

Cisco Nexus 7000 M1-Series 48-Port Gigabit Ethernet Modules with XL Option

Product Overview

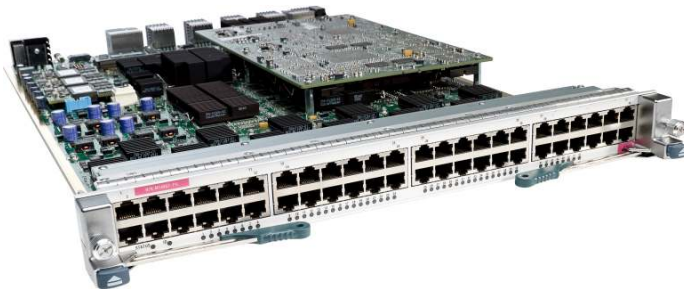
The Cisco Nexus[®] 7000 Series 48-Port Gigabit Ethernet Modules with XL Option are highly scalable modules designed for performance-driven, mission-critical Ethernet networks. The modules use the M1-XL forwarding engine, providing a throughput of up to 60 million packets per second (Mpps) and a large Forwarding Information Base (FIB) - making them ideal for deployment at an Internet exchange point (IXP), a service provider, or a large enterprise. The 48-port modules are available in two versions: the fiber Gigabit Ethernet option using Small Form-Factor Pluggable (SFP) optics (Figure 1) and the copper 10/100/1000 option with RJ45 connectors (Figure 2).

The Cisco Nexus 7000 Series Switches are 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), providing support for future 40 and 100 Gigabit Ethernet interfaces. 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 powered by the proven Cisco[®] NX-OS 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 networks on a single Ethernet fabric.

Figure 1. Cisco Nexus 7000 Series 48-Port Gigabit Ethernet Module with XL Option (SFP Optics)



Figure 2. Cisco Nexus 7000 Series 48-Port 10/100/1000 Ethernet Module with XL Option (RJ45)



Features and Benefits

The Cisco Nexus 7000 Series 48-Port Gigabit Ethernet Modules with XL Option have a number of key features that are designed to enable flexible deployment and support for the highest-performance environments, where high density and rich features are required. With an optional Scalable Feature License, the modules can operate in enhanced XL mode, which enables utilization of the full forwarding table available on the forwarding engine, essential for large-scale deployments such as large enterprises or 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 XL or non-XL mode makes these modules extremely flexible for many types of networking environments. The fiber version of the Cisco Nexus 7000 Series 48-port Gigabit Ethernet XL Module also supports a broad range of SFP optics, allowing deployment in various types of situations, from long-reach intersite over single-mode fiber to short- and medium-reach over multimode fiber for data center and campus environments. The Cisco Nexus 7000 Series 48-Port Gigabit Ethernet Modules with XL Option provide 48 Gbps of local switching and are ideal for the access layer, where high density, high performance, and continuous system operation are crucial.

All Cisco Nexus 7000 M-Series I/O modules contain integrated forwarding engines. The M1-XL forwarding engine on the 48-port modules is part of the Cisco Nexus 7000 M1-Series of forwarding engines, incorporating larger FIB and access control list (ACL) tables. The module is fully compatible with, and offers feature consistency with, all existing M1 modules. Table 1 lists the performance specifications for the Cisco Nexus 7000 Series 48-Port Gigabit Ethernet Modules with XL Option operating in XL and non-XL modes.

Table 1. Performance Specifications for XL and Non-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

The M1-XL forwarding engine delivers up to 60 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 16 Cisco Nexus 7000 Series 48-Port Gigabit Ethernet Modules with XL Option delivers 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 effect on 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 Series 48-Port Gigabit Ethernet Modules with XL Option offer exceptional security with integrated hardware support for the Cisco TrustSec[®] solution. Security features include 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 48 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. This feature removes dependencies on IP addresses, thus improving scalability and simplifying manageability.

The Cisco Nexus 7000 Series 48-Port Gigabit Ethernet Modules with XL Option buffer data in virtual output queues 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 Series 48-Port Gigabit Ethernet Modules with XL Option.

Table 2. Features and Benefits

Feature	Benefit
XL mode	Enables use of a larger forwarding table, providing investment protection through increased system flexibility and ease of sparing
High-density 48-port Gigabit Ethernet module	Delivers up to 768 Gigabit Ethernet ports in the 18-slot chassis and 384 Gigabit Ethernet ports in the 10-slot chassis for efficient and scalable network designs
Virtual output queuing with centralized arbitration	Enables fairness when one or more destinations is congested and future 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 feature-rich line cards support MPLS in the hardware, and these MPLS capabilities will be enabled in the future with software upgrades
Integrated hardware support for Cisco TrustSec	Simplifies and scales access control by using SGTs and SGACLs and delivers data confidentiality and data integrity on all 8 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

Note: Not all Cisco Nexus 7000 Series 48-Port Gigabit Ethernet Modules with XL Option features are enabled in the first software release. Refer to the release notes for up-to-date software version information to see what features are supported.

Product Specifications

Table 3 lists the product specifications for the Cisco Nexus 7000 Series 48-Port Gigabit Ethernet Module with XL Option (SFP Optics) and the Cisco Nexus 7000 Series 48-Port 10/100/1000 Ethernet Module with XL Option (RJ45).

Table 3. Product Specifications

Item	Specifications	
	48-Port Gigabit Ethernet Module (SFP Optics)	48-Port 10/100/1000 Ethernet Module (RJ45)
System		
Product compatibility	Supported in all Cisco Nexus 7000 Series chassis	
Software compatibility	Cisco NX-OS Software Release 5.0 or later (minimum requirement)	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"> • Extensible Markup Language (XML) • Scriptable command-line interface (CLI) • Cisco Data Center Network Manager (DCNM) GUI 	
Network management	Cisco DCNM 5.0	Cisco DCNM 5.1
Physical Interfaces		
Connectivity	48 ports of Gigabit Ethernet using SFP optics	48 ports of 10/100/1000 Ethernet using RJ45 connectors
Maximum port density	384 ports of Gigabit Ethernet for 10-slot chassis, and 768 ports of Gigabit Ethernet for 18-slot chassis	384 ports of 10/100/1000 Ethernet for 10-slot chassis, and 768 ports of 10/100/1000 Ethernet for 18-slot chassis
MAC security	All 48 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"> • Input: 2 queues and 4 thresholds (RX: 2q4t) • Output: 1 strict priority queue, 3 deficit-weighted round-robin (DWRR) queues, and 4 thresholds (TX: 1p3q4t) 	
Scheduler	Deficit-Weighted Round-Robin (DWRR) and Shaped Round-Robin (SRR)	
Port buffers	7.56 MB ingress and 6.15 MB egress per port	
Jumbo frame support for bridged and routed packets	Up to 9216 bytes	
Forwarding Engines: 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	46 Gbps in each direction (92 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: 15.5 lb 	<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: 14 lb

Mean time between failures (MTBF)	73,228 hours	73,974 hours
Environmental conditions	<ul style="list-style-type: none"> • Operating temperature: 32 to 104°F (0 to 40°C) • Operational relative humidity: 5 to 90%, noncondensing • Storage temperature: -40 to 158°F (-40 to 70°C) • Storage relative humidity: 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 	
Environmental standards	<ul style="list-style-type: none"> • 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 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 and distances supported by the Cisco Nexus 7000 Series 48-Port Gigabit Ethernet Module with XL Option (SFP Optics).

Table 4. Interfaces and Distances of SFP Optics Supported by the Cisco Nexus 7000 Series 48-Port Gigabit Ethernet Module with XL Option

SFP Product ID	Wavelength (nm)	Fiber and Cable Type	Core Size (microns)	Modal Bandwidth (MHz.km)	Cable Distance
1000BASE-SX	850	Multimode fiber (MMF)	<ul style="list-style-type: none"> • 50 • 50 • 50 • 62.5 • 62.5 	<ul style="list-style-type: none"> • 400 • 500 • 2000 • 160 • 200 	<ul style="list-style-type: none"> • 500m • 550m • 1000m • 220m • 275m
1000BASE-LX/LH	1310	MMF [†]	<ul style="list-style-type: none"> • 50 • 50 • 62.5 	<ul style="list-style-type: none"> • 400 • 500 • 500 	<ul style="list-style-type: none"> • 550m • 550m • 550m
		Single-mode fiber (SMF)	G.652	-	10 km
1000BASE-ZX	1550	SMF	G.652	-	70 to 100 km ^{**}
1000BASE-T	-	Category 5	-	-	100m

SFP Product ID	Wavelength (nm)	Fiber and Cable Type	Core Size (microns)	Modal Bandwidth (MHz.km)	Cable Distance
Coarse Wavelength-Division Multiplexing (CWDM)	1470 to 1610	SMF	-	-	-
Dense Wavelength-Division Multiplexing (DWDM)	1530.33 to 1561.42	SMF	-	-	-

* A mode-conditioning patch is required. Using an ordinary patch cord with MMF, 1000BASE-LX/LH SFPs, and a short link distance (tens of meters) can cause transceiver saturation, resulting in an elevated bit error rate. In addition, when using the LX/LH SFP with 62.5-micron-diameter MMF, you must install a mode-conditioning patch cord between the SFP and the MMF cable on both the transmit and receive ends of the link. The mode-conditioning patch cord is required for link distances greater than 300m.

** 1000BASE-ZX SFP can reach up to 100 km by using dispersion-shifted SMF or low-attenuation SMF; the distance depends on fiber quality, number of splices, and connectors.

For more information, refer to Cisco SFP data sheets.

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 Series 48-port Gigabit Ethernet Module with XL Option (SFP optics)	N7K-M148GS-11L
Cisco Nexus 7000 Series 48-port 10/100/1000 Ethernet Module with XL Option (RJ45)	N7K-M148GT-11L
1000BASE-SX SFP (DOM)	SFP-GE-S*
1000BASE-LX/LH SFP (DOM)	SFP-GE-L*
1000BASE-ZX Gigabit Ethernet SFP (DOM)	SFP-GE-Z*
1000BASE-T SFP (NEBS 3 ESD)	SFP-GE-T*
GE SFP, LC connector SX transceiver	GLC-SX-MM*
1000Base-SX SFP Transceiver Module, MMF, 850nm, DOM	GLC-SX-MMD*
GE SFP, LC connector LX/LH transceiver	GLC-LH-SM*
1000Base-LX/LH SFP Transceiver Module, MMF/SMF, 1310nm, DOM	GLC-LH-SMD*
1000BASE-ZX SFP	GLC-ZX-SM*
1000BASE-T SFP	GLC-T*
1000Base-BX10 SFP Module, SMF, 1490nm TX/1310nm RX	GLC-BX-D*
1000Base-BX10 SFP Module, SMF, 1310nm TX/1490nm RX	GLC-BX-U*
Coarse Wavelength-Division Multiplexing (CWDM) SFP	CWDM-SFP-1470=**
Dense Wavelength-Division Multiplexing (DWDM) SFP	DWDM-SFP-3033=***

* See the SFP optics data sheet for additional information:

http://cisco.com/en/US/prod/collateral/modules/ps5455/ps6577/product_data_sheet0900aec8033f885.html.

** Also offered in other wavelengths. See the CWDM SFP optics data sheet for additional product numbers and information:

http://cisco.com/en/US/prod/collateral/modules/ps5455/ps6575/product_data_sheet09186a00801a557c.html.

*** Also offered in other wavelengths. See the DWDM SFP optics data sheet for additional product numbers and information:

http://cisco.com/en/US/prod/collateral/modules/ps5455/ps6576/product_data_sheet0900aec80582763.html.

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 operational efficiency and improve your data center network. Cisco Advanced Services uses an architecture-led approach to help you align your data center infrastructure to your business goals and provide long-term value. Cisco SMARTnet[®] Service helps you resolve mission-critical problems with direct access any time to Cisco network experts and award-winning resources. With this service, you can take advantage of the Smart Call Home service capability that 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, 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 account representative.



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