Cisco Nexus 7000 F1-Series 32-Port 1 and 10 Gigabit Ethernet Module

Product Overview

The Cisco Nexus® 7000 Series 32-Port 1 and 10 Gigabit Ethernet Module offers outstanding flexibility and performance, with extensive virtualization and multipath capabilities. The module enables the deployment of high-density, low-latency, scalable data center architectures.

The Cisco Nexus 7000 Series 32-Port 1 and 10 Gigabit Ethernet Module (Figure 1) is the first of the Cisco Nexus 7000 F-Series Ethernet modules, extending the capabilities of the Cisco Nexus 7000 Series in the data center. Powered by the F1 Forwarding Engine, the module delivers 480 million packets per second (Mpps) of distributed Layer 2 forwarding and up to 320 Gbps of data throughput through a custom dedicated forwarding application-specific integrated circuit (ASIC), enabling the creation of extensible data centers. A Cisco Nexus 7000 18-Slot Switch fully populated with Cisco Nexus 32-Port 1 and 10 Gigabit Ethernet Modules has the capability to deliver up to 10.2 terabits per second (Tbps) of switching performance, with a typical power consumption of less than 10 watts (W) per port.

Figure 1. Cisco Nexus 7000 Series 32-Port 1 and 10 Gigabit Ethernet Fabric Module

Powerful access control list (ACL) processing supports 32,000 per module, ingress and egress, with the ACL entries addressing Layer 2, 3, and 4 fields. The F1 forwarding engine also supports applications requiring port mirroring with integrated hardware support for 16 simultaneous unidirectional switched-port analyzer (SPAN) sessions per module. Additionally, the F-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 7000 F-Series module, FCoE can be deployed in director-class modular platforms for the access and core of converged networks. In addition to FCoE host and target support, the module provides VE-port support, allowing creating of FCoE Inter-Switch Links (ISLs) and enabling scalable, multi-hop FCoE topologies. The FCoE traffic in a Cisco Nexus 7000 Series Switch can be segmented using a dedicated storage virtual device context (VDC), providing isolation within the shared physical infrastructure. Cisco Nexus 7000 Series FCoE converged networks can be transparently bridged to Cisco® MDS 9500 Series Fibre Channel SANs with the Cisco MDS 10-Gbps 8-Port FCoE Module. This capability preserves existing and continued investments in Fibre Channel SANs and offers a single unified OS (Cisco NX-OS Software) and management platform (Cisco Data Center Network Manager [DCNM]) for both the LAN and SAN.

The Cisco Nexus 7000 F-Series modules, when combined with the powerful Cisco NX-OS Software, deliver Cisco FabricPath multipath Ethernet technologies based on IETF Transparent Interconnection of Lots of Links (TRILL). Cisco FabricPath comprises a set of multipath Ethernet technologies combines the reliability and scalability benefits of Layer 3 routing with the flexibility of Layer 2 Ethernet networks. With Cisco FabricPath, organizations can now build massively scalable, flexible networks that efficiently use available bandwidth between nodes, offering improved network resiliency.

Cisco FabricPath offers a topology-based Layer 2 routing mechanism that provides an equal-cost multipath (ECMP) forwarding model. Cisco FabricPath implements an enhancement that resolves the MAC address table scalability challenge characteristic of switched Layer 2 networks. Enhanced virtual PortChannel (vPC+) is another technology offered by Cisco FabricPath. Similar to vPC, vPC+ allows the redundant interconnection of the existing Ethernet infrastructure to a Cisco FabricPath fabric without relying on Spanning Tree Protocol.

The benefits of Cisco FabricPath include:

- Operational simplicity: Cisco FabricPath embeds an autodiscovery mechanism that does not require any additional platform configuration. By offering Layer 2 connectivity, this “VLAN anywhere” characteristic simplifies provisioning and offers workload flexibility across the network.
- High resiliency and performance: Since Cisco FabricPath is a Layer 2 routed protocol, it offers stability, scalability, and optimized resiliency along with network failure containment.
- Massively scalable fabric: By building a forwarding model on 16-way ECMP, Cisco FabricPath helps prevent bandwidth bottlenecks and allows capacity to be added dynamically, without network disruption.

The Cisco Nexus 7000 Series 32-Port 1 and 10 Gigabit Ethernet Module delivers up to 512 ports per chassis, capable of flexibly supporting both Gigabit and 10 Gigabit Ethernet on a per-port basis. Both Small Form-Factor Pluggable (SFP) and Enhanced SFP (SFP+) optics are available for long- and short-haul applications, including Twinax support, for rack-to-rack data center applications, enabling migration and support for numerous deployment scenarios requiring different media types. Table 1 summarizes the features and benefits of the Cisco Nexus 7000 Series 32-Port 1 and 10 Gigabit Ethernet Module.

Table 1. Features and Benefits

Feature	Benefit
High-density 10 Gigabit Ethernet module	Offers up to 256 10 Gigabit Ethernet ports in the Cisco Nexus 7000 10-Slot Switch and 512 ports in the Cisco Nexus 7000 18-Slot Switch for efficient and scalable network designs
Cisco FabricPath technologies based on IETF TRILL	With Cisco FabricPath, uses routing principles in the data plane and control plane to bring reliability and scalability to transparent bridging while maintaining flexibility and ease of use
FCoE support	I/O consolidation at the access layer and core of the network, reducing the physical infrastructure that needs to be acquired, managed, and maintained
Ideally suited for deployment in latency-sensitive applications	Port-to-port latency as low as 5 microseconds, enabling support for critical applications
Interface flexibility with SFP and SFP+ support	Interface flexibility to fulfill any Gigabit Ethernet and 10 Gigabit Ethernet deployment needs, per port, with a variety of media types
Efficient power use combined with high performance	Exceptionally low power consumption, typically 10W per port
Virtual output queuing with centralized arbitration	Enables fairness when one or more destinations is congested and support for lossless unified fabric
Load sharing across all fabric modules	Through its high-availability design, shares bandwidth across all fabric modules simultaneously for optimal performance
Distributed forwarding	Through its fully distributed data plane, offers high-performance parallel forwarding at 480 Mpps per module

Feature	Benefit
Online insertion and removal (OIR)	Supports hot insertion and removal for continuous system operation
Identification (ID) LED	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

Product Specifications

Table 2 lists the product specifications for the Cisco Nexus 7000 Series 32-Port 1 and 10 Gigabit Ethernet Module, and Tables 3 and 4 list specifications for pluggable optics.

Table 2. Product Specifications

Item	Specifications
System	
Product compatibility	Supported in all Cisco Nexus 7000 Series chassis
Software compatibility	Cisco NX-OS Software Release 5.1.(1) or later (minimum requirement)
Memory	1 GB DRAM
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) GUI
Network management	• Cisco DCNM 5.1
Physical Interfaces	
Connectivity	32 ports of Gigabit Ethernet and 10 Gigabit Ethernet (SFP or SFP+ pluggable optic modules)
Maximum port density	256 ports of Gigabit Ethernet and 10 Gigabit Ethernet for 10-slot chassis 512 ports of Gigabit Ethernet and 10 Gigabit Ethernet for 18-slot chassis
Queues per port	Configurable template-based queuing modes: • Ingress (4q1t and 2q1t) • Egress (1p3q1t, 2p2q1t, 3p1q1t, 2p6q1t, 3p5q1t, and 1p7q1t)
Scheduler	Deficit-Weighted Round-Robin (DWRR)
Jumbo frame support for bridged and routed packets	Up to 9216 bytes
Forwarding Engine: F1	
Performance	480-Mpps Layer 2 forwarding capacity
MAC entries	16,000 per forwarding engine, and up to 256,000 per module
VLANs	4,000 per forwarding engine, and up to 16,000 per module
ACLs	32,000 per module: 1000 ingress and 1000 egress per sequential port group pair
FCoE features	• T11 VF-, VN-, and VE-port for multi-hop FCoE • T11 FCoE Initialization Protocol (FIP) • Fibre Channel Forwarder (FCF)
Advanced FCoE features	• Virtual SANs (VSANs) • Inter-VSAN Routing (IVR) • PortChannels (up to 16 links) • SAN trunking • Storage VDC
IEEE Data Center Bridging (DCB) Features	• Priority-based flow control (PFC): IEEE P802.1Qbb • Enhanced transmission selection (ETS): IEEE P802.1Qaz • Data Center Bridging Exchange (DCBX) • Maximum lossless link distance: 20km
Fabric Interface	

Item	Specifications
Switch fabric interface	• 230 Gbps in each direction (460 Gbps full duplex) distributed across five Cisco Nexus 7000 Series fabric modules with 46 Gbps per slot • 320-Gbps switching capacity, per module, in meshed architectures
OIR	Online insertion and removal
Environmental	
Physical dimensions	• Occupies one I/O module slot in a Cisco Nexus 7000 Series chassis • Dimensions (H x W x D): 1.733 x 15.3 x 22.68 in. (4.4 x 38.9 x 57.6 cm) • Weight: 15.5 lb with SFP+ and 14 lb without SFP+ module
Maximum power consumption	385W per module
Mean time between failure (MTBF)	• 90,994 hours
Environmental conditions	• Operating temperature: 32 to 104℉ (0 to 40℃) • Operational relative humidity: 5 to 90%, noncondensing • Storage temperature: -40F to 158℉ (-40 to 70℃) • 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
Environmental standards	• NEBS criteria levels • SR-3580 NEBS Level 3 (GR-63-CORE, issue 3, and GR-1089-CORE, issue 4) • Verizon NEBS compliance • Telecommunications Carrier Group (TCG) Checklist • Qwest NEBS requirements • Telecommunications Carrier Group (TCG) Checklist • ATT NEBS requirements • ATT TP76200 level 3 and TCG Checklist • ETSI • ETSI 300 019-1-1, Class 1.2 Storage • ETSI 300 019-1-2, Class 2.3 Transportation • ETSI 300 019-1-3, Class 3.2 Stationary Use
Safety	• UL/CSA/IEC/EN 60950-1 • AS/NZS 60950
Warranty	Cisco Nexus 7000 Series Switches come with the standard Cisco one-year limited hardware warranty

Table 3. 10 Gigabit Ethernet Interface Distances and Options[1]

10 Gigabit Ethernet SFP+ Part Number	Wavelength (nanometers [nm])	Fiber and Cable Type	Core Size (microns)	Model Bandwidth (MHz per km)[1]	Cable Distance[2]
SFP-10G-SR	850	Multimode fiber (MMF)	• 50.0 • 50.0 • 50.0 • 62.5 • 62.5	• 400 • 500 • 2000 • 160 • 200	• 66m • 82m • 300m • 26m • 33m
SFP-10G-LRM	1310	MMF	• G.652 • 50 • 50 • 62.5	• 400 • 500 • 500	• 300m • 100m • 220m • 220m
SFP-10G-LR	1310	SMF	• G.652	-	• 10 km
SFP-10G-ER	1550	SMF			• 40 km[3]
SFP-H10GB-CU1M	-	Twinax cable, 30AWG cable assembly	-	-	• 1m
SFP-H10GB-CU3M	-	Twinax cable, 30AWG cable assembly	-	-	• 3m
SFP-H10GB-CU5M	-	Twinax cable, 24AWG cable assembly	-	-	• 5m
SFP-H10GB-ACU7M	-	Twinax cable, 24AWG cable assembly	-	-	• 7m
SFP-H10GB-ACU10M	-	Twinax cable, 24AWG cable assembly	-	-	• 10m

Note: See the SFP+ optics data sheet for additional information: http://cisco.com/en/US/prod/collateral/modules/ps5455/data_sheet_c78-455693.html.

[1] Not all optics are supported in the first software release. Refer to the release notes for up-to-date software version information to see what optics are supported.
[1] 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.

Table 4. Gigabit Ethernet Interface Distances and Options[1]

Gigabit Ethernet SFP Part Number	Wavelength (nm)	Fiber and Cable Type	Core Size (microns)	Model Bandwidth (MHz per km)	Cable Distance
SFP-GE-S	850	MMF	• 50 • 50 • 50 • 62.5 • 62.5	• 400 • 500 • 2000 • 160 • 200	• 500m • 550m • 1000m • 220m • 275m
SFP-GE-L	1310	MMF[2]	• 50 • 50 • 62.5	• 400 • 500 • 500	• 550m • 550m • 550m
		SMF	G.652		10 km
SFP-GE-Z	1550	SMF	G.652		70 to 100 km[1]
SFP-GE-T		Category 5			100m

Gigabit Ethernet SFP Part Number	Wavelength (nm)	Fiber and Cable Type	Core Size (microns)	Model Bandwidth (MHz per km)	Cable Distance
GLC-SX-MM	850	MMF	• 50 • 50 • 50 • 62.5 • 62.5	• 400 • 500 • 2000 • 160 • 200	• 500m • 550m • 1000m • 220m • 275m
GLC-LH-SM	1310	MMF[7]	• 50 • 50 • 62.5	• 400 • 500 • 500	• 550m • 550m • 550m
		SMF	G.652	-	10 km
GLC-ZX-SM	1550	SMF	G.652	-	70 to 100 km[8]
GLC-T	-	Category 5	-	-	100m
CWDM-SFP-1470=	[3]	SMF	-	-	-
DWDM-SFP-3033=	[4]	SMF	-	-	-

Note: See the SFP optics data sheet for additional information: http://cisco.com/en/US/prod/collateral/modules/ps5455/ps6577/product_data_sheet0900aecd8033f885.html.

[1] Not all optics are supported in the first software release. Refer to the release notes for up-to-date software version information to see what optics are supported.
[1] 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.
[2] A mode-conditioning patch is required. Use of an ordinary patch cord with MMF, 1000BASE-LX/LH SFPs, and a short link distance (tens of meters) can cause transceiver saturation, resulting in an elevated bit error rate. In addition, when using the LX/LH SFP with 62.5-micron-diameter MMF, you must install a mode-conditioning patch cord between the SFP and the MMF cable on both the transmit and receive ends of the link. The mode-conditioning patch cord is required for link distances greater than 300m.
[3] Also offered in other wavelengths. See the coarse wavelength-division mulitplexing (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] Also offered in other wavelengths. See the dense wavelength-division mulitplexing (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 7000 - 32 Port 1G/10G Ethernet Module, SFP/SFP+ (and spare)	N7K-F132XP-15 N7K-F132XP-15=
FCoE License for Nexus 7000 32-port 10G SFP+ (F1) (and spare)	N7K-FCOEF132XP N7K-FCOEF132XP=

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 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 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 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.

For More Information

For more information about the Cisco Nexus 7000 Series, visit the product homepage at http://www.cisco.com/go/nexus or contact your local account representative.

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

Cisco has more than 200 offices worldwide. Addresses, phone numbers, and fax numbers are listed on the Cisco Website at www.cisco.com/go/offices.

Printed in USA C78-605622-05 04/12