

Cisco Nexus 7000 M1-Series 32-Port 10 Gigabit Ethernet Module with XL Option

Product Overview

The Cisco Nexus[®] 7000 M1-Series 32-Port 10 Gigabit Ethernet Module with XL Option (Figure 1) is a highly scalable high-performance module designed for mission-critical Ethernet networks. The module uses the M1-XL forwarding engine that features a larger Forwarding Information Base (FIB). The module also supports a wide range of Small Form Factor Pluggable Plus (SFP+) transceivers, including Twinax CX1, allowing deployment flexibility in various types of networking environments.

The Cisco Nexus 7000 Series Switches comprise a modular data center-class product line designed for highly scalable 10 Gigabit Ethernet networks with a fabric architecture that scales beyond 15 terabits per second (Tbps) and is designed to support high-density 40 and 100 Gigabit Ethernet deployments. Designed to meet the requirements of the most mission-critical network environments, it delivers continuous system operation and virtualized pervasive services. The Cisco Nexus 7000 Series is based on the proven Cisco[®] NX-OS Software operating system, with enhanced features to deliver real-time system upgrades with exceptional manageability and serviceability. Its innovative unified fabric design is purpose built to support consolidation of IP, storage, and interprocess communication (IPC) networks on a single Ethernet fabric.

Figure 1. Cisco Nexus 7000 M1-Series 32-Port 10 Gigabit Ethernet Module with XL Option



Features and Benefits

The Cisco Nexus 7000 M1-Series 32-Port 10 Gigabit Ethernet Module with XL Option has a number of key features that are designed to enable flexible deployment and support for environments requiring the highest performance and a comprehensive feature set. 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 FIB 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 flexible for many types of networking environments, without requiring a hardware module change or upgrade, and delivers a lower total cost of ownership (TCO).

The 32-port module supports a broad range of transceiver modules, allowing deployment in various types of situations, including Twinax CX1 cable for in-rack or rack-to-rack links in the data center, long-reach intersite deployments over single-mode fiber (SMF), and short- and medium-reach deployments over multimode fiber (MMF) for data center and campus environments. The fabric interface on the 32-port module delivers 80 Gbps of bandwidth in each direction.

All Cisco Nexus 7000 I/O modules contain integrated forwarding engines. The M1-XL forwarding engine on the Cisco Nexus 7000 M1-Series 32-Port module is part of the Cisco Nexus 7000 M1-Series forwarding engines. The M1-XL forwarding engine is based on the M1 engine, incorporating larger FIB and access control list (ACL) tables. The module is fully compatible with, and offers feature consistency with, all existing M1 modules. The performance specifications for the Cisco Nexus 7000 M1-Series 32-Port 10 Gigabit Ethernet Module with XL Option operating in non-XL and XL modes are described in Table 1.

Table 1. Performance Specifications for non-XL and XL Mode Operation

Item	Non-XL Mode	XL Mode
MAC entries	128K	128K
IPv4 routes	128K	Up to 1M*
IPv6 routes	64K	Up to 350K*
NetFlow entries	512K	512K
ACL	64K	128K

* Actual limit depends on prefix distribution.

Each M1-XL forwarding engine delivers up to 60 million packets per second (Mpps) of Layer 2 and Layer 3 IPv4 unicast forwarding or 30 Mpps of IPv6 unicast forwarding across all ports. 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 sixteen Cisco Nexus 7000 M1-Series 32-Port 10 Gigabit Ethernet Modules with XL Option can deliver up to 960 Mpps of IPv4 unicast forwarding. Multicast forwarding is built into the I/O module performing egress replication.

The M1-XL forwarding engine also delivers ACL filtering, marking, rate limiting, and NetFlow with no degradation of performance. Powerful ACL processing supports up to 64K entries per module in non-XL mode or 128K entries per module in XL mode, where entries can address Layer 2, 3, and 4 fields in addition to new Cisco metadata fields that employ security group tags (SGTs).

The Cisco Nexus 7000 M1-Series 32-Port 10 Gigabit Ethernet Module with XL Option offers exceptional security with integrated hardware support for Cisco TrustSec® technology, including line-rate data confidentiality, data integrity, and ACL processing for Security Group Tags (SGTs). Data confidentiality and integrity conform to the IEEE MAC security standard (IEEE 802.1AE [MACsec]). All 32 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, thus improving scalability and simplifying manageability.

The Cisco Nexus 7000 M1-Series 32-port 10 Gigabit Ethernet Module with XL Option buffers data in virtual output queues (VOQs) 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.

Table 2 summarizes the features and benefits of the Cisco Nexus 7000 M1-Series 32-Port 10 Gigabit Ethernet Module with XL Option.

Table 2. Features and Benefits*

Feature	Benefit
XL mode	Enables larger forwarding table, providing investment protection through increased system flexibility and ease of sparing
Dedicated mode: Allows up to 8 line-rate 10 Gigabit Ethernet ports per module	Delivers up to 64 line-rate 10 Gigabit Ethernet ports in the Cisco Nexus 7000 10-Slot Switch and 128 line-rate 10 Gigabit Ethernet ports in the Cisco Nexus 7000 18-Slot Switch
Shared mode: Allows up to 32 10 Gigabit Ethernet ports per module	Delivers up to 256 10 Gigabit Ethernet ports in the Cisco Nexus 7000 10-Slot Switch and 512 10 Gigabit Ethernet ports in the Cisco Nexus 7000 18-Slot Switch
Cisco Nexus 2000 Series Fabric Extenders	The Cisco Nexus 2000 Series Fabric Extenders are designed to simplify data center architecture and operations by dramatically reducing the points of management
VOQ with centralized arbitration	Enables fairness when one or more destinations are congested and support for lossless unified I/O
Load sharing across all fabric modules	Through its high-availability design, shares bandwidth across all fabric modules simultaneously for optimal performance
Distributed forwarding	Through its fully distributed data plane, offers high-performance parallel forwarding
Multiprotocol Label Switching (MPLS)	M1-based line cards with comprehensive feature sets, supports MPLS in the hardware
Integrated hardware support for Cisco TrustSec technology	Simplifies and scales access control by using SGTs and SGACLs and delivers data confidentiality and data integrity on all 32 ports using the IEEE 802.1AE standard
Online insertion and removal (OIR)	Supports hot insertion and removal for continuous system operation
Identification (ID) LED	Through the beacon feature, allows administrators to 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 details.

Product Specification

Table 3 lists the specifications for the Cisco Nexus 7000 M1-32-Port 10 Gigabit Ethernet Module with XL Option.

Table 3. Product Specifications

Item	Specifications
System	
Product compatibility	<ul style="list-style-type: none"> 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 5.1 or later (minimum requirement)
Memory	2 GB DRAM
Front-panel LEDs	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> XML Scriptable command-line interface (CLI) Cisco Data Center Network Manager (DCNM) GUI
Network management	Cisco DCNM 5.1
Physical Interfaces	
Connectivity	32 ports of 10 Gigabit Ethernet (SFP+ pluggable optics module)
Maximum port density	256 ports of 10 Gigabit Ethernet for 10-slot chassis

Item	Specifications
	512 ports of 10 Gigabit Ethernet for 18-slot chassis
MAC security	All 32 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Dedicated mode: 1 MB plus 65 MB per port on ingress and 80 MB per port on egress • Shared mode: 1 MB per port plus 65 MB per 4-port group on ingress and 80 MB per 4-port group on egress
Jumbo frame support for bridged and routed packets	Up to 9216 bytes
Forwarding Engine: M1-XL	
Performance	60 Mpps Layer 2 and Layer 3 IPv4 unicast and 30 Mpps IPv6 unicast
MAC entries	128K
VLANs	16,384 bridge domains and 4096 simultaneous VLANs per VDC
Policers	16,000
Fabric Interface	
Switch fabric interface	80 Gbps in each direction (160 Gbps full duplex) distributed across up to five fabric modules
OIR	Online insertion and removal
Environmental	
Physical dimensions	<ul style="list-style-type: none"> • 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: 17 lb (7.7 kg)
Power consumption	<ul style="list-style-type: none"> • Typical: 611 watts (W) • Maximum: 750W
Environmental conditions	<ul style="list-style-type: none"> • Certified for operation (operating temperature): 32 to 104°F (0 to 40°C) • Design and tested for operation (operating temperature): 32 to 131°F (0 to 55°C) • Operational relative humidity: 5 to 90%, noncondensing • Storage temperature (nonoperating): -40 to 158°F (-40 to 70°C) • Storage relative humidity (nonoperating): 5 to 95%, noncondensing
Regulatory compliance	<ul style="list-style-type: none"> • FCC Part 15 (CFR 47) (USA) Class A • ICES-003 (Canada) Class A • EN55022 (Europe) Class A • CISPR22 (International) Class A • AS/NZS CISPR22 (Australia and New Zealand) Class A • VCCI (Japan) Class A • KN22 (Korea) Class A • CNS 13438 (Taiwan) Class A • CISPR24 • EN55024 • EN60601-1-2 • EN61000-3-2 • EN61000-3-3 • EN300 386

Item	Specifications
Environmental standards	<ul style="list-style-type: none"> • Network Equipment Building 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 • European Telecommunications Standards Institute (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 • ETSI 300 132-1
Safety	<ul style="list-style-type: none"> • UL/CSA/IEC/EN 60950-1 • AS/NZS 60950 • GB4943
Warranty	Cisco Nexus 7000 Series Switches come with the standard Cisco 1-year limited hardware warranty

Interface Distances

Table 4 summarizes the interfaces, cabling specifications, and distances of SFP+ optics supported by the Cisco Nexus 7000 M1-Series 32-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 4. 10 Gigabit Ethernet Interface Distances and Options¹

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 SFP-10G-SR-S	850	<ul style="list-style-type: none"> • MMF (FDDI-grade) • MMF (OM1) • MMF (400/400) • MMF (OM2) • MMF (OM3) • MMF (OM4) 	<ul style="list-style-type: none"> • 62.5 • 62.5 • 50.0 • 50.0 • 50.0 • 50.0 	<ul style="list-style-type: none"> • 160 • 200 • 400 • 500 • 2000 • 4700 	<ul style="list-style-type: none"> • 26m • 33m • 66m • 82m • 300m • 400m
SFP-10G-LRM	1310	<ul style="list-style-type: none"> • MMF⁴ 	<ul style="list-style-type: none"> • 62.5 • 50.0 • 50.0 	<ul style="list-style-type: none"> • 500 • 400 • 500 	<ul style="list-style-type: none"> • 220m • 100m • 220m
		<ul style="list-style-type: none"> • SMF 	<ul style="list-style-type: none"> • G.652 	-	<ul style="list-style-type: none"> • 300m
SFP-10G-LR SFP-10G-LR-S	1310	<ul style="list-style-type: none"> • SMF 	<ul style="list-style-type: none"> • G.652 	-	<ul style="list-style-type: none"> • 10 km
SFP-10G-ER SFP-10G-ER-S	1550	<ul style="list-style-type: none"> • SMF 	<ul style="list-style-type: none"> • G.652 	-	<ul style="list-style-type: none"> • 40 km⁵
SFP-10G-ZR SFP-10G-ZR-S	1530 - 1565	<ul style="list-style-type: none"> • SMF 	<ul style="list-style-type: none"> • G.652 	-	<ul style="list-style-type: none"> • 80 km
DWDM-SFP10G-xx.xx=	1530.33 - 1561.416	<ul style="list-style-type: none"> • SMF 	-	-	-
FET-10G	850	<ul style="list-style-type: none"> • MMF (OM2) • MMF (OM3) • MMF (OM4) 	<ul style="list-style-type: none"> • 50.0 • 50.0 • 50.0 	<ul style="list-style-type: none"> • 500 • 2000 • 4700 (OM4) 	<ul style="list-style-type: none"> • 25m • 100m • 100m
SFP-H10GB-CU1M	-	<ul style="list-style-type: none"> • Twinax cable, passive, 30AWG cable assembly 	-	-	<ul style="list-style-type: none"> • 1m
SFP-H10GB-CU1-5M	-	<ul style="list-style-type: none"> • Twinax cable, passive, 30AWG cable assembly 	-	-	<ul style="list-style-type: none"> • 1.5m
SFP-H10GB-CU2M	-	<ul style="list-style-type: none"> • Twinax cable, passive, 30AWG cable assembly 	-	-	<ul style="list-style-type: none"> • 2m

10 Gigabit Ethernet SFP+ Part Number	Wavelength (nanometers)	Fiber and Cable Type	Core Size (microns)	Modal Bandwidth (MHz·km) ²	Cable Distance ³
SFP-H10GB-CU2-5M	-	• Twinax cable, passive, 30AWG cable assembly	-	-	• 2.5m
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
SFP-10G-AOC1M	-	• Active Optical Cable assembly	-	-	• 1m
SFP-10G-AOC2M	-	• Active Optical Cable assembly	-	-	• 2m
SFP-10G-AOC3M	-	• Active Optical Cable assembly	-	-	• 3m
SFP-10G-AOC5M	-	• Active Optical Cable assembly	-	-	• 5m
SFP-10G-AOC7M	-	• Active Optical Cable assembly	-	-	• 7m
SFP-10G-AOC10M	-	• Active Optical 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 The 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 MMF 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 Forty 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 5 provides ordering information.

Table 5. Ordering Information

Product Name	Part Number
Cisco Nexus 7000 M1-Series 32 Port 10GbE with XL Option, 80G Fabric (requires SFP+)	N7K-M132XP-12L
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 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 operational 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, which offers proactive diagnostics and real-time alerts on your Cisco Nexus 7000 Series Switches. Spanning the entire network lifecycle, Cisco Services helps maximize investment protection, optimize network operations, provide migration support, 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 Cisco account representative.



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