

Cisco Nexus 7700 F3-Series 48-Port Fiber 1 and 10 Gigabit Ethernet Module

Product Overview

The Cisco Nexus[®] 7700 F3-Series 48-Port Fiber 1 and 10 Gigabit Ethernet Module (referred to as the 7700 F3-Series module in this document) offers wire-rate performance on each port. As a result, enterprises can use it to deploy a high-density, low-latency, scalable architecture for powering a mission-critical data center.

Powering Cisco Unified Fabric Architecture

The Cisco Nexus 7000 Series Switches are the foundation of the Cisco[®] Unified Fabric solution. The switches deliver exceptional availability and scalability and run 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's operation and features are consistent with the existing 7000 Series switches. Both platforms use the same 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 1 and 10 Gigabit Ethernet module designed for the 7700 platform. It delivers up to 768 wire-rate 10 Gigabit Ethernet ports in a single Cisco Nexus 7700 18-Slot Switch chassis (Table 1).

Figure 1. Cisco Nexus 7700 F3-Series Module

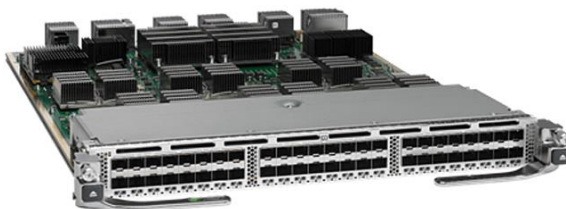


Table 1. Cisco Nexus 7700 Platform Switches 10 Gigabit Ethernet Maximum Port Density

Cisco Nexus 7700 Chassis	Maximum Wire-Rate Port Density
Cisco Nexus 7700 18-Slot Switch	768
Cisco Nexus 7700 10-Slot Switch	384
Cisco Nexus 7700 6-Slot Switch	192
Cisco Nexus 7700 2-Slot Switch	48

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 that makes it particularly suitable for building the network infrastructure of 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. It can thus enable 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 720 million packets per second (mpps) of distributed Layer 2 and Layer 3 forwarding and up to 480 Gbps of data throughput. A 7700 18-Slot Switch fully populated with the 7700 F3-Series module can deliver up to 11.5 billion packets per second (bpps) and 15.4 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 classic 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 10 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 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 of 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 10 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, including line-rate data confidentiality, data integrity, and ACL processing for security group tags (SGTs); data confidentiality and integrity conforming to the IEEE MAC security standard (IEEE 802.1AE MACsec) is supported on a subset of ports: more specifically, ports 41 to 48 (the rightmost eight ports) on the module support the Advanced Encryption Standard (AES) cipher, using a 128-bit key

Note: This document describes capabilities of the 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. Tables 3 and 4 list specifications for Cisco transceivers installed in the module's Small Form-Factor Pluggable (1-Gbps SFP and 10-Gbps Enhanced SFP [SFP+]) ports to enable connectivity over multimode fiber (MMF), single-mode fiber (SMF), or copper cabling. 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 https://www.cisco.com/en/US/products/hw/modules/ps5455/prod_models_home.html.

Table 2. Product Specifications

Item	Specification
System	
Product compatibility	Supported in all 7700 platform chassis
Software compatibility	Cisco NX-OS Software Release 6.2.6 or later
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	Specification
Physical Interfaces	
Connectivity	48 ports of 1 and 10 Gigabit Ethernet (SFP and SFP+)
Maximum port density	<ul style="list-style-type: none"> • 768 ports of 10 Gigabit Ethernet in 7700 18-Slot chassis • 384 ports of 10 Gigabit Ethernet in 7700 10-Slot chassis • 192 ports of 10 Gigabit Ethernet in 7700 6-Slot chassis • 48 ports of 1 and 10 gigabit Ethernet in 7700 2-Slot chassis
Queues per port	4 ingress and 8 egress
Virtual output queue (VOQ) buffer	72 MB per module
Jumbo frame support for bridged and routed packets	Up to 9216 bytes
SoC	
Forwarding performance	720 mpps 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: 17lb (7.7kg)
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	Specification
Environmental standards	<ul style="list-style-type: none"> • NEBS criteria levels* • SR-3580 NEBS Level 3 (GR-63-CORE and GR-1089-CORE) • Verizon NEBS compliance* • Telecommunications Carrier Group (TCG) Checklist • Century Link NEBS requirements* • Telecommunications Carrier Group (TCG) Checklist • ATT NEBS requirements* • ATT TP76200 level 3 • ETSI* • 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 * Validation in progress
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. 10 Gigabit Ethernet Interface Distances and Options

10 Gigabit Ethernet SFP+ Part Number	Wavelength (nanometers)	Fiber and Cable Type	Core Size (microns)	Model Bandwidth (MHz per km) ¹	Cable Distance ²
SFP-10G-SR SFP-10G-SR-S⁷	• 850	<ul style="list-style-type: none"> • MMF (FDDI-grade) • MMF (OM1) • MMF (400/400) • MMF (OM2) • MMF (OM3) • MMF (OM4) 	<ul style="list-style-type: none"> • 62.5 • 62.5 • 50.0 • 50.0 • 50.0 • 50.0 	<ul style="list-style-type: none"> • 160 • 200 • 400 • 500 • 2000 • 4700 	<ul style="list-style-type: none"> • 26m • 33m • 66m • 82m • 300m • 400m
SFP-10G-LRM⁴	• 1310	<ul style="list-style-type: none"> • MMF⁶ • SMF 	<ul style="list-style-type: none"> • 62.5 • 50 • 50 	<ul style="list-style-type: none"> • 500 • 400 • 500 	<ul style="list-style-type: none"> • 220m • 100m • 220m • 300m
SFP-10G-LR SFP-10G-LR-S⁷	• 1310	<ul style="list-style-type: none"> • SMF 	<ul style="list-style-type: none"> • G.652 	<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • 10 km
FET-10G	• 850	<ul style="list-style-type: none"> • MMF (OM2) • MMF (OM3, OM4) 	<ul style="list-style-type: none"> • 50 • 50 	<ul style="list-style-type: none"> • 500 • 2000 	<ul style="list-style-type: none"> • 25m • 100m
SFP-10G-ER⁸ SFP-10G-ER-S^{7, 8}	• 1550	<ul style="list-style-type: none"> • SMF 	<ul style="list-style-type: none"> • G.652 	<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • 40 km³
SFP-10G-ZR SFP-10G-ZR-S^{7, 9}	• 1550	<ul style="list-style-type: none"> • SMF 	<ul style="list-style-type: none"> • G.652 	<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • 80 km
DWDM-SFP10G-xx.xx=	• ⁵	<ul style="list-style-type: none"> • SMF 	<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • ⁶
SFP-H10GB-CUxM (x=1, 3, or 5)	• -	<ul style="list-style-type: none"> • Twinax cable assembly, passive 	<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • 1, 3, or 5m
SFP-H10GB-ACUxM (x=7 or 10)	• -	<ul style="list-style-type: none"> • Twinax cable assembly, active 	<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • 7 or 10m
SFP-10G-AOCxM (x=1, 2, 3, 5, 7, or 10)	• -	<ul style="list-style-type: none"> • Active optical cable assembly 	<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • - 	<ul style="list-style-type: none"> • 1, 2, 3, 5, 7, or 10m

¹ Bandwidth is specified at the transmission wavelength

² Minimum cabling distance for -SR, -LRM, -LR, and -ER modules is 2m, according to IEEE 802.3ae

³ Links longer than 30 km are considered engineered links according to IEEE 802.3ae

⁴ See the dense wavelength-division multiplexing (DWDM) SFP optics data sheet for additional product numbers and information: https://www.cisco.com/en/US/prod/collateral/modules/ps5455/ps6576/data_sheet_c78-711186.html.

⁵ FCoE traffic is supported up to 80 km

⁶ A mode-conditioning patch is required for use over traditional MMF types such as FDDI-grade, OM1, and OM2. Please refer to the product bulletin: https://www.cisco.com/en/US/prod/collateral/modules/ps5455/product_bulletin_c25-530836.html. Note that MMF support with SFP-10G-LRM is on ports 41 to 48 only. 300m SMF support is applicable to all ports

⁷ No Fibre Channel over Ethernet (FCoE) support

⁸ Requires 5-dB 1550-nm fixed loss attenuator for greater than 20 km. Attenuator is available as a spare

⁹ Requires 15dB attenuator if Link Distance < 5km

Requires 10dB attenuator if Link Distance is between 5km and 25km

Requires 5dB attenuator if Link Distance is between 25km and 45km

Attenuator is available as a spare

Table 4. Gigabit Ethernet Interface Distances and Options

Gigabit Ethernet SFP Part Number	Wavelength (nm)	Fiber and Cable Type	Core Size (microns)	Model Bandwidth (MHz per km)	Cable Distance
GLC-SX-MMD	• 850	<ul style="list-style-type: none"> • MMF (FDDI-grade) • MMF (OM1) • MMF (400/400) • MMF (OM2) • MMF (OM3 and OM4) 	<ul style="list-style-type: none"> • 62.5 • 62.5 • 50 • 50 • 50 	<ul style="list-style-type: none"> • 160 • 200 • 400 • 500 • 2000 	<ul style="list-style-type: none"> • 220m • 275m • 500m • 550m • 1000m
GLC-LH-SMD	• 1310	• MMF ¹	<ul style="list-style-type: none"> • 62.5 • 50 • 50 	<ul style="list-style-type: none"> • 500 • 400 • 500 	<ul style="list-style-type: none"> • 550m • 550m • 550m
		• SMF	• G.652	• -	• 10 km
GLC-EX-SMD	• 1310	• SMF	• G.652	• -	• 40 km
GLC-ZX-SMD	• 1550	• SMF	• G.652	• -	• 70 to 100 km ²
GLC-T SFP-GE-T	• -	• Category 5	• -	• -	• 100m
GLC-BX-U	• 1310	• SMF	• G.652	• -	• 10 km
GLC-BX-D	• 1490	• SMF	• G.652	• -	• 10 km
CWDM-SFP-1xxx=	• ³	• SMF	• -	• -	• -
DWDM-SFP-xxxx=	• ⁴	• SMF	• -	• -	• -

¹ A mode-conditioning patch is required for use over traditional MMF types such as FDDI-grade, OM1, and OM2. Please refer to the product bulletin: https://www.cisco.com/en/US/prod/collateral/modules/ps5455/product_bulletin_c25-530836.html.

² 1000BASE-ZX SFP can reach up to 100 km by using dispersion-shifted SMF or low-attenuation SMF; the distance depends on the fiber quality, number of splices, and connectors.

³ This option is also offered in other wavelengths. See the coarse wavelength-division multiplexing (CWDM) SFP optics data sheet for additional product numbers and information: https://cisco.com/en/US/prod/collateral/modules/ps5455/ps6575/product_data_sheet09186a00801a557c.html.

⁴ This option is also offered in other wavelengths. See the dense wavelength-division multiplexing (DWDM) SFP optics data sheet for additional product numbers and information: https://cisco.com/en/US/prod/collateral/modules/ps5455/ps6576/product_data_sheet0900aecd80582763.html.

Note: This data sheet describes the hardware capabilities of the Cisco Nexus 7700 F3-Series 48-Port 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

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

Description	Part Number
Nexus 7700 F3-Series 48-Port Fiber 1 and 10G Ethernet Module (req. SFP/SFP+ modules)	N77-F348XP-23 N77-F348XP-23=
Fibre Channel over Ethernet (FCoE) for Cisco Nexus 7700 F3 Series 48-port 10-Gigabit Ethernet SFP+ module (and spare)	N77-FCOE-F348XP N77-FCOE-F348XP=

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 Smart Net Total Care™ 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 <https://www.cisco.com/go/dcservices>.

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