

# Cisco Nexus 7000 M1-Series 32-Port 10Gb Ethernet Module

## Product Overview

The Cisco Nexus® 7000 M1-Series 32-Port 10Gb Ethernet Module (Figure 1) is a highly scalable, high-density module designed for performance driven mission-critical Ethernet networks.

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). Designed to meet the requirements of the most mission-critical data centers, 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 design is purpose built to support end-to-end data center connectivity, consolidating IP, storage, and interprocess communication (IPC) networks onto a single Ethernet fabric.

**Figure 1.** Cisco Nexus 7000 M1-Series 32-Port 10Gb Ethernet Module



## Features and Benefits

The Cisco Nexus 7000 M1-Series 32-Port 10Gb Ethernet Module with 80 Gbps of bandwidth to the fabric is a high-performance, high-density 10 Gigabit Ethernet module designed for mission-critical Ethernet networks. Up to 512 ports of 10 Gigabit Ethernet are supported in a single system in the Cisco Nexus 7000 18-Slot Switch chassis, providing a high-density, compact solution for the largest 10 Gigabit Ethernet networks.

Populating the Cisco Nexus 7000 10-Slot Switch chassis with this module delivers up to 256 ports of 10 Gigabit Ethernet in a single chassis, or up to 512 ports of 10 Gigabit Ethernet in a single rack. These configurations are ideal for the core layer or the aggregation layer of a data center network, in which density, performance, and continuous system operation are critical. This module can also be used as a 10 Gigabit Ethernet uplink when employing a Cisco Nexus 7000 M1-Series 48-port 10/100/1000 module for the access layer. The physical interfaces on the Cisco Nexus 7000 M1-Series 32-Port 10Gb Ethernet Module support SFP+ optics to meet the needs of a variety of distances and types of fiber cable.

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All Cisco Nexus 7000 Series I/O modules contain an integrated forwarding engine. This architecture scales the forwarding performance of the chassis linearly by the number of I/O modules employed. The forwarding engine on the Cisco Nexus 7000 M1-Series 32-Port 10Gb Ethernet Module is part of the Cisco Nexus 7000 M-Series forwarding engines. Because this is the first generation of the Cisco Nexus M-Series, the engine is referred to as the M1 forwarding engine.

The M1 forwarding engine delivers 60 million packets per second (Mpps) of Layer 2 and 3 IPv4 unicast forwarding or 30 Mpps of IPv6 unicast forwarding across all ports on a single I/O module. An 18-slot chassis with 16 M1 I/O modules delivers up to 960 Mpps of IPv4 unicast forwarding. Multicast forwarding is built into the I/O module that performs egress replication. The M1 forwarding engine also delivers access control list (ACL) filtering, marking, rate limiting, and NetFlow with no degradation of performance. Powerful ACL processing supports up to 64,000 entries per module, 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 10Gb Ethernet Module offers exceptional security with integrated hardware support for Cisco TrustSec<sup>®</sup> technology. This includes line-rate data confidentiality, data integrity, and ACL processing for SGT Security Group Tags. 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<sup>1</sup>. This capability removes dependencies on IP addresses, thus improving scalability and simplifying manageability.

The fabric interface on the Cisco Nexus 7000 M1-Series 32-Port 10Gb Ethernet Module delivers 80 Gbps of bandwidth in each direction. Traffic destined for a different module is distributed across up to five fabric modules. At least two fabric modules are required in the chassis to achieve the full 80 Gbps of bandwidth. Although this configuration offers fault tolerance, if one of the fabric modules fails, loss of bandwidth will occur. With three fabric modules installed in the chassis, one of the fabric modules can fail with no loss of bandwidth.

The 32-port 10 Gigabit Ethernet I/O module 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.

The Cisco Nexus 7000 M1-Series 32-Port 10Gb Ethernet Module can deliver 8 ports at line rate or allow up to 32 ports to share 80 Gbps of bandwidth. The 32 ports are organized into eight groups of 4 ports. In dedicated mode, the first port in each group is active, delivering line-rate performance, and the other 3 ports are disabled. In shared mode, all 4 ports in the group are active. The software allows each group to be individually configured for dedicated mode or shared mode. Up to 64 and 128 ports of line-rate 10 Gigabit Ethernet are supported on the Cisco Nexus 7000 10-Slot and 18-Slot Switches respectively. Table 1 summarizes the features and benefits of the Cisco Nexus 7000 M1-Series 32-Port 10Gb Ethernet Module.

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<sup>1</sup> Requires Cisco Secure Access Control Server (ACS).

**Table 1.** Features and Benefits<sup>\*</sup>

Feature	Benefit
<b>High-density 10 Gigabit Ethernet module</b>	Offers up to 256 10 Gigabit Ethernet ports in the 10-slot chassis and 512 ports in the 18-slot chassis for efficient and scalable network designs
<b>Performance mode allows up to 8 line-rate ports per module</b>	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 for the highest levels of 10 Gigabit Ethernet
<b>Shared mode allows up to 32 ports per module</b>	Supports flexible provisioning of performance and shared modes in groups of 4 ports
<b>Cisco Nexus 2000 Series Fabric Extenders</b>	The Cisco Nexus 2000 Series Fabric Extenders are designed to simplify data center architecture and operations by dramatically reducing the points of management
<b>VOQ with centralized arbitration</b>	Enables fairness when one or more destinations is congested and future support for lossless unified I/O
<b>Load sharing across all fabric modules</b>	Through its high-availability design, shares bandwidth across all fabric modules simultaneously for optimal performance
<b>Distributed forwarding</b>	Through its fully distributed data plane, offers high-performance parallel forwarding
<b>Multiprotocol Label Switching (MPLS)</b>	M1-based line cards with a comprehensive feature set support MPLS in the hardware
<b>Integrated hardware support for Cisco TrustSec technology</b>	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
<b>Online insertion and removal (OIR)</b>	Supports hot insertion and removal for continuous system operation
<b>Identification (ID) LED</b>	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

<sup>\*</sup> 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 2 lists the product specifications for the Cisco Nexus 7000 M1-Series 32-Port 10Gb Ethernet Module.

**Table 2.** Product Specifications

Item	Specifications
<b>System</b>	
<b>Product compatibility</b>	<ul style="list-style-type: none"> <li>Supported in Cisco Nexus 7000 Series 9-, 10-, and 18-slot chassis</li> <li>Supported Fabric-1 or Fabric-2 fabric modules</li> <li>Supported SUP1, SUP2 or SUP2E Supervisor modules</li> </ul>
<b>Software compatibility</b>	Cisco NX-OS Software Release 4.0 or later (minimum requirement)
<b>Memory</b>	1 GB DRAM
<b>Front-panel LEDs</b>	<ul style="list-style-type: none"> <li>Status: Green (operational), red (faulty), or orange (module booting)</li> <li>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)</li> <li>ID: Blue (operator has flagged this card for identification; beacon) or off (module not flagged)</li> </ul>
<b>Programming interfaces</b>	<ul style="list-style-type: none"> <li>XML</li> <li>Scriptable command-line interface (CLI)</li> <li>Cisco Data Center Network Manager (DCNM) GUI</li> </ul>
<b>Network management</b>	<ul style="list-style-type: none"> <li>Cisco DCNM 4.0</li> </ul>
<b>Physical Interfaces</b>	
<b>Connectivity</b>	32 ports of 10 Gigabit Ethernet (SFP+ pluggable optics module)
<b>Maximum port density</b>	256 ports of 10 Gigabit Ethernet for 10-slot chassis 512 ports of 10 Gigabit Ethernet for 18-slot chassis
<b>MAC security</b>	All 32 ports have built-in IEEE 802.1AE MAC security and an AES cipher with a 128-bit key (requires a Cisco Advanced LAN license to enable)

Item	Specifications
<b>Queues per port</b>	<ul style="list-style-type: none"> <li>Ingress: 8 queues and 2 thresholds (RX: 8q2t)</li> <li>Egress: 1 strict priority queue, 7 Deficit-Weighted Round-Robin (DWRR) queues, and 4 thresholds (TX: 1p7q4t)</li> </ul>
<b>Scheduler</b>	DWRR and Shaped Round-Robin (SRR)
<b>Port buffers</b>	<ul style="list-style-type: none"> <li>1 MB plus 65 MB per port on ingress and 80 MB per port on egress for dedicated mode operation</li> <li>1 MB per port plus 65 MB shared per 4-port group on ingress and 80 MB per 4-port group on egress in shared mode</li> </ul>
<b>Jumbo frame support for bridged and routed packets</b>	Up to 9216 bytes
<b>Forwarding Engine: M1</b>	
<b>Performance</b>	60 Mpps Layer 2 and 3 IPv4 unicast and 30 Mpps IPv6 unicast
<b>MAC entries</b>	128K
<b>Forwarding Information Base (FIB) entries</b>	128K
<b>NetFlow entries</b>	512,000 shared (ingress plus egress)
<b>VLANs</b>	16,384 bridge domains and 4096 simultaneous VLANs per VDC
<b>ACLs</b>	64,000
<b>Policers</b>	16K
<b>Fabric Interface</b>	
<b>Switch fabric interface</b>	80 Gbps in each direction (160 Gbps full duplex) distributed across up to 5 fabric modules (80-Gbps throughput requires 2 or more fabric modules)
<b>OIR</b>	Online insertion and removal
<b>Environmental</b>	
<b>Physical dimensions</b>	<ul style="list-style-type: none"> <li>Occupies one I/O module slot in a Cisco Nexus 7000 Series chassis</li> <li>Dimensions (H x W x D): 1.733 x 15.3 x 21.9 in. (4.4 x 38.9 x 55.6 cm)</li> <li>Weight: 18.5 lb with SFP+ and 17 lb without SFP+ modules</li> </ul>
<b>Power consumption</b>	<ul style="list-style-type: none"> <li>Typical: 611 watts (W)</li> <li>Maximum: 750W</li> </ul>
<b>Environmental conditions</b>	<ul style="list-style-type: none"> <li>Operating temperature: 32 to 104°F (0 to 40°C)</li> <li>Operational relative humidity: 5 to 90%, noncondensing</li> <li>Storage temperature: -40F to 158°F (-40 to 70°C)</li> <li>Storage relative humidity: 5 to 95%, noncondensing</li> </ul>
<b>Regulatory compliance</b>	<ul style="list-style-type: none"> <li>EMC compliance</li> <li>FCC Part 15 (CFR 47) (USA) Class A</li> <li>ICES-003 (Canada) Class A</li> <li>EN55022 (Europe) Class A</li> <li>CISPR22 (International) Class A</li> <li>AS/NZS CISPR22 (Australia and New Zealand) Class A</li> <li>VCCI (Japan) Class A</li> <li>KN22 (Korea) Class A</li> <li>CNS13438 (Taiwan) Class A</li> <li>CISPR24</li> <li>EN55024</li> <li>EN50082-1</li> <li>EN61000-3-2</li> <li>EN61000-3-3</li> <li>EN61000-6-1</li> <li>EN300 386</li> </ul>

Item	Specifications
<b>Environmental standards</b>	<ul style="list-style-type: none"> <li>• NEBS criteria levels</li> <li>• SR-3580 NEBS Level 3 (GR-63-CORE, issue 3, and GR-1089-CORE, issue 4)</li> <li>• Verizon NEBS compliance</li> <li>• Telecommunications Carrier Group (TCG) Checklist</li> <li>• Qwest NEBS requirements</li> <li>• Telecommunications Carrier Group (TCG) Checklist</li> <li>• ATT NEBS requirements</li> <li>• ATT TP76200 level 3 and TCG Checklist</li> <li>• ETSI</li> <li>• ETSI 300 019-1-1, Class 1.2 Storage</li> <li>• ETSI 300 019-1-2, Class 2.3 Transportation</li> <li>• ETSI 300 019-1-3, Class 3.2 Stationary Use</li> </ul>
<b>Safety</b>	<ul style="list-style-type: none"> <li>• UL/CSA/IEC/EN 60950-1</li> <li>• AS/NZS 60950</li> </ul>
<b>Warranty</b>	Cisco Nexus 7000 Series Switches come with the standard Cisco 1-year limited hardware warranty

## Interface Distances

Table 3 summarizes the interfaces, cabling specifications, and distances of SFP+ optics supported by the Cisco Nexus 7000 M1-Series 32-Port 10 Gigabit Ethernet Module. 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 3.** 10 Gigabit Ethernet Interface Distances and Options<sup>1</sup>

10 Gigabit Ethernet SFP+ Part Number	Wavelength (nanometers)	Fiber and Cable Type	Core Size (microns)	Modal Bandwidth (MHz·km) <sup>2</sup>	Cable Distance <sup>3</sup>
<b>SFP-10G-SR</b>	850	<ul style="list-style-type: none"> <li>• Multimode fiber (MMF) (FDDI-grade)</li> <li>• MMF (OM1)</li> <li>• MMF (400/400)</li> <li>• MMF (OM2)</li> <li>• MMF (OM3)</li> <li>• MMF (OM4)</li> </ul>	<ul style="list-style-type: none"> <li>• 62.5</li> <li>• 62.5</li> <li>• 50.0</li> <li>• 50.0</li> <li>• 50.0</li> <li>• 50.0</li> </ul>	<ul style="list-style-type: none"> <li>• 160</li> <li>• 200</li> <li>• 400</li> <li>• 500</li> <li>• 2000</li> <li>• 4700</li> </ul>	<ul style="list-style-type: none"> <li>• 26m</li> <li>• 33m</li> <li>• 66m</li> <li>• 82m</li> <li>• 300m</li> <li>• 400m</li> </ul>
<b>SFP-10G-LR</b>	1310	<ul style="list-style-type: none"> <li>• Single-mode fiber (SMF)</li> </ul>	• G.652	-	• 10 km
<b>SFP-10G-ER</b>	1550	<ul style="list-style-type: none"> <li>• SMF</li> </ul>	• G.652	-	• 40 km <sup>4</sup>
<b>FET-10G</b>	850	<ul style="list-style-type: none"> <li>• MMF (OM2)</li> <li>• MMF (OM3)</li> <li>• MMF (OM4)</li> </ul>	<ul style="list-style-type: none"> <li>• 50.0</li> <li>• 50.0</li> <li>• 50.0</li> </ul>	<ul style="list-style-type: none"> <li>• 500</li> <li>• 2000</li> <li>• 4700 (OM4)</li> </ul>	<ul style="list-style-type: none"> <li>• 25m</li> <li>• 100m</li> <li>• 100m</li> </ul>
<b>SFP-H10GB-ACU7M</b>	-	<ul style="list-style-type: none"> <li>• Twinax cable, active, 30AWG cable assembly</li> </ul>	-	-	• 7m
<b>SFP-H10GB-ACU10M</b>	-	<ul style="list-style-type: none"> <li>• Twinax cable, active, 28AWG cable assembly</li> </ul>	-	-	• 10m

<sup>1</sup>. 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](http://www.cisco.com/en/US/prod/collateral/modules/ps5455/data_sheet_c78-455693.html).

<sup>2</sup>. Bandwidth is specified at transmission wavelength.

<sup>3</sup>. The minimum cabling distance for -SR, -LR, and -ER modules is 2m according to IEEE 802.3ae.

<sup>4</sup>. Links longer than 30 km are considered engineered links according to IEEE 802.3ae.

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## Ordering Information

To place an order, visit the [Cisco Ordering homepage](#). To download software, visit the [Cisco Software Center](#). Table 4 provides ordering information.

**Table 4.** Ordering Information

Product Name	Part Number
Cisco Nexus 7000 M1-Series 32-Port 10Gb Ethernet Module with 80Gbps Fabric (requires SFP+)	N7K-M132XP-12

## 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 provide long-term value. Cisco SMARTnet<sup>®</sup> 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 help 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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Americas Headquarters  
Cisco Systems, Inc.  
San Jose, CA

Asia Pacific Headquarters  
Cisco Systems (USA) Pte. Ltd.  
Singapore

Europe Headquarters  
Cisco Systems International BV Amsterdam,  
The Netherlands

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