

# Cisco NX-OS Software Release 6.0(2)N1(1) for Cisco Nexus 5500 Platform and 6000 Series Switches and 2000 Series Fabric Extenders

PB726519

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

## What Is New

Cisco NX-OS Software Release 6.0(2)N1(1) supports the Cisco Nexus® 5500 platform switches and all existing Cisco Nexus 2000 Series Fabric Extenders. In addition, Cisco NX-OS 6.0(2)N1(1) supports two new platforms: the Cisco Nexus 6004 Switch and the Cisco Nexus 2248PQ 10GE Fabric Extender. The Cisco Nexus 5010 and 5020 Switches are not supported in this release. In addition, this release introduces several new software features and enhancements for quality of service (QoS), unified fabric, Border Gateway Protocol (BGP), and power-on autoprovisioning (PoAP).

The combination of the Cisco Nexus 2000 Series Fabric Extenders and Cisco Nexus 5500 platform and 6000 Series Switches offers flexible connectivity options and highly cost-effective access-layer and aggregation-layer architecture for 100 Megabit Ethernet, Gigabit Ethernet, 10 and 40 Gigabit Ethernet, mixed Gigabit Ethernet unified fabric, and virtualized server environments.

## New Hardware Support

### Cisco Nexus 6004 Switch

The new Cisco Nexus 6004 provides high-density 10 and 40 Gigabit Ethernet in an energy-efficient, compact form factor. With a comprehensive integrated Layer 2 and 3 feature set, the Cisco Nexus 6004 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 designs, and compact aggregation deployments - to build scalable Cisco Unified Fabric in the data center.

The Cisco Nexus 6004 provides up to 96 ports at 40 Gbps or 384 ports at 10 Gbps in a four-rack-unit (4RU) form factor (Table 1). The platform provides integrated line-rate Layer 2 and 3 capabilities with cut-through switching for both 40 and 10 Gigabit Ethernet with latency as low as 1 microsecond. The Cisco Nexus 6004 provides an excellent storage solution, with Fibre Channel over Ethernet (FCoE) support for up to 40 Gigabit Ethernet. This switch also supports up to 24 fabric extenders for both Layer 2 and Layer 3. The increased scalability of MAC address tables and route tables makes the Cisco Nexus 6004 an excellent aggregation platform. For more information, please refer to the [N6004 scalability document](#).

The Cisco Nexus 6004 is delivered with four fixed modules with 12 40-Gbps ports, with 24 ports enabled in slot 1 and 24 enabled in slot 2 (Figure 1). The purchase of each port based license, Cisco part number N6004-12Q-LIC, allows the user to increase the port count by increments of 12 40-Gbps ports. In addition to the four fixed modules, there are four slots for line-card expansion modules (Cisco part number N6K-C6004-M12Q). Each line-card expansion module provides 12 ports at 40 Gbps or 48 ports at 10 Gbps. For more information, please refer to the [Cisco Nexus 6004 data sheet](#).

**Table 1.** Cisco Nexus 6004 Ports and Licenses

Part Number	Cisco Nexus 6004 Ports	Chassis License
N6K-C6004-96Q	24 ports of 40 Gigabit Ethernet	None
N6K-C6004-96Q	36 ports of 40 Gigabit Ethernet	N6004-12Q-LIC
N6K-C6004-96Q	48 ports of 40 Gigabit Ethernet	N6004-12Q-LIC
N6K-C6004-96Q N6K-C6004-M12Q	60 ports of 40 Gigabit Ethernet	N6004-12Q-LIC

**Figure 1.** Cisco Nexus 6004 and Line-Card Expansion Module



### Cisco Nexus 2248PQ 10GE Fabric Extender

The Cisco Nexus 2248PQ (Figure 2) provides high-density 1- and 10-Gbps Enhanced Small Form-Factor Pluggable (SFP+) host interfaces, 48 ports for servers, and 4 ports of Quad SFP+ (QSFP+) for connectivity upstream. Support of unified fabric, increased packet buffers, and predictable low latency makes this fabric extender an optimal solution for scalable top-of-rack (ToR) designs in both virtualized and non-virtualized environments.

**Figure 2.** Cisco Nexus 2248PQ



For more information, please refer to the [Cisco Nexus 2248PQ data sheet](#).

## New Supported Optics and Cables

Table 2 lists the new optics and cables that the Cisco Nexus 6004 and 2248PQ support.

**Table 2.** Supported Optics and Cables

Part Number	Distance	Cisco Nexus 2248PQ Support	Cisco Nexus 6004 Support
QSFP-40G-SR4	100m with OM3 150m with OM4	Yes	Yes
QSFP-40G-CSR4	300m with OM3 400m with OM4	Yes	Yes
QSFP-4SFP10G-CU1M	1m	Yes	No
QSFP-4SFP10G-CU3M	3m	Yes	No
QSFP-4SFP10G-CU5M	5m	Yes	No
QSFP-4x10G-AC7M	7m	Yes	Yes
QSFP-4x10G-AC10M	10m	Yes	Yes
QSFP-H40G-CU1M	1m	Yes	Yes
QSFP-H40G-CU3M	3m	Yes	Yes
QSFP-H40G-CU5M	5m	Yes	Yes
QSFP-H40G-ACU7M	7m	Yes	Yes
QSFP-H40G-ACU10M	10m	Yes	Yes

## Software Support

Cisco NX-OS 6.0(2)N1(1) supports all the software features previously supported on the Cisco Nexus 5000 Series Switches up through Cisco NX-OS 5.2(1)N1(3). Cisco NX-OS 6.0(2)N1(1) is compatible with In-Service Software Upgrade (ISSU) with Cisco NX-OS Release 5.0 and later, with the exception of Layer 3 features. In addition, Cisco NX-OS 6.0(2)N1(1) supports the new software features described in Table 3.

For more detailed information about features and ISSU, refer to the [Cisco NX-OS 6.0\(2\)N1\(1\) release notes](#).

**Table 3.** New Features in Cisco NX-OS Release 6.0(2)N1(1)

Feature	Description
<b>Access control list (ACL) logging</b>	<ul style="list-style-type: none"><li>ACL logging provides the capability to log the packets that reach the IPv4 deny ACL filter for all types of ACL: port ACLs (PACLs), VLAN ACLs (VACLs), router ACLs (RACLs), and role-based ACLs (RBACLs). This feature is supported on all types of interfaces, including fabric extender host interfaces (HIFs) and management interfaces.</li><li>The ACL log message will be displayed by flow. Flow is identified using the combination of IP source address, destination address, Layer 4 protocol, and Layer 4 source and destination ports.</li></ul>
<b>Ingress rate limiting</b>	<ul style="list-style-type: none"><li>Cisco NX-OS 6.02(2)N1(1) enables Cisco Nexus 5500 platform switches to rate-limit ingress data on both the switch ports and the HIF ports on the Cisco Nexus fabric extender. Note that the Cisco Nexus 5010 and 5020 are not supported. With Ingress policing, users now can protect the network from servers that saturate the network with an overload of data and hence degrade the performance of the entire network.</li><li>Ingress rate limiting supports both IPv4 and IPv6 traffic matching for all criteria supported by the QoS policies for the Cisco Nexus 5500 platform. For additional information, please refer to the <a href="#">Nexus 5500 configuration guide</a>.</li></ul>
<b>Virtual Routing and Forwarding (VRF) route leaking</b>	<ul style="list-style-type: none"><li>Support for VRF route leaking enables the sharing of routes that was previously visible available only in segmented networks.</li></ul>

Feature	Description
<b>BGP enhancements</b>	<p>The following BGP enhancements are available in Cisco NX-OS 6.0(2)N1(1):</p> <ul style="list-style-type: none"> <li>• BGP allow-AS-in: Allows BGP to accept the route that contains the local autonomous system (AS).</li> <li>• BGP disable-peer-as-check: Allows external BGP (eBGP) learned routes to advertise to the peers in the same autonomous system.</li> <li>• BGP local-AS: Allows a router to appear to be a member of a second autonomous system in addition to its real autonomous system.</li> <li>• BGP prefix-peering: Allows passive peering from the BGP peer with an IP address within a given prefix range.</li> <li>• BGP AS-path relax: Allows the switch to handle the paths received from different autonomous systems for multipath if their autonomous system path lengths are the same and other multipath conditions are met; by default, multipath is allowed when paths are received from peers in the same autonomous system.</li> <li>• BGP remove-private-as: Removes private autonomous system numbers from outbound route updates to an eBGP peer.</li> </ul>
<b>PoAP enhancements</b>	<p>PoAP enables administrators to automate the deployment of Cisco Nexus platforms like turnkey systems through the use of Dynamic Host Configuration Protocol (DHCP) and Python scripting. Cisco NX-OS 6.0(2)N1(1) includes new enhancements:</p> <ul style="list-style-type: none"> <li>• USB support: Store the PoAP script, configuration files, quick-start, and system image locally on the USB drive. Note that USB takes precedence over the DHCP method of retrieving the configuration and images.</li> <li>• HTTP protocol support: Files and images can be downloaded using HTTP.</li> <li>• Enhanced PoAP log messages: Use the log messages to help in troubleshooting.</li> <li>• DHCP Option 7 (syslog server): PoAP log messages are sent to a syslog server using the DHCP Option 7 information provided by the DHCP server.</li> <li>• DHCP Option 12 (hostname): Cisco Nexus switches can now retrieve configuration files based on the hostname that is assigned by the DHCP server using Option 12.</li> <li>• MAC address-based configuration: Cisco Nexus switches can now retrieve configuration files based on the MAC address.</li> <li>• PoAP DHCP Option 60 (vendor class identifier): Cisco Nexus switch are able to identify switch model based on this information. For example, on the Cisco Nexus 5548UP, the value DHCP options 60 will be "Cisco N5k-C5548UP".</li> </ul>
<b>Optics</b>	<p>A wide range of 40- and 10-Gbps optic is supported for both the active and passive transceivers supported. See Table 2 earlier in this document.</p>

## License Information

Table 4 lists licenses and supported features.

**Table 4.** License Information

License	Chassis Based or Port Based	Part Number	Price	Supported Features
<b>Cisco Nexus 6004 Platform 12 x 40-Gbps Ports License; for slots 3 and 4</b>	Port	N6004-12Q-LIC	\$40,000	Enables 12 x 40-Gbps ports in slots 3 and 4 for of the Cisco Nexus 6004 chassis.
<b>Cisco Nexus 6000 Base OS Software License</b>	Chassis	N6KUK9-602N1.1	\$0	Cisco Nexus 6000 Series base OS software for Cisco NX-OS 6.0(2)N1(1).
<b>Cisco Nexus 6004 Layer 3 Base Software License</b>	Chassis	N6K-BAS1K9	\$0	Base Layer 3 features: BGP, VRF-Lite, and full Enhanced Interior Gateway Routing Protocol (EIGRP).
<b>Cisco Nexus 6004 Layer 3 LAN Software License</b>	Chassis	N6004-LAN1K9	\$15,000	Advanced Layer 3 features: BGP, VRF-Lite, and full EIGRP.
<b>Cisco Nexus 6000 FCoE N-Port Virtualization (NPV) License</b>	Chassis	N6K-FNPV-SSK9	\$3,200	FCoE NPV features supported on the Cisco Nexus 6000 Series.
<b>Cisco Nexus 6004 Enhanced Layer 2 Software License</b>	Chassis	N6004-EL2-SSK9	\$25,000	Cisco FabricPath supported on the Cisco Nexus 6004 chassis.
<b>Cisco Nexus 6000 VM-FEX Software License</b>	Chassis	N6K-VMFEXK9	\$0	Cisco Data Center Virtual Machine Fabric Extender (VM-FEX) supported on the Cisco Nexus 6000 Series.

License	Chassis Based or Port Based	Part Number	Price	Supported Features
<b>Cisco Nexus 6004 Software Bundle</b>	Chassis/Ports	N6004-SBUN-P1-L	\$25,000	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.
<b>Cisco Nexus 6004 Software Bundle Chassis</b>	Chassis	N6004-SBUN-P1	\$30,000	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.
<b>Cisco Nexus 6004 Storage Protocols Services License (4 ports of 40 Gigabit Ethernet or 16 ports of 10 Gigabit Ethernet)</b>	Port	N6004-4Q-SSK9	\$6,400	Fibre Channel and FCoE and FCoE NPV features supported on any 4 ports of 40 Gigabit Ethernet or 16 ports of 10 Gigabit Ethernet.
<b>Cisco Nexus 6004 Storage Protocols Services License (12 ports of 40 Gigabit Ethernet or 48 ports of 10 Gigabit Ethernet)</b>	Port	N6004-12Q-SSK9	\$10,000	Fibre Channel and FCoE and FCoE NPV features supported on any 12 ports of 40 Gigabit Ethernet or 48 ports of 10 Gigabit Ethernet.
<b>Cisco Nexus 6004 Storage Protocols Services License (96 ports of 40 Gigabit Ethernet or 384 ports of 10 Gigabit Ethernet)</b>	Port	N6004-96Q-SSK9	\$20,000	Fibre Channel and FCoE and FCoE NPV features supported on any 96 ports of 40 Gigabit Ethernet or 384 ports of 10 Gigabit Ethernet.
<b>Limited-Time Promotion: Cisco Nexus 6004 Enhanced Layer 2 License</b>	Chassis	N6004-EL2-P-SSK9	\$10,000	Cisco FabricPath supported on the Cisco Nexus 6004 Chassis.
<b>Limited-Time Promotion: Cisco Nexus 6004 Storage License ( 4 ports of 40 Gigabit Ethernet or 16 ports of 10 Gigabit Ethernet)</b>	Port	N6004-4Q-SSK9-P	\$3,200	Fibre Channel and FCoE and FCoE NPV features supported on any 4 ports of 40 Gigabit Ethernet or 16 ports of 10 Gigabit Ethernet.

## Cisco Services and Support

Cisco offers a wide range of services to help accelerate your success in deploying and optimizing Cisco Nexus 5000 and 6000 Series Switches in your data center. Cisco's innovative services 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<sup>®</sup> 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 5000 and 6000 Series Switches. Spanning the entire network lifecycle, Cisco Services helps protect your investment, optimize network operations, support migration, and strengthen your IT expertise. For more information about Cisco Data Center Services, visit <http://www.cisco.com/go/dcservices>.

## For More Information

For more information about Cisco Nexus switches, please visit:

- <http://www.cisco.com/go/nexus5000>
- <http://www.cisco.com/go/nexus6000>
- <http://www.cisco.com/go/nexus2000>




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