulatory Standards Compliance

Table 6 summarizes regulatory standards compliance for the Cisco Nexus 3200 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 style="list-style-type: none"> • UL 60950-1 • CAN/CSA-C22.2 No. 60950-1EN 60950-1 • IEC 60950-1AS/NZS 60950-1GB4943
EMC: Emissions	<ul style="list-style-type: none"> • 47CFR Part 15 (CFR 47) Class A • AS/NZS CISPR22 Class A • CISPR22 Class A • EN55022 Class A • ICES003 Class A • VCCI Class A • EN61000-3-2 • EN61000-3-3 • KN22 Class A • CNS13438 Class A
EMC: Immunity	<ul style="list-style-type: none"> • EN50082-1 • EN61000-6-1 • EN55024 • CISPR24 • EN300386 • KN 61000-4 series

Ordering Information

Table 7 provides ordering information for the Cisco Nexus 3232C.

Table 7. Ordering Information

Part Number	Description
Chassis	
N3K-C3232C	Nexus 3232C 32 x 100G, 1RU switch
NXA-FAN-30CFM-F	Nexus 9300 Fan, Forward airflow (Port-side Exhaust)
NXA-FAN-30CFM-B	Nexus 9300 Reverse airflow (Port-side Intake)
NXA-PAC-650W-PI	Nexus 9300 650W AC PS, Port-side Intake
NXA-PAC-650W-PE	Nexus 9300 650W AC PS, Port-side Exhaust
Software Licenses	
N3K-LAN1K9	Nexus 3164 Layer 3 LAN Enterprise License
Spares	
N3K-C3232C=	Nexus 3232C 32 x 100G, 1RU switch, Spare
NXA-FAN-30CFM-F=	Nexus 9300 Fan, Forward airflow (Port-side Exhaust)
NXA-FAN-30CFM-B=	Nexus 9300 Reverse airflow (Port-side Intake)
NXA-PAC-650W-PI=	Nexus 9300 650W AC PS, Port-side Intake
NXA-PAC-650W-PE=	Nexus 9300 650W AC PS, Port-side Exhaust

Services and Support

Cisco offers a wide range of services to help accelerate your success in deploying and optimizing the Cisco Nexus 3200 platform switches 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 use 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 3200 platform switches. Spanning the entire network lifecycle, Cisco Services help increase investment protection, optimize network operations, support migration operations, and strengthen your IT expertise.

Cisco Capital

Financing to Help You Achieve Your Objectives

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

For More Information

For more information, please visit <http://www.cisco.com/go/nexus3000>.




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