# Cisco Nexus 7000 M1-Series 8-Port 10 Gigabit Ethernet Module with XL Option

## Product Overview

The Cisco Nexus® 7000 M1-Series 8-Port 10 Gigabit Ethernet Module with XL Option (Figure 1) is a cost-effective, highly scalable, high-performance module designed for mission-critical Ethernet networks. The module uses two M1-XL forwarding engines that feature a larger Forwarding Information Base (FIB). The module also supports a wide range of X2 optics, allowing deployment flexibility in various types of networking environment.

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), 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, the 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 8-Port 10 Gigabit Ethernet Module with XL Option



## Features and Benefits

The Cisco Nexus 7000 M1-Series 8-Port 10 Gigabit Ethernet Module with XL Option has a number of 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 8-port module supports a broad range of optics, allowing deployment in various types of situations, from a long-reach intersite deployment over single-mode fiber (SMF) to short and medium reaches over multimode fiber (MMF) for data center and campus environments. The fabric interface on the 8-port module delivers 80 Gbps of bandwidth in each direction.

All Cisco Nexus 7000 M-Series I/O modules contain integrated forwarding engines. The M1-XL forwarding engines on the 8-port module are part of the Cisco Nexus 7000 M1-Series of 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 8-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 8-port module has dual M1-XL forwarding engines and can deliver up to 120 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 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 8-Port 10 Gigabit Ethernet Modules with XL Option can deliver up to 1.92 billion packets per second (Bpps) 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 M1-Series 8-Port 10 Gigabit Ethernet Module with XL Option offers exceptional security, with integrated hardware support for the Cisco TrustSec® solution. This includes 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 eight 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 capability removes dependencies on IP addresses, thus improving scalability and simplifying manageability.

The Cisco Nexus 7000 M1-Series 8-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 8-Port 10 Gigabit Ethernet Module with XL Option.

**Table 2.** Features and Benefits[*]

| Feature | Benefit |
|---|---|
| XL mode | Enables a larger forwarding table, providing investment protection through increased system flexibility and ease of sparing |
| 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 |
| VOQ with centralized arbitration | Enables fairness when one or more destinations are 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) | Support MPLS forwarding in 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 8-Port 10 Gigabit Ethernet Module with XL Option.

**Table 3.** Product Specifications

| Item | Specifications |
|---|---|
| **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) |
| 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 | • Extensible Markup Language (XML)<br>• Scriptable command-line interface (CLI)<br>• Cisco Data Center Network Manager (DCNM) GUI |
| Network management | Cisco DCNM 5.0 |
| **Physical Interfaces** | |
| Connectivity | 8 ports of 10 Gigabit Ethernet using X2 optics |
| Maximum port density | 64 ports of 10 Gigabit Ethernet for 10-slot chassis and 128 ports of 10 Gigabit Ethernet for 18-slot chassis |
| MAC security | All 8 ports have built-in IEEE 802.1AE MAC security and an AES cipher with a 128-bit key (requires a software license to enable) |

| Item | Specifications |
|---|---|
| Queues per port | • Ingress: 8 queues and 2 thresholds (RX: 8q2t)<br>• 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: 92 MB per port<br>• Egress: 80 MB per port |
| Jumbo frame support for bridged and routed packets | Up to 9216 bytes |
| **Forwarding Engines: Dual M1-XL** | |
| Performance | 120 Mpps Layer 2 and Layer 3 IPv4 unicast and 60 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 | • 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) |
| Power Consumption | • Typical: 520 watts (W)<br>• Maximum: 650W |
| 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 and Table 5 summarize the interfaces and distances of X2 and SFP+ optics supported by the Cisco Nexus 7000 M1-Series 8-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.

**Table 4.**     10 Gigabit Ethernet X2 Interface Distances and Options[1]

| 10 Gigabit Ethernet X2 Part Number | Wavelength (nanometers) | Fiber and Cable Type | Core Size (microns) | Modal Bandwidth (MHz·km)[2] | Cable Distance[3] |
|---|---|---|---|---|---|
| X2-10GB-SR | 850 | • MMF (FDDI grade)<br>• MMF (OM1)<br>• MMF (400/400)<br>• MMF (OM2)<br>• MMF (OM3)<br>• MMF (OM4) | • 62.5<br>• 62.5<br>• 50.0<br>• 50.0<br>• 50.0<br>• 50.0 | • 160<br>• 200<br>• 400<br>• 500<br>• 2000<br>• 4700 | • 26m<br>• 33m<br>• 66m<br>• 82m<br>• 300m<br>• 400m |
| X2-10GB-LRM | 1310 | • MMF[4] | • 62.5<br>• 50.0<br>• 50.0 | • 500<br>• 400<br>• 500 | • 220m<br>• 100m<br>• 220m |
| | | • SMF | • G.652 | - | • 300m |
| X2-10GB-LR | 1310 | • SMF | • G.652 | - | • 10 km |
| X2-10GB-ER | 1550 | • SMF | • G.652 | - | • 40 km[5] |
| X2-10GB-ZR | 1530 - 1565 | • SMF | • G.652 | - | • 80 km |
| X2-10GB-LX4 | 1310 | • MMF | • 62.5<br>• 50.0<br>• 50.0 | • 500<br>• 400<br>• 500 | • 300m<br>• 240m<br>• 300m |
| X2-10GB-CX4 | - | • CX4 (copper) | - | - | • 15m |
| DWDM-X2-xx.xx= | 1530.33 - 1560.61[6] | • SMF | - | - | - |

[1] See the Cisco 10GBASE X2 Modules Data Sheet for additional information: http://www.cisco.com/en/US/prod/collateral/modules/ps5455/ps6574/product_data_sheet0900aecd801f92aa.html.

[2] Bandwidth is specified at transmission wavelength.

[3] Minimum cabling distance for -SR, -LR, -LX4, and -ER modules is 2m, according to IEEE 802.3ae. Minimum cabling distance for -LRM modules is 0.5m, according to IEEE 802.3aq standard.

[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.

**Table 5.**     10 Gigabit Ethernet SFP+ Interface Distances and Options (Requires CVR-X2-SFP10G OneX Converter)[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<br>SFP-10G-SR-S | 850 | • MMF (FDDI-grade)<br>• MMF (OM1)<br>• MMF (400/400)<br>• MMF (OM2)<br>• MMF (OM3)<br>• MMF (OM4) | • 62.5<br>• 62.5<br>• 50.0<br>• 50.0<br>• 50.0<br>• 50.0 | • 160<br>• 200<br>• 400<br>• 500<br>• 2000<br>• 4700 | • 26m<br>• 33m<br>• 66m<br>• 82m<br>• 300m<br>• 400m |

| 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-LRM | 1310 | • MMF[4]<br><br>• SMF | • 62.5<br>• 50.0<br>• 50.0<br>• G.652 | • 500<br>• 400<br>• 500<br>- | • 220m<br>• 100m<br>• 220m<br>• 300m |
| SFP-10G-LR<br>SFP-10G-LR-S | 1310 | • SMF | • G.652 | - | • 10 km |
| SFP-H10GB- CU1M | - | • Twinax cable, passive, 30-AWG cable assembly | - | - | • 1m |
| SFP-H10GB- CU3M | - | • Twinax cable, passive, 30-AWG cable assembly | - | - | • 3m |
| SFP-H10GB- CU5M | - | • Twinax cable, passive, 24-AWG cable assembly | - | - | • 5m |

[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, and -LR 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.

## 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 M1-Series 8-Port 10 Gigabit Ethernet Module with XL Option (requires X2)** | N7K-M108X2-12L |
| **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 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 anytime 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 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 account representative.

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