

# Cisco Nexus 7000 M3-Series 24-Port 40 Gigabit Ethernet Module

The Cisco Nexus<sup>®</sup> 7000 M3-Series 24-Port 40 Gigabit Ethernet Module is a versatile I/O module with a comprehensive feature set that offers wire-rate performance on each port. The module provides deep buffers and high-capacity ternary content-addressable memory (TCAM), making this module an excellent choice for building high-density, low-latency, scalable data centers.

## Product Overview

Cisco Nexus 7000 Series Switches are the foundation of Cisco<sup>®</sup> Unified Fabric solutions. Designed to meet the requirements of mission-critical data centers, these switches deliver exceptional availability, outstanding scalability, and the proven and comprehensive Cisco NX-OS Software data center switching feature set.

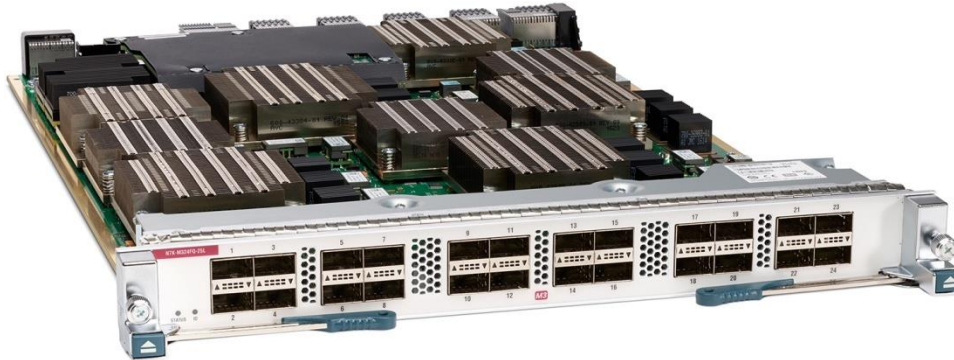
The first in the next generation of data center switching platforms, the Cisco Nexus 7000 Series provides integrated resilience combined with features optimized specifically for availability, reliability, scalability, and ease of management. The Cisco Nexus 7000 Series fabric architecture scales beyond 17 terabits per second (Tbps) and is designed to support high-density 10, 40, and 100 Gigabit Ethernet deployments. Table 1 summarizes the 40 Gigabit Ethernet port density of switches in this platform.

**Table 1.** Cisco Nexus 7000 Series Switches 40 Gigabit Ethernet Port Density

Cisco Nexus 7000 Series Chassis	Maximum Number of 40 Gigabit Ethernet Ports
Cisco Nexus 7000 18-Slot Switch	384
Cisco Nexus 7000 10-Slot Switch	192
Cisco Nexus 7000 9-Slot Switch	168
Cisco Nexus 7000 4-Slot Switch	48
Support for Cisco Nexus 7000 4-Slot Switch chassis will be available in a later Software Release	

The Cisco Nexus 7000 M3-Series 24-Port 40 Gigabit Ethernet Module (Figure 1) is a high-performance, high-density 40 Gigabit Ethernet module designed for the Cisco Nexus 7000 Series. It delivers up to 384 40 Gigabit Ethernet ports (2:1 oversubscribed) in a single Cisco Nexus 7000 18-Slot Switch chassis. The module delivers 720 million packets per second (mpps) of distributed Layer 2 and 3 forwarding and up to 550 Gbps of data throughput. A Cisco Nexus 7000 18-Slot Switch fully populated with sixteen 24-port 40 Gigabit Ethernet M3-Series modules can deliver up to 11.5 bpps and 15.4 Tbps of switching performance.

**Figure 1.** Nexus 7000 M3 24-Port 40G Card



## Features and Benefits

The Cisco Nexus 7000 M3-Series modules are powered by the proven and widely deployed NX-OS operating system. The modules integrate a broad set of data center switching technologies, including both industry standards and Cisco's own innovations such as these:

- General Packet Radio Service (GPRS) Tunneling Protocol (GTP) hashing: This feature uses the advanced packet parsing capabilities of the M3-Series modules to provide enhanced port-channel and equal-cost multipath (ECMP) load balancing for GTP packets.
- Virtual Extensible LAN (VXLAN): VXLAN enables organizations to build highly scalable virtual overlay networks for virtualized environments. It also provides the architectural flexibility and agility required to scale cloud deployments with repeatable pods in different Layer 2 domains and to migrate virtual machines between servers across Layer 3 networks.
- Advanced data center interconnect (DCI) protocols: Advanced protocols such as Cisco Overlay Transport Virtualization (OTV), Locator/ID Separation Protocol (LISP), Multiprotocol Label Switching (MPLS), and Virtual Private LAN Service (VPLS) offer customers a broad choice of technologies to transparently interconnect their data centers and to extend applications across geographically dispersed data center sites.
- Virtual device context (VDC): This feature enables the virtualization of a single physical device as multiple logical devices. Each provisioned logical device is configured and managed as if it were a separate physical device.
- Exceptional integrated hardware security capabilities:
  - MAC Security (MACsec) at wire rate with 128- and 256-bit encryption on all ports, supporting both key agreement protocols (Security Association Protocol [SAP] and MACsec Key Agreement [MKA]) in hardware
  - Cisco TrustSec<sup>®</sup> technology and access control list (ACL) processing for security-group tags (SGTs) on all ports
  - Control-Plane Policing (CoPP), which protects the supervisor CPU from excessive traffic
  - ACL counters and logging capability to provide deeper packet visibility
  - Layer 2-to-Layer 4 ACL for both IPv4 and IPv6 traffic

- Onboard fabric services accelerator (FSA): The accelerator provides higher performance and greater scalability for distributed fabric services such as Bidirectional Forwarding Detection (BFD) and Cisco NetFlow.
- Cisco FabricPath: This technology enables organizations to build resilient, flexible, and massively scalable Layer 2 networks. FabricPath provides investment protection by allowing existing spanning-tree-based deployments to be connected to a FabricPath network.
- Cisco Nexus 2000 Series Fabric Extenders: The Cisco Nexus 7000 M3-Series modules can be used with the Cisco Nexus 2000 Series Fabric Extenders. These fabric extenders are designed to simplify data center architecture and operations by dramatically reducing the number of points of management.

This broad set of foundational and advanced features available on the Cisco Nexus 7000 M3-Series 24-Port 40 Gigabit Ethernet Module provides flexible deployment options and investment protection for organizations that are consolidating their data centers and migrating to high-density 40 Gigabit Ethernet networks.

### 256-Bit AES Encryption

The Cisco Nexus 7000 M3-Series 24-Port 40 Gigabit Ethernet Module supports 256-bit Advanced Encryption Standard (AES) MACsec encryption on all ports at all speeds. This encryption can be used to secure:

- Data center uplinks to campus or MPLS cores
- DCI links when using OTV, virtual port channel (vPC), direct links, etc.
- vPC and FabricPath links within a data center

### High-Performance Fabric Services Accelerator

The Cisco Nexus 7000 M3-Series 24-Port 40 Gigabit Ethernet Module has an onboard high-performance coprocessor: a fabric services accelerator. The FSA is directly connected to the M3-Series switch on a chip (SoC) with high-speed links. This approach enables the module to provide higher performance and greater scalability for distributed fabric services such as BFD and NetFlow.

## Product Specifications

Table 2 summarizes the specifications for the Cisco Nexus 7000 M-Series 24-Port 40 Gigabit Ethernet Module.

**Table 2.** Product Specifications

Item	Specification
<b>System</b>	
<b>Product compatibility</b>	<ul style="list-style-type: none"> <li>• Supported on Cisco Nexus 7000 Series 4-, 9-, 10-, and 18-Slot Switch chassis</li> <li>• Supported with Cisco Fabric-2 modules</li> <li>• Supported with Cisco Nexus 7000 Supervisor 2 and Supervisor 2E Modules</li> </ul>
<b>Software compatibility</b>	Cisco NX-OS Software Release 8.0 or later
<b>Memory</b>	8 GB of dynamic RAM (DRAM)
<b>Front-panel LEDs</b>	<ul style="list-style-type: none"> <li>• Status <ul style="list-style-type: none"> <li>◦ Green (operational)</li> <li>◦ Orange (module booting)</li> <li>◦ Red (fault)</li> </ul> </li> <li>• Link <ul style="list-style-type: none"> <li>◦ Green (port enabled and connected)</li> <li>◦ Orange (port disabled)</li> <li>◦ Off (port enabled and not connected)</li> <li>◦ Blinking green and orange in conjunction with blue ID LED (port flagged for identification; beacon)</li> </ul> </li> </ul>

Item	Specification
	<ul style="list-style-type: none"> <li>• ID <ul style="list-style-type: none"> <li>◦ Blue (operator has flagged this card for identification; beacon)</li> <li>◦ Off (module not flagged)</li> </ul> </li> </ul>
<b>Programming interfaces</b>	<ul style="list-style-type: none"> <li>• Cisco NX-API</li> <li>• XML</li> <li>• Scriptable command-line interface (CLI)</li> <li>• Cisco Data Center Network Manager (DCNM) web services</li> <li>• Python and Tcl</li> <li>• Puppet and Chef</li> <li>• Cisco Embedded Event Manager (EEM)</li> </ul>
<b>Physical Interfaces</b>	
<b>Connectivity</b>	24 ports of 40 Gigabit Ethernet (Quad Enhanced Small Form-Factor Pluggable [QSFP+])
<b>Port density</b>	<ul style="list-style-type: none"> <li>• 384 x 10 Gigabit Ethernet ports in Cisco Nexus 7000 18-Slot chassis</li> <li>• 192 x 10 Gigabit Ethernet ports in Cisco Nexus 7000 10-Slot chassis</li> <li>• 168 x 10 Gigabit Ethernet ports in Cisco Nexus 7000 9-Slot chassis</li> <li>• 48 x 10 Gigabit Ethernet ports in Cisco Nexus 7000 4-Slot chassis<sup>1</sup></li> </ul>
<b>MACsec</b>	All 24 ports have built-in IEEE 802.1AE MACsec and an AES cipher with a 256-bit key
<b>Queues per port</b>	4 ingress and 8 egress
<b>Virtual output queuing (VOQ) buffer</b>	3 GB
<b>Jumbo frames</b>	Up to 9216 bytes for bridged and routed packets
<b>Forwarding Engine</b>	
<b>Forwarding performance</b>	720 mpps of Layer 2 and 3 forwarding capacity for both IPv4 and IPv6 packets
<b>MAC address entries</b>	384,000
<b>VLANs</b>	4096 per VDC
<b>IPv4 entries</b>	2 million
<b>IPv6 entries</b>	1 million
<b>ACLs</b>	128,000
<b>Policers</b>	8000
<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: 1.733 x 15.3 x 21.9 in. (4.4 x 38.9 x 55.6 cm)</li> <li>• Weight: 12 lbs</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: -40 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>• KN32 (Korea) Class A</li> <li>• KN35 (Korea) Class A</li> <li>• CNS13438 (Taiwan) Class A</li> <li>• TCVN 7189 (Vietnam)</li> <li>• CISPR24</li> <li>• EN55024</li> </ul>

Item	Specification
	<ul style="list-style-type: none"> <li>• EN50082-1</li> <li>• EN61000-3-2</li> <li>• EN61000-3-3</li> <li>• EN61000-6-1</li> <li>• EN300 386</li> </ul>
<b>Environmental standards</b>	Designed to meet: <ul style="list-style-type: none"> <li>• GR-1089-CORE<sup>*</sup></li> <li>• GR-63-CORE<sup>*</sup></li> <li>• ETSI<sup>*</sup> <ul style="list-style-type: none"> <li>◦ ETSI 300 019-2-1, Class 1.2 Storage</li> <li>◦ ETSI 300 019-2-2, Class 2.3 Transportation<sup>**</sup></li> <li>◦ ETSI 300 019-2-3, Class 3.2 Stationary Use</li> </ul> </li> </ul> <sup>*</sup> Validation in progress <sup>**</sup> Some exception apply
<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.

Table 3 summarizes distances and options for 40 Gigabit Ethernet interfaces.

**Table 3.** 40 Gigabit Ethernet Interface Distances and Options

Cisco 40 Gigabit Ethernet QSFP+ Module	Wavelength (nm)	Fiber and Cable Type	Core Size (microns)	Modal Bandwidth (MHz <sup>2</sup> Km) <sup>3</sup>	Connector Type	Cable Distance <sup>1</sup>
<b>QSFP-40G-SR4</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</li> </ul>	12-fiber MTP/MPO	<ul style="list-style-type: none"> <li>• 30m</li> <li>• 100m</li> <li>• 150m<sup>2</sup></li> </ul>
<b>QSFP-40G-SR-S</b>		<ul style="list-style-type: none"> <li>• MMF (OM3)</li> <li>• MMF (OM4)</li> </ul>	<ul style="list-style-type: none"> <li>• 50.0</li> <li>• 50.0</li> </ul>	<ul style="list-style-type: none"> <li>• 2000</li> <li>• 4700</li> </ul>	12-fiber MTP/MPO	<ul style="list-style-type: none"> <li>• 100m</li> <li>• 150m<sup>2</sup></li> </ul>
<b>QSFP-40G-CSR4</b>	850	<ul style="list-style-type: none"> <li>• MMF (OM1)</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>• 50.0</li> <li>• 50.0</li> <li>• 50.0</li> </ul>	<ul style="list-style-type: none"> <li>• 200</li> <li>• 500</li> <li>• 2000</li> <li>• 4700</li> </ul>	12-fiber MTP/MPO	<ul style="list-style-type: none"> <li>• 33m</li> <li>• 82m</li> <li>• 300m</li> <li>• 400m</li> </ul>
<b>QSFP-40G-SR-BD</b>	850/900	<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</li> </ul>	LC duplex	<ul style="list-style-type: none"> <li>• 30m</li> <li>• 100m</li> <li>• 150m<sup>2</sup></li> </ul>
<b>QSFP-40GE-LR4</b>	1310	Single-mode fiber (SMF)	G.652	-	LC Duplex	10 km
<b>QSFP-H40G-ACUxM (X=7 or 10)</b>	-	Direct-attach copper, active	-	-	QSFP+ to QSFP+	7 or 10m
<b>QSFP-H40G-AOCxM (x=1, 2, 3, 5, 7, 10, or 15)</b>	-	Active optical cable assembly	-	-	QSFP+ to QSFP+	1, 2, 3, 5, 7, 10, or 15m
<b>WSP-Q40GLR4L</b>	1310	SMF	G.652	-	LC	2 km
<b>QSFP-40G-LR4</b>	1310	SMF	G.652	-	LC	10 km
<b>QSFP-40G-LR4-S</b>	1310	SMF	G.652	-	LC	10 km
<b>QSFP-40G-ER4</b>	1310	SMF	G.652	-	LC	40 km <sup>4</sup>
<b>QSFP-4X10G-LR-S</b>	1310	SMF	G.652	-	MPO-12	10 km
<b>QSFP-4X10G-ACxM (x = 7, 10)</b>		Direct-attach copper cable assembly				7 or 10m
<b>QSFP-4X10G-AOCxM (x = 1, 2, 3, 5, 7, 10)</b>		Active optical cable assembly				1, 2, 3, 5, 7, or 10m

<sup>1</sup> Minimum cabling distance of 0.5m for -SR4 or -CSR4 modules and 2m for -LR4 modules according to the IEEE 802.3 standard

<sup>2</sup> Considered an engineered link with a maximum of 1 dB allocated to connectors and splice loss

<sup>3</sup> Specified at transmission wavelength

<sup>4</sup> Links longer than 30 km for the same link power budget are considered engineered links as per IEEE 802.3 Table 87-6. Depending on the link architecture, attenuation may be required to help ensure operation.

**Note:** Please refer to the Cisco 40GBASE QSFP Modules Data Sheet

([https://www.cisco.com/c/en/us/products/collateral/interfaces-modules/transceiver-modules/data\\_sheet\\_c78-660083.html](https://www.cisco.com/c/en/us/products/collateral/interfaces-modules/transceiver-modules/data_sheet_c78-660083.html)) for further details about these QSFP Modules.

**Note:** This data sheet describes the hardware capabilities of the Cisco Nexus 7000 M3-Series 24-Port 40 Gigabit Ethernet Module. Please refer to the Cisco NX-OS Software release notes (<https://www.cisco.com/c/en/us/support/switches/nexus-7000-series-switches/products-release-notes-list.html>) or consult your Cisco representative to confirm the current or future NX-OS release required for any of these features.

## Ordering Information

Table 4 provides ordering information for the Cisco Nexus 7000 M3-Series 24-Port 40 Gigabit Ethernet Module.

**Table 4.** Ordering Information

Part Number	Product Description
N7K-M324FQ-25L N7K-M324FQ-25L=	Cisco Nexus 7000 M3-Series 24-Port 40G Ethernet Module (req. QSFP+ modules)

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