Cisco MDS 9000 10-Gbps 8-Port FCoE Module

Product Overview

Cisco® unified fabric is a crucial building block for both traditional and virtualized data centers. Cisco unified fabric unifies storage and data networking with the data center operating system to deliver transparent convergence, scalability, and network intelligence. With the Cisco MDS 9000 10-Gbps 8-Port FCoE Module (Figure 1), Cisco introduces the industry's first multihop-capable Fibre Channel over Ethernet (FCoE) module for the core data center SAN. Now it is possible to extend the benefits of FCoE beyond the access layer into the core of the data center with a full line-rate FCoE module for the Cisco MDS 9500 Series Multilayer Directors.

FCoE allows an evolutionary approach to I/O consolidation by preserving all Fibre Channel constructs, maintaining the latency, security, and traffic management attributes of Fibre Channel while preserving investments in Fibre Channel tools, training, and SANs. FCoE enables the preservation of Fibre Channel as the storage protocol in the data center while giving customers a viable solution for I/O consolidation. It simplifies customer environments by using Ethernet, allowing the industry to avoid creating a separate protocol for I/O consolidation. In addition, FCoE extends Fibre Channel SAN connectivity; now 100 percent of the servers connected to the network can also be attached to the SAN.

Figure 1. Cisco MDS 9000 10-Gbps 8-Port FCoE Module

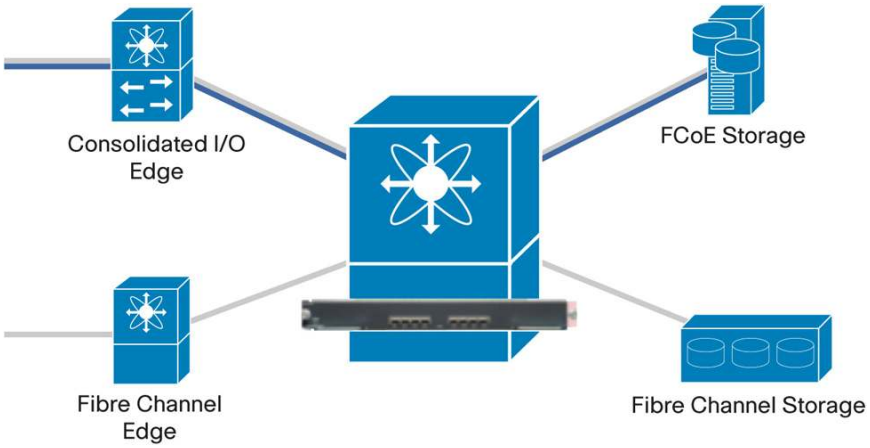
Enterprise networks are growing rapidly, and data centers are struggling to manage power, cooling, and space. In response, enterprises are looking for ways to extend the life of existing data centers to get the most from their investments for years to come. The Cisco MDS 9000 10-Gbps 8-Port FCoE Module bridges the gap between the traditional Fibre Channel SAN and the evolution to FCoE. Enterprises can reduce capital expenditures (CapEx) and operating expenses (OpEx) in the data center by deploying FCoE while using the Cisco MDS 9000 10-Gbps 8-Port FCoE Module to protect their investment in existing Fibre Channel SANs and Fibre Channel-attached storage.

The Power of Convergence

With the ongoing increase in server workloads, converged networks reduce complexity and provide lower overall data center power consumption, extending the lifecycle of existing assets. Moreover, a converged network reduces complexity and improves SAN attach rates, simplifying virtual machine mobility.

Enterprise customers have been waiting for a director-class FCoE platform, which is what they get with the Cisco MDS 9000 10-Gbps 8-Port FCoE Module. With up to 88 ports of line-rate performance per chassis, simplified deployment, and ease of configuration and management, the new module bridges the Fibre Channel and FCoE worlds at the core layer (Figure 2).

Figure 2. Converged Network Extended into the Core Director-Class Environment



The benefits that I/O consolidation brings to the access layer can now be achieved in the core of the data center as well. With the capability to consolidate the network in the core, as shown in Figure 2, the Cisco MDS 9000 10-Gbps 8-Port FCoE Module bring an immediate benefit by reducing data center complexity.

This type of next-generation approach brings three distinct benefits to the data center:

- Agility: Over time, a converged network provides a more efficient use of network capacity for both LAN and SAN deployments. Increasing bandwidth capacity over time results in improved responsiveness for all traffic types, meaning sacrifices do not have to be made to determine which applications get upgrades and which do not because of resource limitations.
- Efficiency: By eliminating infrastructure replication beyond the access layer, a converged network can provide a greater return on investment (ROI).
- Responsiveness: The end-to-end benefits of FCoE provide the capability to set up, move, and change both physical and virtual assets with greater speed and with fewer points of failure.

The Cisco MDS 9000 10-Gbps 8-Port FCoE Module helps provide true enterprise-class systems and topologies for FCoE deployments.

The Power of Unified Fabric

A unified fabric uses converged network protocols such as FCoE to allow customers to wire once to connect any device on the SAN and LAN. FCoE in particular takes advantage of the more efficient encoding mechanisms of 10-Gbps Ethernet to provide 50 percent more bandwidth than 8-Gbps Fibre Channel (the real bandwidth of 8-Gbps Fibre Channel is 6.8 Gbps). This means that it is possible to use fewer 10 Gigabit Ethernet links to achieve the same bandwidth. Used in combination with low-cost media options such as Twinax cables, the Cisco MDS 9000 10-Gbps 8-Port FCoE Module helps align the storage network with the economies of Ethernet while preserving the reliability and features of Fibre Channel. Every host can mount any storage target, leading to storage consolidation and improving utilization.

The Power of Scalability

The Cisco MDS 9000 10-Gbps 8-Port FCoE Module provides the scalability of 88 line-rate ports per chassis - without oversubscription - and PortChannels with up to 16 physical links, creating massive 160-Gbps logical links. When connecting to the Cisco Nexus® 7000 Series Switches populated with Cisco Nexus 7000 Series 32-Port 1 and 10 Gigabit Ethernet Modules, the number of director-class FCoE ports easily scales to meet the needs of the most demanding data center environments.

The Power of Intelligent Fabrics

Cisco Services embed critical, policy-based intelligent capabilities into the unified fabric for both traditional and virtualized data centers. Distributed, network-integrated services enable scalability, high performance, agility, and operational simplicity. Delivered in either physical (appliance or blade) or virtual formats, Cisco intelligent fabric services enable flexibility and cost effectiveness for service deployment.

Cisco MDS 9000 Services-Oriented SANs similarly deliver advanced, integrated storage services to improve agility and enable cloud storage deployments. These are huge investments in the world of Fibre Channel, and Cisco is dedicated to supporting Fibre Channel while moving to Ethernet and consolidated I/O, fulfilling the promise of unified fabric.

Not only does the Cisco MDS 9000 10-Gbps 8-Port FCoE Module take advantage of migration of FCoE into the core layer, but it extends enterprise-class Fibre Channel services to Cisco Nexus 7000 and 5000 Series Switches and FCoE initiators. This capability:

- Allows FCoE initiators to access remote Fibre Channel resources connected through Fibre Channel over IP (FCIP) for enterprise backup solutions
- Supports virtual SANs (VSANs) for resource separation and consolidation
- Supports inter-VSAN routing (IVR) to use resources that may be segmented
- Uses Cisco Data Center Network Manager (DCNM) for SAN, a tool for managing Cisco MDS 9000 Family and Cisco Nexus Family devices

Features and Benefits

Table 1 describes the features and benefits of the Cisco MDS 9000 10-Gbps 8-Port FCoE Module.

Table 1. Features and Benefits

Feature	Benefit
Category	
Multihop FCoE	• Compatible with FCoE connectivity to the Cisco Nexus 5000 Series Switches and the Cisco Nexus 7000 Series directors
Unified OS	• Uses the same operating system that administrators are familiar with from Cisco Nexus products, providing transparent interoperability • Extends Fibre Channel services and features to FCoE-capable systems connected to the Cisco Nexus 7000 Series
Line-rate ports	• Provides full line-rate bandwidth with no oversubscription
Advanced services	• Extends director-class services, such as FCIP, into the aggregation and edge fabric layers
Unified management	• Uses the same policies and same management tools across Cisco Nexus and Cisco MDS 9000 Family platforms
More Efficient Encoding	• Uses line-rate 10-Gbps FCoE, which provides 50 percent more bandwidth than 8-Gbps Fibre Channel

Product Specifications

Table 2 lists the specifications for the Cisco MDS 9000 10-Gbps 8-Port FCoE Module.

Table 2. Product Specifications

Item	Specification
Product compatibility	Cisco MDS 9500 Series Multilayer Directors
Software compatibility	Requires Cisco MDS NX-OS Release 5.2(0) or later

Item	Specification
Fibre Channel and FCoE protocols	Fibre Channel standards: • FC-BB-5, Revision 2.0 (ANSI INCITS 462-2010) • FC-BB-4, Revision 2.7 (ANSI INCITS 419-2008) • FC-BB-3, Revision 6.8 (ANSI INCITS 414-2006) • FC-BB-2, Revision 6.0 (ANSI INCITS 372-2003) • FC-FS-3, Revision 1.11 (ANSI INCITS 470-2011) • FC-FS-2, Revision 1.01 (ANSI INCITS 424-2007) • FC-FS-2, Amendment 1 (ANSI INCITS 424-2007/AM1-2007) • FC-FS, Revision 1.9 (ANSI INCITS 373-2003) • FC-LS-2, Revision 2.21 (ANSI INCITS 477-2011) • FC-LS, Revision 1.62 (ANSI INCITS 433-2007) • FC-SW-5, Revision 8.5 (ANSI INCITS 461-2010) • FC-SW-4, Revision 7.5 (ANSI INCITS 418-2006) • FC-SW-3, Revision 6.6 (ANSI INCITS 384-2004) • FC-SW-2, Revision 5.3 (ANSI INCITS 355-2001) • FC-GS-6, Revision 9.4 (ANSI INCITS 463-2010) • FC-GS-5, Revision 8.51 (ANSI INCITS 427-2007) • FC-GS-4, Revision 7.91 (ANSI INCITS 387-2004) • FC-GS-3, Revision 7.01 (ANSI INCITS 348-2001) • FCP-4, Revision 2 • FCP-3, Revision 4 (ANSI INCITS 416-2006) • FCP-2, Revision 8 (ANSI INCITS 350-2003) • FCP, Revision 12 (ANSI INCITS 269-1996) • FC-SB-4, Revision 3.0 (ANSI INCITS 466-2011) • FC-SB-3, Revision 1.6 (ANSI INCITS 374-2003) • FC-SB-3, Amendment 1 (ANSI INCITS 374-2003/AM1-2007) • FC-SB-2, Revision 2.1 (ANSI INCITS 349-2001) • FC-VI, Revision 1.84 (ANSI INCITS 357-2002) • FC-SP, Revision 1.8 (ANSI INCITS 426-2007) • FAIS-2, Revision 2.23 (ANSI INCITS 449-2008) • FAIS, Revision 1.03 (ANSI INCITS 432-2007) • FC-IFR, Revision 1.06 (ANSI INCITS 475-2011) • FC-MI-2, Revision 2.6 (INCITS TR-39-2005) • FC-MI, Revision 1.92 (INCITS TR-30-2002) • FC-DA, Revision 3.1 (INCITS TR-36-2004) • FC-FLA, Revision 2.7 (INCITS TR-20-1998) • FC-PLDA, Revision 2.1 (INCITS TR-19-1998) • FC-Tape, Revision 1.17 (INCITS TR-24-1999) Fibre Channel features: • T11 standards-compliant FCoE • T11 FCoE Initialization Protocol (FIP) • FCoE Forwarder (FCF) • Multihop FCoE with virtual E (VE) port support • Converged Enhanced Ethernet (CEE) interoperability • Direct attachment of FCoE targets • Class of service: Class 2, Class 3, and Class F • Fibre Channel enhanced port types: VE, TE, and VF • F-port trunking • F-port channeling • VSANs • Fibre Channel PortChannel • Native Interop Mode 2 • Native Interop Mode 3 • VSAN trunking • Fabric Device Management Interface (FDMI) • Fibre Channel ID (FCID) persistence • Distributed device alias services • In-order delivery • Port tracking

Item	Specification
	• N-port virtualization (NPV) • N-port ID virtualization (NPIV) • Fabric services: Name server, registered state change notification (RSCN), login services, and name-server zoning • Per-VSAN fabric services • Cisco Fabric Services • Fabric Shortest Path First (FSPF) • Diffie-Hellman Challenge Handshake Authentication Protocol (DH-CHAP) and Fibre Channel Security Protocol (FC-SP) • Host-to-switch and switch-to-switch FC-SP authentication • Fabric binding for Fibre Channel • Port security • Distributed device alias services • Standard zoning • Domain and port zoning • Enhanced zoning • Cisco Fabric Analyzer • Fibre Channel traceroute • Fibre Channel ping • Fibre Channel debugging • Cisco Fabric Manager support • Storage Management Initiative Specification (SMI-S)
Ethernet protocols	• IEEE 802.3, Carrier Sense Multiple Access/Collision Detect (CSMA/CD) access method and Physical Layer specifications • IEEE 802.1Q, MAC bridges and virtual bridged LANs • IEEE 802.1Qbb, priority-based flow control (PFC) • IEEE 802.1Qaz, enhanced transmission selection (ETS) • IEEE 802.1Qaz, Data Center Bridging Exchange Protocol (DCBX)
Cards, ports, and slots	• 8 fixed autosensing 10-Gbps FCoE ports
Components	
Supported optical interface modules	• 10 Gigabit Ethernet -SR, -LR • Active CX-1 (7 and 10m) • Passive CX-1 (1, 3, and 5m)
Features and Functions	
Fabric services	• Name server • RSCN • Login services • Fabric Configuration Server (FCS) • Public loop • Broadcast • In-order delivery
Advanced capabilities	• VSAN • PortChannel with multipath load balancing • Quality of service (QoS): Flow based and zone based
Diagnostics and troubleshooting tools	• Power-on self-test (POST) diagnostics • Online diagnostics • Fibre Channel ping • Fibre Channel debug • Cisco Fabric Analyzer • Syslog • Online system health • Port-level statistics • Real-Time Transport Protocol (RTP) debug • Online Health Monitoring System (OHMS) or Cisco Generic Online Diagnostics (GOLD) • Enhanced Small Form-Factor Pluggable (SFP+) digital diagnostics

Item	Specification
Security	• VSANs • Access control lists (ACLs) • Per-VSAN role-based access control (RBAC) • Fibre Channel zoning • FC-SP: ◦ DH-CHAP switch-switch authentication ◦ DH-CHAP host-switch authentication • Port security and fabric binding • Management access ◦ Secure Shell (SSH) Protocol Version 2 (v2) implementing Advanced Encryption Standard (AES) ◦ Simple Network Management Protocol (SNMP) Version 3 implementing AES ◦ Secure FTP (SFTP) • Link-level encryption ◦ SSHv2 implementing AES
Serviceability	• Nondisruptive, concurrent code load and activation • Configuration file management • Nondisruptive software upgrades for Fibre Channel interfaces • Call Home • Power-management LEDs • Port beaconing • System LED • SNMP traps for alerts • Network boot
Performance	• Port speed: 10-Gbps fixed bandwidth • PortChannel: Up to 16 ports
Reliability and availability	• Hot-swappable module • Hot-swappable SFP optics • Online diagnostics • Stateful process restart • Nondisruptive supervisor failover • Any module, any port configuration for PortChannels • Fabric-based multipathing • Per-VSAN fabric services • Port tracking
Network management	• Access methods through Cisco MDS 9500 Series Supervisor module: ◦ Out-of-band 10/100/1000 Ethernet port (Supervisor-2A) ◦ RS-232 serial console port ◦ In-band IPFC ◦ DB-9 COM port • Access protocols ◦ Command-line interface (CLI) by console and Ethernet ports ◦ SNMPv3 by Ethernet port and in-band IPFC access ◦ Storage Networking Industry Association (SNIA) SMI-S • Distributed device alias service • Network security ◦ Per-VSAN RBAC using RADIUS-based and TACACS+-based authentication, authorization, and accounting (AAA) functions ◦ SFTP ◦ SSHv2 implementing AES ◦ SNMPv3 implementing AES • Management applications ◦ Cisco MDS 9000 Family CLI ◦ Cisco DCNM for SAN ◦ Cisco Device Manager ◦ CiscoWorks Resource Manager Essentials (RME) and Device Fault Manager (DFM)

Item	Specification
Programming interfaces	• Scriptable CLI • Cisco DCNM for SAN GUI • Cisco Device Manager GUI
Environmental	• Temperature, ambient operating: 32 to 104°F (0 to 40°C) • Temperature, ambient nonoperating and storage: -40 to 167°F (-40 to 75°C) • Relative humidity, ambient (noncondensing) operating: 10 to 90% • Relative humidity, ambient (noncondensing) nonoperating and storage: 10 to 95% • Altitude, operating: -197 to 6500 ft (-60 to 2000m)
Physical dimensions	• Dimensions (H x W x D): 1.75 x 14.4 x 16 in. (3.0 x 35.6 x 40.6 cm) • Occupies one slot in a Cisco MDS 9500 Series chassis • Weight: 8.0 lbs (3.63 kg)
Power	• 120 watts (W) • 2.86 amps
Approvals and compliance	• Safety compliance: ◦ CE marking ◦ UL 60950 ◦ CAN/CSA-C22.2 No. 60950 ◦ EN 60950 ◦ IEC 60950 ◦ TS 001 ◦ AS/NZS 3260 ◦ IEC60825 ◦ EN60825 ◦ 21 CFR 1040 • EMC compliance: ◦ FCC Part 15 (CFR 47) Class A ◦ ICES-003 Class A ◦ EN 55022 Class A ◦ CISPR 22 Class A ◦ AS/NZS 3548 Class A ◦ VCCI Class A ◦ EN 55024 ◦ EN 50082-1 ◦ EN 61000-6-1 ◦ EN 61000-3-2 ◦ EN 61000-3-3

System Requirements

Table 3 lists system requirements for the Cisco MDS 9000 10-Gbps 8-Port FCoE Module.

Table 3. System Requirements

Hardware	Requires Cisco MDS 9500 Series Supervisor-2A Module (2 per chassis) Requires Cisco MDS 9513 Fabric 2 Module (Cisco MDS 9513 Multilayer Director chassis only)
Software	Cisco MDS 9000 NX-OS 5.2(0)

Ordering Information

Table 4 provides ordering information for the Cisco MDS 9000 10-Gbps 8-Port FCoE Module.

Table 4. Ordering Information

Description	Part Number
Cisco MDS 9000 10-Gbps 8-Port FCoE Module	DS-X9708-K9
Cisco MDS 9000 10-Gbps 8-Port FCoE Module, spare	DS-X9708-K9=
10GBASE-SR SFP+ Module	SFP-10G-SR

Description	Part Number
10GBASE-SR SFP+ Module, spare	SFP-10G-SR=
10GBASE-LR SFP+ Module	SFP-10G-LR
10GBASE-LR SFP+ Module, spare	SFP-10G-LR=
10GBASE-CU SFP+ cable 1 meter	SFP-H10GB-CU1M
10GBASE-CU SFP+ cable 1 meter, spare	SFP-H10GB-CU1M=
10GBASE-CU SFP+ cable 3 meter	SFP-H10GB-CU3M
10GBASE-CU SFP+ cable 3 meter, spare	SFP-H10GB-CU3M=
10GBASE-CU SFP+ cable 5 meter	SFP-H10GB-CU5M
10GBASE-CU SFP+ cable 5 meter	SFP-H10GB-CU5M=
10GBASE-CU SFP+ active copper cable 7 meter	SFP-H10GB-ACU7M
10GBASE-CU SFP+ active copper cable 7 meter, spare	SFP-H10GB-ACU7M=
10GBASE-CU SFP+ active copper cable 10 meter	SFP-H10GB-ACU10M
10GBASE-CU SFP+ active copper cable 10 meter, spare	SFP-H10GB-ACU10M=

Service and Support

Using the Cisco Lifecycle Services approach, Cisco and its partners provide a broad portfolio of end-to-end services and support that can help increase your network's business value and ROI. This approach defines the minimum set of activities needed, by technology and by network complexity, to help you successfully deploy and operate Cisco technologies and optimize their performance throughout the lifecycle of your network.

For More Information

For more information about the Cisco MDS 9000 Family Fibre Channel switching modules, visit http://www.cisco.com/go/storage or contact your local account representative.

For detailed information about supported optics, see Cisco MDS 9000 Family Pluggable Transceivers.

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