Cisco Nexus 7700 F2-Series Enhanced 48-Port Fiber 1 and 10 Gigabit Ethernet Module

Product Overview

The Cisco Nexus® 7700 F2-Series Enhanced 48-Port Fiber 1 and 10 Gigabit Ethernet Module (referred to as the Cisco Nexus 7700 F2e-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's 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 Cisco Nexus 7000 Series modular switches. With more than 83 terabits per second (Tbps) of overall switching capacity, the Cisco Nexus 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 Cisco Nexus 7700 switches have operation and feature consistency with the existing Cisco Nexus 7000 Series Switches, using a common system architecture, the same application-specific integrated circuit (ASIC) technology, and the same proven Cisco NX-OS Software releases.

The Cisco Nexus 7700 F2e-Series module (Figure 1) is a low-latency, high-performance, high-density 10 Gigabit Ethernet module designed for the Cisco Nexus 7700 platform to deliver up to 768 wire-rate 10 Gigabit Ethernet ports in a single Cisco Nexus 7700 18-Slot Switch chassis (Table 1).

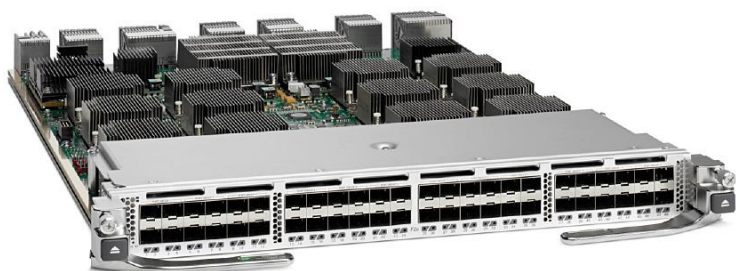**Figure 1.**   Cisco Nexus 7700 F2e-Series Module

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

The Cisco Nexus 7700 F2e-Series module is built on a switch-on-chip (SoC) architecture, in which a single ASIC implements all the module functions, including ingress buffering, forwarding of lookup operations, management of access control lists (ACLs) and quality-of-service (QoS) tables, establishment of lossless links to fabric interfaces, and traffic load balancing through virtual output queues (VOQs). This type of design increases performance while lowering the power and cooling requirements of the module. 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 Cisco Nexus 7700 18-Slot Switch fully populated with the Cisco Nexus 7700 F2e-Series module has the capability to deliver up to 11.5 billion packets per second (bpps) and 15.4 Tbps of switching performance.

Features and Benefits

The module protects investments with standards-based 10 Gigabit Ethernet that allows IT departments to consolidate networks based on their own unique requirements and timing:

- Each port can also be used at 1 Gigabit Ethernet speed, allowing IT departments to migrate to 10 Gigabit Ethernet according to the specific needs of their networks.

- The Cisco Nexus 7700 F2e-Series module includes classic Layer 2 and Layer 3 forwarding, powered by the proven and comprehensive Cisco 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 Cisco Nexus 7700 F2e-Series module is a key enabler of Cisco FabricPath. With Cisco FabricPath, organizations can build resilient, flexible, and if needed, massively scalable Layer 2 networks. Cisco FabricPath protects enterprises' investments by allowing existing spanning-tree-based deployments to be connected to a Cisco FabricPath network.

- The Cisco Nexus 7700 F2e-Series module can be used in conjunction with the Cisco Nexus 2000 Series Fabric Extenders. The Cisco Nexus 2000 Series Fabric Extenders (FEX) are designed to simplify data center architecture and operations by dramatically reducing the number of points of management.

- The Cisco Nexus 7700 F2e-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 Cisco Nexus 7700 F2e-Series module, FCoE can be deployed in director-class modular platforms for the access layer and core of converged networks. (FCoE functionality is supported on all Nexus 7700 platforms, except for Nexus 7706 for which the support will be enabled in a future software release).

- 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 Cisco Nexus 7700 F2e-Series module offers exceptional security with integrated hardware support for:
  - Configurable control-plane policing (CoPP), which protects the supervisor CPU from excessive traffic
  - ACL counters and logging capability to allow administrators to see what traffic is policed
  - 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 leftmost eight ports) on the module support the Advanced Encryption Standard (AES) cipher, using a 128-bit key

Product Specifications

Table 2 lists product specifications for the Cisco Nexus 7700 F2e-Series module. Tables 3 and 4 list specifications for transceivers. Refer to the release notes for up-to-date software version information to verify the optics that 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 6-, 10-, and 18-Slot Switch chassis
Software compatibility	Cisco NX-OS Software Release 6.2.2 or later
Front-panel LEDs	• 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	• 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
Physical Interfaces	
Connectivity	48 ports of 1 and 10 Gigabit Ethernet (Small Form-Factor Pluggable [SFP] or Enhanced SFP [SFP+] optics modules)
Maximum port density	• 768 ports of 1 and 10 Gigabit Ethernet in Cisco Nexus 7700 18-Slot chassis • 384 ports of 1 and 10 Gigabit Ethernet in Cisco Nexus 7700 10-Slot chassis • 192 ports of 1 and 10 Gigabit Ethernet in Cisco Nexus 7700 6-Slot chassis
Queues per port	Configurable template-based queuing modes: • Ingress (4q1t and 2q1t) • Egress (1p3q1t, 2p2q1t, and 3p1q1t)
VOQ buffer	• Enables fairness when one or more destinations is congested and provides support for lossless unified fabric • 72 MB per module
Scheduler	Deficit-Weighted Round-Robin (DWRR)
Jumbo frame support for bridged and routed packets	Up to 9216 bytes

Item	Specifications
SoC	
Performance	720-mpps Layer 2 and Layer 3 forwarding capacity for both IPv4 and IPv6 packets
MAC address entries	16K
VLAN	4096 simultaneous virtual LANs (VLANs) per VDC
IPv4 entries	32K
IPv6 entries	16K
Adjacency entries	16K
ACLs	16K
FCoE features[1]	• T11 VF-, VN-, and VE-port for multihop FCoE • T11 FCoE Initialization Protocol (FIP) • Fibre Channel Forwarder (FCF)
Advanced FCoE features[1]	• Virtual SANs (VSANs) • Inter-VSAN Routing (IVR) • PortChannels (up to 16 links) • SAN trunking • Storage VDC
Policers	1024
Control-Plane Policing (CoPP)	Supported
Sampled NetFlow	Up to 256 programmable sampling rates
Online insertion and removal (OIR)	Supported
IEEE Data Center Bridging (DCB)	
• Priority-based flow control (PFC): IEEE P802.1Qbb • Enhanced transmission selection (ETS): IEEE P802.1Qaz • Data Center Bridging Exchange (DCBX)	
Environmental	
Physical dimensions	• Occupies one I/O module slot in a Cisco Nexus 7700 chassis • Dimensions (H x W x D): 1.75 x 15.9 x 21.8 in. (4.4 x 40.39 x 55.37 cm) • Weight: 17lb (7.7kg)
Power consumption	• Typical: 400 watts (W) • Maximum: 500W
Environmental conditions	• 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	• 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	• 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/CSA/IEC/EN 60950-1 • AS/NZS 60950
Warranty	Cisco Nexus 7700 platform switches come with the standard Cisco 1-year limited hardware warranty

[1] FCoE Support for Nexus 7706 will be enabled in future Software release.

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-S	850	• MMF (FDDI-grade) • MMF (OM1) • MMF (400/400) • MMF (OM2) • MMF (OM3) • MMF (OM4)	• 62.5 • 62.5 • 50.0 • 50.0 • 50.0 • 50.0	• 160 • 200 • 400 • 500 • 2000 • 4700	• 26m • 33m • 66m • 82m • 300m • 400m
SFP-10G-LRM	1310	• MMF[6]	• 62.5 • 50 • 50	• 500 • 400 • 500	• 220m • 100m • 220m
		• SMF	G.652	-	• 300m
SFP-10G-LR SFP-10G-LR-S	1310	• SMF	G.652	-	• 10 km
FET-10G	850	• MMF (OM2) • MMF (OM3 and OM4)	• 50 • 50	• 500 • 2000	• 25m • 100m
SFP-10G-ER SFP-10G-ER-S	1550	• SMF	G.652	-	40 km[3]
SFP-10G-ZR SFP-10G-ZR-S	1550	• SMF	G.652		80 km
DWDM-SFP10G-xx.xx=	[4]	• SMF			[5]
SFP-H10GB-CUxM (x=1, 3, or 5)	-	• Twinax cable assembly, passive	-	-	1, 3, or 5m
SFP-H10GB-ACUxM (x=7 or 10)	-	• Twinax cable assembly, active	-	-	7 or 10m
SFP-10G-AOCxM (x=1, 2, 3, 5, 7, or 10)	-	• Active optical cable assembly	-	-	1, 2, 3, 5, 7, or 10m

[1] Bandwidth is specified at 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] 40 different wavelengths are offered. See the dense wavelength-division multiplexing (DWDM) SFP optics data sheet for additional product numbers and information: http://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: http://www.cisco.com/en/US/prod/collateral/modules/ps5455/product_bulletin_c25-530836.html.

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	MMF (FDDI-grade) MMF (OM1) MMF (400/400) MMF (OM2) MMF (OM3 and OM4)	62.5 62.5 50 50 50	160 200 400 500 2000	220m 275m 500m 550m 1000m
GLC-LH-SMD	1310	MMF[1]	62.5 50 50	500 400 500	550m 550m 550m
		SMF	G.652	-	10 km
GLC-EX-SMD	1310	SMF	G.652	-	40km
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 legacy traditional MMF types such as FDDI-grade, OM1, and OM2. Please refer to the product bulletin: http://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 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: http://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: http://cisco.com/en/US/prod/collateral/modules/ps5455/ps6576/product_data_sheet0900aecd80582763.html.

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

Product Name	Part Number
Nexus 7700 F2e-Series 48-Port 1 and 10G Ethernet Module (req. SFP/SFP+ modules)	N77-F248XP-23E N77-F248XP-23E=
Fibre Channel over Ethernet (FCoE) for Cisco Nexus 7700 Enhanced F2E Series 48 Port 10G (SFP+) (and spare)	N77-FCOE-F248XP N77-FCOE-F248XP=

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 Cisco Nexus 7700 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 switches, visit the product homepage at http://www.cisco.com/go/nexus or contact your local account representative.

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