Cisco Nexus 7000 M2-Series 24-Port 10 Gigabit Ethernet Module with XL Option

Product Overview

The Cisco Nexus® 7000 M2-Series 24-Port 10 Gigabit Ethernet Module with XL Option (referred to here as the Cisco Nexus 7000 M2-Series module) is a highly scalable, high-performance module offering outstanding flexibility and full-featured, non-blocking 10 Gigabit Ethernet performance on each port. The Cisco Nexus 7000 M2-Series module (Figure 1) facilitates the deployment of high-density, high-bandwidth, scalable network architecture, especially in large network cores and in service provider and Internet peering environments.

Figure 1.   Cisco Nexus 7000 M2-Series 24-Port 10 Gigabit Ethernet Module with XL Option

The Cisco Nexus 7000 Series Switches provide the foundation of the Cisco® Unified Fabric. They are a modular data center-class product line designed for highly scalable 10 Gigabit Ethernet networks. The fabric architecture scales beyond 15 terabits per second (Tbps), and is designed to support high-density 40 and 100 Gigabit Ethernet deployments. To meet the requirements of the most mission-critical network environments, the switches deliver continuous system operations and virtualized services. The Cisco Nexus 7000 Series is powered by the proven Cisco NX-OS Software operating system, with enhanced features to deliver real-time system upgrades with exceptional manageability and serviceability. The software's innovative unified fabric design is purpose-built to support consolidation of IP and storage networks on a single lossless Ethernet fabric.

Features and Benefits

The Cisco Nexus 7000 M2-Series module offers outstanding flexibility and full-featured, non-blocking performance on each port. The module enables the deployment of high-density, high-speed, scalable data center architecture. Up to 384 non-blocking 10 Gigabit Ethernet ports are supported in a single Cisco Nexus 7000 18-Slot Switch chassis. Populating the Cisco Nexus 7000 10-Slot and 9-Slot Switch chassis with this module delivers, respectively, up to 192 and 168 ports of 10 Gigabit Ethernet in a single chassis (Table 1).

Table 1.   Non-blocking 10 Gigabit Ethernet Port Density on Cisco Nexus 7000 Series Platform

Cisco Nexus 7000 Series Chassis	Non-blocking 10 Gigabit Ethernet Ports
Cisco Nexus 7000 18-Slot Switch	384
Cisco Nexus 7000 10-Slot Switch	192
Cisco Nexus 7000 9-Slot Switch	168
Cisco Nexus 7000 4-Slot Switch	48

The Cisco Nexus 7000 M2-Series module has a number of essential features that provide flexible deployment and support for environments requiring the highest performance and comprehensive features. With an optional Scalable Feature License, the module can operate in the enhanced XL mode, which enables use of the full forwarding table, essential for large-scale deployments such as Internet peering environments. This larger forwarding table can support multiple copies of the full Internet route table for use in Internet-facing deployments with Virtual Routing and Forwarding (VRF) and Virtual Device Context (VDC) support. The capability to operate in either non-XL or XL mode makes this module extremely versatile and flexible for many types of networking environments, without requiring a hardware module change or upgrade, and delivers a lower total cost of ownership (TCO). Table 2 lists the performance specifications for the Cisco Nexus 7000 M2-Series module operating in non-XL and XL modes.

Table 2. Performance Specifications for Non-XL and XL Mode Operation

Item	Non-XL Mode	XL Mode (with Scalable Feature License)
MAC Entries	128K	128K
IPv4 Routes	128K	Up to 1M[*]
IPv6 Routes	64K	Up to 350K[*]
NetFlow Entries	512K	512K
Access Control List (ACL)	64K	128K

[*] Actual limit depends on prefix distribution

The Cisco Nexus 7000 M2-Series module contains two integrated forwarding engines capable of delivering up to 120 million packets per second (Mpps) of Layer 2 and Layer 3 IPv4 unicast forwarding or 60 Mpps of IPv6 unicast forwarding across all ports of a single I/O module. The distributed architecture, with the forwarding engine integrated into each module, scales the forwarding performance of the chassis linearly by the number of I/O modules employed. The 18-slot chassis with 16 Cisco Nexus 7000 M2-Series modules can deliver up to 1.92 billion packets per second (Bpps) of IPv4 unicast forwarding or 960 Mpps of IPv6 unicast forwarding. Multicast forwarding is built into the I/O module, performing egress replication. The integrated forwarding engines also deliver ACL filtering, marking, rate limiting, and NetFlow with no degradation of performance. Powerful ACL processing supports up to 128K entries per module, where entries can address Layer 2, 3, and 4 fields in addition to the Cisco metadata fields that employ Security Group Tags (SGTs).

The Cisco Nexus 7000 M2-Series module offers exceptional security with integrated hardware support for Cisco TrustSec® technology, including line-rate data confidentiality, data integrity, and ACL processing for SGTs. Data confidentiality and integrity conform to the IEEE MAC security standard (IEEE 802.1AE [MACsec]). All ports on the module support the Advanced Encryption Standard (AES) cipher, using a 128-bit key. New security ACLs are enhanced through hardware support for Cisco metadata headers capable of carrying SGTs. Security group ACLs (SGACLs) use SGT information to provide hardware-based enforcement of security policies, removing dependencies on IP addresses, and thus improving scalability and simplifying manageability.

The Cisco Nexus 7000 M2-Series module buffers data in Virtual Output Queues (VOQ) before the data flows to the fabric. The data flow is controlled by a central arbiter on the supervisor module, using a credit-based buffer design. This architecture offers a lossless fabric that delivers quality of service (QoS) and fairness across all ports, even during congestion.

The comprehensive feature set of the Cisco Nexus 7000 M2-Series module includes classis Layer 2 and Layer 3 forwarding, with the robust feature set offered by Cisco NX-OS Software: a modular multitasking and multithreaded operating system built with high availability, granular fault management, resiliency, and nondisruptive serviceability at its foundation. This extremely comprehensive set of Layer 2 and Layer 3 functions makes this module ideal for data center networks, where density, performance, and continuous system operation are critical.

Table 3 summarizes the features and benefits of the Cisco Nexus 7000 M2-Series 24-Port 10 Gigabit Ethernet Module with XL Option.

Table 3.   Features and Benefits[*]

Feature	Benefit
XL mode	XL mode enables a larger forwarding table (up to 1 million IPv4 routes or up to 350,000 IPv6 routes), providing investment protection through increased system flexibility and ease of sparing.
High-density, full-featured 10 Gigabit Ethernet module	• Up to 384 10 Gigabit Ethernet ports are supported in the Cisco Nexus 7000 18-Slot switch. • Up to 192 10 Gigabit Ethernet ports are supported in the Cisco Nexus 7000 10-Slot switch. • Up to 168 10 Gigabit Ethernet ports are supported in the Cisco Nexus 7000 9-Slot switch. • Up to 48 10 Gigabit Ethernet ports are supported in the Cisco Nexus 7000 4-Slot switch.
Comprehensive Layer 2 and Layer 3 capabilities[*]	The comprehensive set of Layer 2 and Layer 3 functions makes this module ideal for data center networks.
VOQ with centralized arbitration	VOQ enables fairness when one or more destinations are congested and supports lossless unified fabric.
Load sharing across all fabric modules	Through its high-availability design, bandwidth is shared across all fabric modules simultaneously for optimal performance.
Distributed forwarding	Through its fully distributed data plane, the module offers high-performance parallel forwarding.
Multiprotocol Label Switching (MPLS)	Supports MPLS forwarding in hardware.
IEEE 1588 Precision Time Protocol (PTP)	The module supports PTP based on IEEE 1588.
Cisco Nexus 2000 Series Fabric Extenders	The Cisco Nexus 2000 Series Fabric Extenders are designed to simplify data center architectures and operations by dramatically reducing the points of management.
Integrated hardware support for Cisco TrustSec technology	Cisco TrustSec technology simplifies and scales access control by using SGTs and SGACLs, and delivers data confidentiality and data integrity on all ports, using the IEEE 802.1AE standard.
Online insertion and removal (OIR)	The module supports hot insertion and removal for continuous system operation.
Identification (ID) LED	Through the beacon feature, administrators can clearly identify the module for a service condition; ports on the I/O module can send beacons as well.

[*] Initial software releases may support a subset of the overall hardware capabilities. Refer to the Cisco Nexus 7000 Series NX-OS release notes for up-to-date software version information and feature support.

Product Specifications

Table 4 lists the product specifications for the Cisco Nexus 7000 M2-Series 24-Port 10 Gigabit Ethernet Module with XL Option.

Table 4.   Product Specifications

Item	Specifications
System	
Product compatibility	• Supported in all Cisco Nexus 7000 Series chassis • Supported Fabric-1 or Fabric-2 fabric modules • Supported SUP1, SUP2 or SUP2E Supervisor modules
Software compatibility	Cisco NX-OS Software Release 6.1 or later (minimum requirement)

Item	Specifications
Memory	2 GB DRAM
Front-panel LEDs	• Status: Green (operational), red (faulty), or orange (module booting) • Link: Green (port enabled and connected), orange (port disabled), blinking orange (faulty port), off (port enabled and not connected), or blinking green and orange in conjunction with ID LED blue (port flagged for identification; beacon) • ID: Blue (operator has flagged this card for identification; beacon) or off (module not flagged)
Programming interfaces	• Extensible Markup Language (XML) • Scriptable command-line interface (CLI) • Cisco Data Center Network Manager (DCNM) GUI
Physical Interfaces	
Connectivity	24 ports of 10 Gigabit Ethernet (Small Form-Factor Pluggable Plus [SFP+] optics modules)
Maximum port density	• 384 ports of 10 Gigabit Ethernet for 18-slot chassis • 192 ports of 10 Gigabit Ethernet for 10-slot chassis • 168 ports of 10 Gigabit Ethernet for 9-slot chassis • 48 ports of 10 Gigabit Ethernet for 4-slot chassis
MAC security	All ports have built-in IEEE 802.1AE MAC security and an AES cipher with a 128-bit key (requires a software license to enable)
Queues per port	• Ingress: 8 queues and 2 thresholds (RX: 8q2t) • Egress: 1 strict priority queue, 7 deficit-weighted round-robin (DWRR) queues, and 4 thresholds (TX: 1p7q4t)
Scheduler	DWRR and shaped round-robin (SRR)
Port buffers	• Ingress: 5.21 MB per port • Egress: 5.21 MB per port
Jumbo frame support for bridged and routed packets	Up to 9216 bytes
Forwarding Engines	
Performance	120 Mpps Layer 2 and Layer 3 IPv4 unicast and 60 Mpps IPv6 unicast
MAC address entries	128K
VLANs	16,384 bridge domains and 4096 simultaneous VLANs per VDC
IPv4 entries	• 128K (non-XL mode) • 1M (XL mode)
IPv6 entries	• 64K (non-XL mode) • 350K (XL mode)
ACLs	• 64K (non-XL mode) • 128K (XL mode)
Policers	16,000
Fabric Interface	
Switch fabric interface	550 Gbps in each direction (1.1 Tbps full duplex) distributed across up to five Fabric-2 modules 230 Gbps in each direction (460 Gbps full duplex) distributed across up to five Fabric-1 modules
OIR	Online insertion and removal
Environmental	
Physical dimensions	• Occupies one I/O module slot in a Cisco Nexus 7000 Series chassis • Dimensions (H x W x D): 1.733 x 15.3 x 21.9 in, (4.4 x 38.9 x 55.6 cm) • Weight: 16.5 lb (7.5 kg)
Power consumption	• Typical: 720 watts (W) • Maximum: 795W
Environmental conditions	• Operating temperature: 32 to 104ºF (0 to 40ºC) • Operational relative humidity: 5 to 90%, noncondensing • Storage temperature: -40 to 158ºF (-40 to 70ºC)

Item	Specifications
	• Storage relative humidity: 5 to 95%, noncondensing
Regulatory compliance	EMC - Emissions • 47CFR Part 15 (CFR 47) Class A • AS/NZS CISPR22 Class A • CISPR22 Class A • EN55022 Class A • ICES003 Class A • VCCI Class A • EN61000-3-2 • EN61000-3-3 • KN22 Class A • CNS13438 Class A EMC - Immunity • EN55024 • CISPR24 • EN300386 • KN24
Environmental standards	• NEBS criteria levels • SR-3580 NEBS Level 3 (GR-63-CORE, issue 3, and GR-1089-CORE, issue 4) • Telecommunications Carrier Group (TCG) Checklist • ATT TP76200 level 3 • ETSI 300 019-1-1, Class 1.2 Storage • ETSI 300 019-1-2, Class 2.3 Transportation • ETSI 300 019-1-3, Class 3.2 Stationary Use
Safety	• UL 60950-1 Second Edition • CAN/CSA-C22.2 No. 60950-1 Second Edition • EN 60950-1 Second Edition • IEC 60950-1 Second Edition • AS/NZS 60950-1
Warranty	Cisco Nexus 7000 Series Switches come with the standard Cisco 1-year limited hardware warranty

Interface Distances

Table 5 summarizes the interfaces, cabling specifications, and distances of SFP+ optics supported by the Cisco Nexus 7000 M2-Series 24-Port 10 Gigabit Ethernet Module with XL Option. Not all optics are supported in the first software release. Refer to the Cisco Nexus 7000 Series NX-OS Release Notes for up-to-date software version information and optics support details.

Table 5.   10 Gigabit Ethernet Interface Distances and Options[1]

10 Gigabit Ethernet SFP+ Part Number	Wavelength (nanometers)	Fiber and Cable Type	Core Size (microns)	Modal Bandwidth (MHz*km)[2]	Cable Distance[3]
SFP-10G-SR	850	• Multimode fiber (MMF) (FDDI-grade) • MMF (OM1) • MMF (400/400) • MMF (OM2) • MMF (OM3) • MMF (OM4)	• 62.5 • 62.5 • 50.0 • 50.0 • 50.0 • 50.0	• 160 • 200 • 400 • 500 • 2000 • 4700	• 26m • 33m • 66m • 82m • 300m • 400m
SFP-10G-LRM	1310	• MMF[4]	• 62.5 • 50.0 • 50.0	• 500 • 400 • 500	• 220m • 100m • 220m

10 Gigabit Ethernet SFP+ Part Number	Wavelength (nanometers)	Fiber and Cable Type	Core Size (microns)	Modal Bandwidth (MHz*km)[2]	Cable Distance[3]
		• Single-mode fiber (SMF)	• G.652	-	• 300m
SFP-10G-LR	1310	• SMF	• G.652	-	• 10km
SFP-10G-ER	1550	• SMF	• G.652	-	• 40km[5]
SFP-10G-ZR	1530-1565	• SMF	• G.652	-	• 80km
DWDM-SFP10G-xx.xx=	1530.33 - 1561.41[6]	• SMF	-	-	-
FET-10G	850	• MMF (OM2) • MMF (OM3) • MMF (OM4)	• 50.0 • 50.0 • 50.0	• 500 • 2000 • 4700 (OM4)	• 25m • 100m • 100m
SFP-H10GB- CU1M	-	• Twinax cable, passive, 30AWG cable assembly	-	-	• 1m
SFP-H10GB- CU3M	-	• Twinax cable, passive, 30AWG cable assembly	-	-	• 3m
SFP-H10GB- CU5M	-	• Twinax cable, passive, 24AWG cable assembly	-	-	• 5m
SFP-H10GB- ACU7M	-	• Twinax cable, active, 30AWG cable assembly	-	-	• 7m
SFP-H10GB- ACU10M	-	• Twinax cable, active, 28AWG cable assembly	-	-	• 10m

[1] See the Cisco 10GBASE SFP+ Modules Data Sheet for additional information:
http://www.cisco.com/en/US/prod/collateral/modules/ps5455/data_sheet_c78-455693.html.
[2] Bandwidth is specified at transmission wavelength.
[3] Minimum cabling distance for -SR, -LRM, -LR, and -ER modules is 2m, according to IEEE 802.3ae.
[4] A mode-conditioning patch is required for use over legacy multimode fiber types such as FDDI-grade, OM1, and OM2. Please refer to the product bulletin at http://www.cisco.com/en/US/prod/collateral/modules/ps5455/product_bulletin_c25-530836.html.
[5] Links longer than 30 km are considered engineered links according to IEEE 802.3ae.
[6] 40 different wavelengths are offered. See the Cisco 10GBASE Dense Wavelength-Division Multiplexing SFP+ Modules Data Sheet for additional product numbers and information:
http://www.cisco.com/en/US/prod/collateral/modules/ps5455/ps6576/data_sheet_c78-711186.html.

Ordering Information

To place an order, visit the Cisco Ordering homepage. To download software, visit the Cisco Software Center.

Table 6 provides ordering information.

Table 6.   Ordering Information

Product Name	Part Number
Cisco Nexus 7000 M2-Series 24 Port 10 GbE with XL Option (req. SFP+)	N7K-M224XP-23L
Cisco Nexus 7004 Scalable Feature License	N7K-C7004-XL
Cisco Nexus 7009 Scalable Feature License	N7K-C7009-XL
Cisco Nexus 7010 Scalable Feature License	N7K-C7010-XL
Cisco Nexus 7018 Scalable Feature License	N7K-C7018-XL

Service and Support

Cisco offers a wide range of services to help accelerate your success in deploying and optimizing Cisco Nexus 7000 Series Switches in your data center. Our innovative services are delivered through a unique combination of people, processes, tools, and partners and are focused on helping you increase operating 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 provide 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 7000 Series Switches. Spanning the entire network lifecycle, Cisco Services helps increase investment protection, 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 the Cisco Nexus 7000 Series, visit the product homepage at http://www.cisco.com/go/nexus7000 or contact your local account representative.

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