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

## Product Overview

The Cisco Nexus® 7000 M1-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 excellent 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 RJ-45 connectors (Figure 2).

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 are designed to support high-density 40 and 100 Gigabit Ethernet deployments. Designed to meet the requirements of the most mission-critical network environments, these switches deliver 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 (IPC) networks on a single Ethernet fabric.

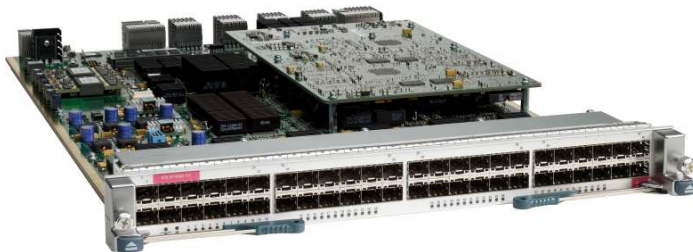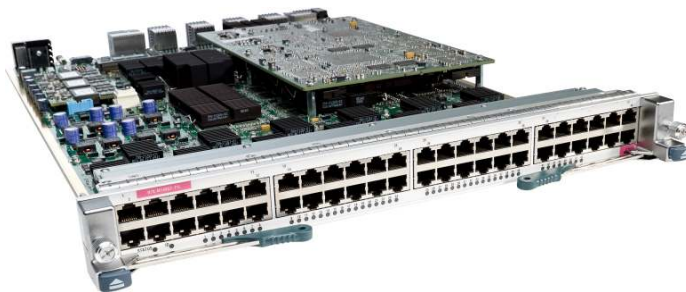**Figure 1.**    Cisco Nexus 7000 M1-Series 48-Port Gigabit Ethernet Module with XL Option (SFP Optics)



**Figure 2.**    Cisco Nexus 7000 M1-Series 48-Port 10/100/1000 Ethernet Module with XL Option (RJ-45)

## Features and Benefits

The Cisco Nexus 7000 M1-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, in which high density and a comprehensive feature set 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 M1-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 deployments over single-mode fiber (SMF) to short- and medium-reach deployments over multimode fiber (MMF) for data center and campus environments. The Cisco Nexus 7000 M1-Series 48-Port Gigabit Ethernet Modules with XL Option provide 48 Gbps of local switching and are excellent for the access layer, where high density, high performance, and continuous system operation are crucial.

All Cisco Nexus 7000 M1-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 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 M1-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 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 48-Port Gigabit Ethernet Modules with XL Option offer exceptional security with integrated hardware support for Cisco TrustSec® technology. 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 M1-Series 48-Port Gigabit Ethernet Modules with XL Option buffer 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 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 |
| VOQ 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 line cards with comprehensive feature sets support 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 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 |

* 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 Specifications

Table 3 lists the product specifications for the Cisco Nexus 7000 M1-Series 48-Port Gigabit Ethernet Module with XL Option (SFP Optics) and the Cisco Nexus 7000 M1-Series 48-Port 10/100/1000 Ethernet Module with XL Option (RJ-45).

**Table 3.**     Product Specifications

| Item | Specifications | |
|---|---|---|
| | **48-Port Gigabit Ethernet Module (SFP Optics)** | **48-Port 10/100/1000 Ethernet Module (RJ-45)** |
| **System** | | |
| **Product compatibility** | • Supported in all Cisco Nexus 7000 Series chassis<br>• Supported Fabric-1 or Fabric-2 fabric modules<br>• Supported SUP1, SUP2 or SUP2E Supervisor modules | |
| **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** | • Status: Green (operational), red (faulty), or orange (module booting)<br>• 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)<br>• ID: Blue (operator has flagged this card for identification; beacon) or off (module not flagged) | |
| **Programming interfaces** | • XML<br>• Scriptable command-line interface (CLI)<br>• 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 RJ-45 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** | • Input: 2 queues and 4 thresholds (RX: 2q4t)<br>• Output: 1 strict priority queue, 3 Deficit-Weighted Round-Robin (DWRR) queues, and 4 thresholds (TX: 1p3q4t) | |
| **Scheduler** | DWRR and Shaped Round-Robin (SRR) | |
| **Port buffers** | Ingress: 7.56 MB per port<br>Egress: 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** | • Occupies one I/O module slot in a Cisco Nexus 7000 Series chassis<br>• Dimensions (H x W x D): 1.733 x 15.3 x 21.9 in. (4.4 x 38.9 x 55.6 cm)<br>• Weight: 15.5 lb (7 kg) | • Occupies one I/O module slot in a Cisco Nexus 7000 Series chassis<br>• Dimensions (H x W x D): 1.733 x 15.3 x 21.9 in. (4.4 x 38.9 x 55.6 cm)<br>• Weight: 14 lb (6.4 kg) |

| Item | Specifications | |
|------|----------------|---|
| | **48-Port Gigabit Ethernet Module (SFP Optics)** | **48-Port 10/100/1000 Ethernet Module (RJ-45)** |
| **Power consumption** | • Typical: 358 watts (W)<br>• Maximum: 400W | • Typical: 358W<br>• Maximum: 400W |
| **Environmental conditions** | • Operating temperature: 32 to 104ºF (0 to 40ºC)<br>• Operational relative humidity: 5 to 90%, noncondensing<br>• Storage temperature: -40 to 158ºF (-40 to 70ºC)<br>• Storage relative humidity: 5 to 95%, noncondensing | |
| **Regulatory compliance** | • FCC Part 15 (CFR 47) (USA) Class A<br>• ICES-003 (Canada) Class A<br>• EN55022 (Europe) Class A<br>• CISPR22 (International) Class A<br>• AS/NZS CISPR22 (Australia and New Zealand) Class A<br>• VCCI (Japan) Class A<br>• KN22 (Korea) Class A<br>• CNS 13438 (Taiwan) Class A<br>• CISPR24<br>• EN55024<br>• EN60601-1-2<br>• EN61000-3-2<br>• EN61000-3-3<br>• EN300 386 | |
| **Environmental standards** | • NEBS criteria levels<br>• SR-3580 NEBS Level 3 (GR-63-CORE, issue 3, and GR-1089-CORE, issue 4)<br>• Telecommunications Carrier Group (TCG) Checklist<br>• ATT TP76200 level 3<br>• ETSI 300 019-1-1, Class 1.2 Storage<br>• ETSI 300 019-1-2, Class 2.3 Transportation<br>• ETSI 300 019-1-3, Class 3.2 Stationary Use | |
| **Safety** | • UL/CSA/IEC/EN 60950-1<br>• AS/NZS 60950<br>• 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 supported by the Cisco Nexus 7000 M1-Series 48-Port Gigabit Ethernet Module with XL Option (SFP Optics). 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.** Gigabit Ethernet Interface Distances and Options[1]

| Gigabit Ethernet SFP Part Number | Wavelength (nanometers) | Fiber and Cable Type | Core Size (microns) | Modal Bandwidth (MHz*km)[2] | Cable Distance |
|---|---|---|---|---|---|
| GLC-SX-MM<br>SFP-GE-S<br>GLC-SX-MMD | 850 | • MMF (FDDI-grade)<br>• MMF (OM1)<br>• MMF (400/400)<br>• MMF (OM2)<br>• MMF (OM3) | • 62.5<br>• 62.5<br>• 50.0<br>• 50.0<br>• 50.0 | • 160<br>• 200<br>• 400<br>• 500<br>• 2000 | • 220m<br>• 275m<br>• 500m<br>• 550m<br>• 1000m |
| GLC-LH-SM<br>SFP-GE-L<br>GLC-LH-SMD | 1310 | • MMF[3] | • 62.5<br>• 50.0<br>• 50.0 | • 500<br>• 400<br>• 500 | • 550m<br>• 550m<br>• 550m |
| | | • SMF | • G.652 | - | • 10km |
| GLC-ZX-SM<br>SFP-GE-Z | 1550 | • SMF | • G.652 | - | • 70km |
| GLC-T<br>SFP-GE-T | - | • Category[5] | - | - | • 100m |
| GLC-BX-D | 1310 | • SMF | • G.652 | - | • 10km |
| GLC-BX-U | 1490 | • SMF | • G.652 | - | • 10km |
| CWDM-SFP-1xxx= | 1470 - 1610[4] | • SMF | - | - | - |
| DWDM-SFP-1xxx= | 1530.33 - 1561.42[5] | • SMF | - | - | - |

[1]. See the Cisco Gigabit Ethernet SFP Modules Data Sheet for additional information:
http://www.cisco.com/en/US/prod/collateral/modules/ps5455/ps6577/product_data_sheet0900aecd8033f885.html.

[2]. Bandwidth is specified at transmission wavelength.

[3]. 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.

[4]. Multiple wavelengths are offered. See the Cisco Coarse Wavelength-Division Multiplexing (CWDM) SFP Modules Data Sheet for additional product numbers and information:
http://www.cisco.com/en/US/prod/collateral/modules/ps5455/ps6575/product_data_sheet09186a00801a557c.html.

[5]. Multiple wavelengths are offered. See the Cisco Dense Wavelength-Division Multiplexing (DWDM) SFP Modules Data Sheet for additional product numbers and information:
http://www.cisco.com/en/US/prod/collateral/modules/ps5455/ps6576/product_data_sheet0900aecd80582763.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 48-port Gigabit Ethernet Module with XL Option (SFP optics) | N7K-M148GS-11L |
| Cisco Nexus 7000 M1-Series 48-port 10/100/1000 Ethernet Module with XL Option (RJ45) | N7K-M148GT-11L |
| 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 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 gain 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, 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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