

Cisco Nexus 7700 F3-Series 24-Port 40 Gigabit Ethernet Module

Product Overview

The Cisco Nexus[®] 7700 F3-Series 24-Port 40 Gigabit Ethernet Module (referred to as the 7700 F3-Series module in this document) offers outstanding feature flexibility and wire-rate performance on each port. The module enables the deployment of high-density, low-latency, scalable data center architecture.

Powering Cisco Unified Fabric Architecture

The Cisco Nexus 7000 Series Switches are the foundation of the Cisco[®] Unified Fabric solution. 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 Cisco Nexus 7700 platform is the latest extension to the 7000 Series modular switches. With more than 83 terabits per second (Tbps) of overall switching capacity, the 7700 platform delivers the highest-capacity 10, 40, and 100 Gigabit Ethernet ports in the industry, with up to 768 native 10-Gbps ports, 384 40-Gbps ports, and 192 100-Gbps ports. This high system capacity is designed to meet the scalability requirements of the largest cloud environments.

The 7700 platform switches have operation and feature consistency with the existing 7000 Series switches, using a common system architecture, the same application-specific integrated circuit (ASIC) technology, and the same proven NX-OS releases.

The 7700 F3-Series module (Figure 1) is a low-latency, high-performance, high-density 40 Gigabit Ethernet module designed for the 7700 platform to deliver up to 384 wire-rate 40 Gigabit Ethernet ports in a single Cisco Nexus 7700 18-Slot Switch chassis (Table 1).

Figure 1. Cisco Nexus 7700 F3-Series Module

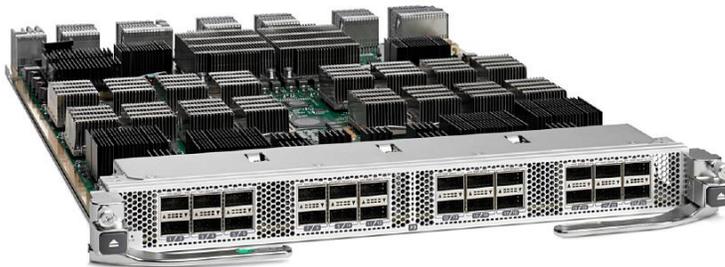


Table 1. Cisco Nexus 7700 Platform Switches with 40 Gigabit Ethernet Maximum Port Density

Cisco Nexus 7700 Chassis	Maximum Wire-Rate Port Density
Cisco Nexus 7700 18-Slot Switch	384
Cisco Nexus 7700 10-Slot Switch	192
Cisco Nexus 7700 6-Slot Switch	96

The 7700 F3-Series module is based on the Cisco Nexus F3-Series switch-on-a-chip (SoC) ASIC. This type of design increases performance while lowering the power and cooling requirements of the module. The F3-Series SoC is an innovative ASIC designed by Cisco and powered by a flexible packet engine, which makes it excellent for building the network infrastructure for public and private cloud environments. The F3-Series engine supports all the foundational networking protocols needed to build Layer 2 and Layer 3 networks, but it also can support highly virtualized environments, enabling virtual overlay networking with hardware support for Cisco Virtual Extensible LAN (VXLAN) and Locator/ID Separation Protocol (LISP) technologies. The 7700 F3-Series hardware enables customers to transparently interconnect their data centers with protocols such as Overlay Transport Virtualization (OTV) and Multiprotocol Label Switching (MPLS) and Virtual Private LAN Service (VPLS).

The module delivers 1.44 billion packets per second (bps) of distributed Layer 2 and Layer 3 forwarding and up to 960 Gbps of data throughput. A 7700 18-Slot Switch fully populated with the 7700 F3-Series module can deliver up to 23 bpps and 30.7 terabits per second (Tbps) of switching performance.

Features and Benefits

The 7700 F3-Series module integrates a broad set of data center switching technologies, including industry standards and Cisco's own innovations. It combines the benefits of classical fabric interface line cards with the advanced routing features of edge interface modules. With this integration, the module provides exceptional investment protection for organizations consolidating their data center environments while migrating to dense multiservice 40 Gigabit Ethernet networks.

- The 7700 F3-Series module is powered by the proven and comprehensive NX-OS feature set. This extremely comprehensive set of Layer 2 and Layer 3 functions makes this module excellent for data center networks, in which density, performance, and continuous system operation are critical.
- The 7700 F3-Series module is a critical enabler of Cisco FabricPath. With FabricPath, organizations can build resilient, flexible, and if needed, massively scalable Layer 2 networks. FabricPath protects enterprises' investments by allowing existing spanning-tree-based deployments to be connected to a FabricPath network.
- The 7700 F3-Series module can be used in conjunction with the Cisco Nexus 2000 Series Fabric Extenders (FEX). The 2000 Series is designed to simplify data center architecture and operations by dramatically reducing the number of points of management.
- The 7700 F3-Series module supports port breakout. Up to 19 of the 24 physical ports on the module can be configured in breakout mode, each becoming 4 logical and independent 10 Gigabit Ethernet ports. This breakout mode can be configured at any time on any port (up to 19 ports) independently from configuration of other ports and without the need to reload the module. When 19 ports of the module are configured in breakout mode, the other 5 ports remain available for establishing 40 Gigabit Ethernet links. Copper or fiber breakout assemblies are required to enable the physical separation of 10-Gigabit channels.
- The 7700 F3-Series module delivers integrated Fibre Channel over Ethernet (FCoE), greatly simplifying the network infrastructure and reducing costs by enabling the deployment of unified data center fabrics to consolidate data center traffic onto a single, general-purpose, high-performance, highly available network. With the 7700 F3-Series module, FCoE can be deployed in director-class modular platforms for the access layer and core of converged networks.
- The 7700 F3-Series module provides support for wire-rate VXLAN, offering the architectural flexibility needed to expand cloud deployments with repeatable pods in different Layer 2 domains. VXLAN can also enable migration of virtual machines between servers across Layer 3 networks.

- The support for advanced data center interconnect (DCI) protocols such as Cisco OTV and VPLS makes the module excellent for helping customers simplify the extension of applications across geographically dispersed data center sites.
- The 7700 F3-Series module supports high-performance MPLS for 40 Gigabit Ethernet data center deployments.
- Support for Cisco LISP enables enterprises and service providers to simplify multihomed routing and facilitates scalable any-to-any WAN connectivity while supporting data center virtual machine mobility.
- The virtual device context (VDC) feature helps enable the virtualization of a single physical device in one or more logical devices. Each provisioned logical device is configured and managed as if it were a separate physical device.
- The 7700 F3-Series module offers exceptional security with integrated hardware support for:
 - Configurable Control-Plane Policing (CoPP), which protects the supervisor CPU from excessive traffic
 - Access control list (ACL) counters and logging capability to provide deeper packet visibility
 - Layer 2 to Layer 4 ACL for both IPv4 and IPv6 traffic
 - Cisco TrustSec[®] technology and ACL processing for security group tags (SGTs)

Note: This document describes the capabilities of the 7700 F3-Series module hardware. Please consult your Cisco representative to confirm the appropriate NX-OS release required to enable these features.

Product Specifications

Table 2 lists product specifications for the 7700 F3-Series module. Table 3 lists specifications for Cisco transceivers installed in the module's Quad Small Form-Factor Pluggable Plus (QSFP+) ports to enable connectivity over the physical medium. Refer to the release notes for up-to-date software version information to see which optics and copper assemblies are supported. Complete information about supported transceivers can be found at http://www.cisco.com/en/US/products/hw/modules/ps5455/prod_models_home.html.

Table 2. Product Specifications

Item	Specifications
System	
Product compatibility	Supported on Cisco Nexus 7700 2-, 6-, 10-, and 18-Slot Switch chassis.
Software compatibility	Contact your local account representative for software release availability
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), 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"> • XML • Scriptable command-line interface (CLI) • Cisco Data Center Network Manager (DCNM) web services • Python • Tool Command Language (TCL) Interpreter • Cisco Embedded Event Manager (EEM) • Cisco One Platform Kit (OnePK[™]) • OpenFlow

Item	Specifications
Physical Interfaces	
Connectivity	24 ports of 40 Gigabit Ethernet (QSFP+)
Maximum port density	<ul style="list-style-type: none"> • 384 ports of 40 Gigabit Ethernet in 7700 18-Slot chassis • 192 ports of 40 Gigabit Ethernet in 7700 10-Slot chassis • 96 ports of 40 Gigabit Ethernet in 7700 6-Slot chassis
Queues per port	4 ingress, and 8 egress
VOQ buffer	144 MB per module
Jumbo frame support for bridged and routed packets	Up to 9216 bytes
SoC	
Forwarding performance	1.44 bpps of Layer 2 and Layer 3 forwarding capacity for both IPv4 and IPv6 packets
MAC address entries	64,000
VLAN	4096 simultaneous VLANs per VDC
IPv4 entries	64,000
IPv6 entries	32,000
Adjacency entries	64,000
ACLs	16,000
CoPP	Supported
Environmental	
Physical dimensions	<ul style="list-style-type: none"> • Occupies one I/O module slot in a 7700 platform chassis • Dimensions: 1.75 x 15.9 x 21.8 in. (4.4 x 40.39 x 55.37 cm) • Weight: 17 lb (7.7 kg)
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"> • EMC compliance • 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 • CNS13438 (Taiwan) Class A • CISPR24 • EN55024 • EN50082-1 • EN61000-3-2 • EN61000-3-3 • EN61000-6-1 • EN300 386

Item	Specifications
Environmental standards	<ul style="list-style-type: none"> • NEBS criteria levels[*] <ul style="list-style-type: none"> ◦ SR-3580 NEBS Level 3 (GR-63-CORE and GR-1089-CORE) • Verizon NEBS compliance[*] <ul style="list-style-type: none"> ◦ Telecommunications Carrier Group (TCG) Checklist • Century Link NEBS requirements[*] <ul style="list-style-type: none"> ◦ Telecommunications Carrier Group (TCG) Checklist • ATT NEBS requirements[*] <ul style="list-style-type: none"> ◦ ATT TP76200 level 3 • ETSI[*] <ul style="list-style-type: none"> ◦ ETSI 300 019-2-1, Class 1.2 Storage ◦ ETSI 300 019-2-2, Class 2.3 Transportation ◦ ETSI 300 019-2-3, Class 3.2 Stationary Use <p>[*] Validation in Progress</p>
Safety	<ul style="list-style-type: none"> • UL/CSA/IEC/EN 60950-1 • AS/NZS 60950
Warranty	The 7700 platform switches come with the standard Cisco 1-year limited hardware warranty

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 km) ³	Connector Type	Cable Distance ¹
QSFP-40G-SR4	850	MMF (OM2) MMF (OM3) MMF (OM4)	50.0/500 50.0/2000 50.0/4700	12-fiber MTP/MPO	30m 100m 150m ²
QSFP-40G-SR4-S	850	MMF (OM3) MMF (OM4)	50.0/2000 50.0/4700	12-fiber MTP/MPO	100m 150m ²
QSFP-40G-CSR4	850	MMF (OM1) MMF (OM2) MMF (OM3) MMF (OM4)	62.5/200 50.0/500 50.0/2000 50.0/4700	12-fiber MTP/MPO	33m 82m 300m 400m
QSFP-40G-SR-BD	850/900	MMF (OM2) MMF (OM3) MMF (OM4)	50.0/500 50.0/2000 50.0/4700	LC duplex	30m 100m 150m ²
FET-40G	850	MMF (OM2) MMF (OM3) MMF (OM4)	50.0/500 50.0/2000 50.0/4700	12-fiber MTP/MPO	30m 100m 150m ²
WSP-Q40GLR4L	1310	SMF	G.652/-	LC	2km
QSFP-40GE-LR4	1310	SMF	G.652/-	LC	10km
QSFP-40G-LR4	1310	SMF	G.652/-	LC	10 km
QSFP-40G-LR4-S	1310	SMF	G.652/-	LC	10 km
QSFP-40GE-ER4	1310	SMF	G.652/-	LC	40km ⁴
QSFP-4X10G-LR-S	1310	SMF	G.652/-	MPO-12	10km
QSFP-H40G-ACxM (X=7 or 10)	-	Direct-attach copper, active	-	QSFP+ to QSFP+	7 or 10m
QSFP-4X10G-ACxM (x=7 or 10)	-	Direct-attach breakout copper, active	-	QSFP+ to 4 SFP+	7or 10m
QSFP-H40G-AOCxM (x=1, 2, 3, 5, 7, or 10)	-	Active optical cable assembly	-	QSFP+ to QSFP+	1, 2, 3, 5, 7, or 10m
QSFP-4X10G-AOCxM (x=1, 2, 3, 5, 7 or 10)	-	Active Optical breakout Cable assembly	-	QSFP+ to 4 SFP+	1, 2, 3, 5, 7 or 10m

¹ Minimum cabling distance of 0.5m for -SR4 and -CSR4 modules, and 2m for -LR4 modules, according to the IEEE 802.3 standard

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

³ Specified at transmission wavelength

⁴ 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

(http://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 7700 M3-Series 24-Port module. Please refer to the Cisco NX-OS Software release notes (<http://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

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
Nexus 7700 F3-Series 24-Port 40G Ethernet Module (req. QSFP+ modules)	N77-F324FQ-25 N77-F324FQ-25=
Fibre Channel over Ethernet (FCoE) for Cisco Nexus 7700 F3 Series 24-port 40-Gigabit Ethernet QSFP+ module (and spare)	N77-FCOE-F324FQ N77-FCOE-F324FQ=

Service and Support

Cisco offers a wide range of services to help accelerate your success in deploying and optimizing the Cisco Nexus 7700 platform 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 operating 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[®] 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 7700 platform switch. Spanning the entire network lifecycle, Cisco Services helps increase investment protection, optimize network operations, support migration, and strengthen your IT expertise. For more information about Cisco Data Center Services, visit <http://www.cisco.com/go/dcservices>.

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For More Information

For more information about the Cisco Nexus 7700 platform, visit the product homepage at <http://www.cisco.com/go/nexus> or contact your local account representative.



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