

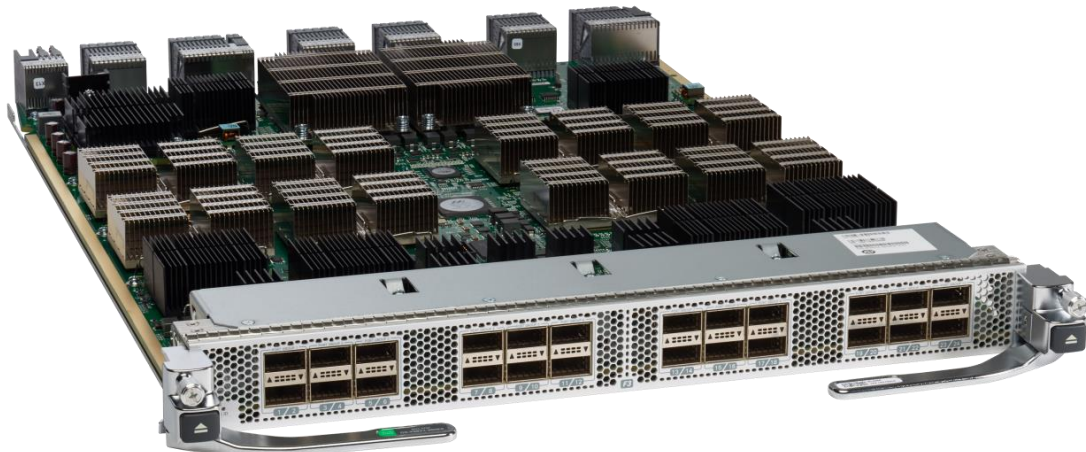
Cisco MDS 9700 40-Gbps 24-Port Fibre Channel over Ethernet Module

Product Overview

The next-generation Cisco® MDS 9700 40-Gbps 24-Port Fibre Channel over Ethernet (FCoE) Module (Figure 1) provides Cisco Unified Fabric connectivity to the SAN core. It empowers midsize and large enterprises that are rapidly deploying cloud-scale applications with Inter-Switch Link (ISL) consolidation by four to one over traditional 10Gbps FCoE and three to one over 16Gbps FC, and exceptional investment protection for their SANs. The data center fabric is already using 40-Gbps connectivity in the core for more efficient convergence, higher performance, and lower total cost of ownership (TCO). With the entire Cisco Nexus® Family supporting 40-Gbps FCoE, this capability can now be extended to the SAN core. You can extend the benefits of FCoE beyond the access layer to the data center core with a full line-rate FCoE module for the Cisco MDS 9700 Series Multilayer Directors.

You can save money; simplify management; reduce cabling, power, and cooling requirements; and improve flexibility by deploying FCoE, while protecting your Fibre Channel SAN investment with the MDS 9700 40-Gbps 24-Port FCoE Module. FCoE allows an evolutionary approach to I/O consolidation by preserving all Fibre Channel constructs. It maintains the latency, security, and traffic management attributes of Fibre Channel, as well as your investment in Fibre Channel tools, training, and SANs. FCoE also extends Fibre Channel SAN connectivity. Now 100 percent of your network servers can be attached to the SAN.

Figure 1. Cisco MDS 9700 40-Gbps 24-Port FCoE Module



Main Features

The main features of the MDS 9700 40-Gbps 24-Port FCoE Module include:

- High performance: MDS 9700 Series architecture, based on central arbitration and crossbar fabric, provides 40-Gbps line-rate, non-blocking, predictable performance across all traffic conditions for every FCoE port in the chassis.
- CAPEX reduction: The 40Gbps FCoE capable ports support QSFP-40G-SR4-BD transceivers that allow users to deploy them on existing 10Gbps cable plants without having to rip and replace existing cabling in their data center thus greatly reducing capital expenditure.
- Higher Bandwidth: FCoE takes advantage of full bandwidth utilization on a 40-Gbps Ethernet link to provide 294 percent the bandwidth of 16-Gbps Fibre Channel (the actual throughput of 16-Gbps Fibre Channel is 13.6 Gbps). Therefore, you need fewer 40-Gbps links to achieve the same bandwidth as with multiple 16-Gbps links.
- High availability: MDS 9700 Series directors provide outstanding availability and reliability. These are the industry's first director-class switches that offer redundancy on all major components. They provide grid redundancy on the power supply and 1+1 redundant supervisors. Users can also add fabric cards to enable N+1 fabric redundancy.
- Scalability: The MDS 9700 FCoE module provides up to 384 40-Gbps, full line-rate, ports in a single Cisco MDS 9718 Multilayer Director chassis or 192 40-Gbps, full line-rate, autosensing ports in a single Cisco MDS 9710 Multilayer Director chassis or up to 96 40-Gbps full line-rate ports in a single Cisco MDS 9706 Multilayer Director chassis.
- Resilient high-performance ISLs: FCoE ISLs can be grouped into port channels with up to 16 physical links, creating massive 640-Gbps logical links. When you connect to Cisco Nexus 7000 Series Switches populated with Cisco Nexus 7000 Series 40 Gigabit Ethernet modules, you can easily scale the number of director-class FCoE ports to meet the needs of the most demanding data center environments.
- Intelligent network services: VSAN technology, access control lists (ACLs) for hardware-based intelligent frame processing, and fabricwide quality of service (QoS) enable migration from SAN islands to enterprisewide storage networks.
- Sophisticated diagnostics: The MDS 9700 FCoE module provides intelligent diagnostics, protocol decoding, network analysis tools, and integrated Cisco Call Home capability for greater reliability, faster problem resolution, and reduced service costs.
- Programmable fabric: The MDS 9700 Series provides powerful representational state transfer (REST) and Cisco NX-API capabilities to enable flexible and rapid programming of utilities for the SAN.

Main Benefits

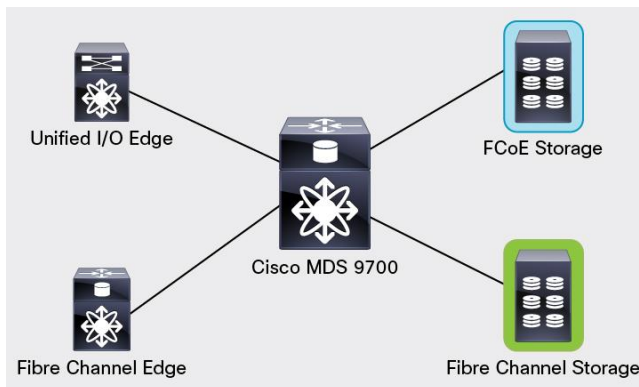
Converged fabrics are increasing host and application sprawl at the access layer, resulting in greater oversubscription on the converged link. The use of 40-Gbps links reduces the bandwidth contention at the access layer and core by as much as 400 percent and at the same time enables ISL consolidation without the need to make any changes to the existing cable plan.

You can bring the benefits of I/O consolidation at the access layer to the data center core with the MDS 9700 40-Gbps 24-Port FCoE Module. This solution offers several important benefits:

- Investment protection: FCoE is an evolutionary technology with the same management model as Fibre Channel and with the roadmap of Ethernet, which is rapidly shifting from 10 to 40 Gbps. With FCoE, you can preserve your investments in Fibre Channel tools, training, and SANs. The MDS 9700 FCoE module provides investment protection for existing Fibre Channel storage by transparently bridging the gap between FCoE SANs (traffic originating from server-side networks) and Fibre Channel SANs (traffic heading toward storage arrays), as shown in Figure 2.

Figure 2. Cisco MDS 9700 Interconnects FCoE and Fibre Channel SANs

Cisco MDS 9700 Series



- Agility: Over time, a converged network uses network capacity more efficiently in both LAN and SAN deployments. Greater bandwidth capacity also improves responsiveness for all traffic types. The end-to-end benefits of FCoE include the capability to set up, move, and change both physical and virtual assets with greater speed and fewer points of failure.
- Simplification: Through consolidation, a converged network can reduce complexity and provide a greater return on investment (ROI).
- Better convergence: 40-Gbps links benefit from lower latency than lower-bandwidth links, bringing better-performing converged storage workloads to your storage array. Higher bandwidth also helps ensure less ISL congestion for newer converged storage workloads that are moving to the storage arrays: for instance, Small Computer System Interface over IP (iSCSI) and FCoE workloads with a combination of Nexus series switches.
- This module can also support connectivity to FCoE initiators and targets that send only FCoE traffic, thus providing a way to deploy a dedicated FCoE SAN without requiring any convergence at 40 Gbps: 147 percent of 32-Gbps Fibre Channel owing to better bandwidth utilization on ethernet links.

Product Specifications

Table 1 lists the specifications for the MDS 9700 40-Gbps 24-Port FCoE Module.

Table 1. Product Specifications

Item	Specification
Product compatibility	Cisco MDS 9700 Series Multilayer Directors
Software compatibility	Requires Cisco MDS 9000 NX-OS Software Release 7.3 or later
Fibre Channel and FCoE protocols	<ul style="list-style-type: none"> • Fibre Channel standards: <ul style="list-style-type: none"> ◦ 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: <ul style="list-style-type: none"> ◦ T11 standards-compliant FCoE ◦ T11 FCoE Initialization Protocol (FIP) ◦ FCoE forwarder (FCF) ◦ Multihop FCoE with virtual Ethernet (VE) port support ◦ Converged Enhanced Ethernet (CEE) interoperability ◦ Direct attachment of FCoE targets ◦ Class of service: Classes 2, 3, and F ◦ Fibre Channel enhanced port types: VE, TE, and VF ◦ F-port trunking

Item	Specification
	<ul style="list-style-type: none"> ◦ F-port channeling ◦ VSANs ◦ Fibre Channel port channel ◦ VSAN trunking ◦ Fabric Device Management Interface (FDMI) ◦ Fibre Channel ID (FCID) persistence ◦ Distributed device alias services ◦ In-order delivery ◦ Port tracking ◦ 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 ◦ 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	<ul style="list-style-type: none"> • IEEE 802.3, Carrier Sense Multiple Access/Collision Detect (CSMA/CD) access method and physical layer (phy) specifications • IEEE 802.1Q, MAC address 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 (DCBX) Protocol
Ports	<ul style="list-style-type: none"> • 24 fixed autosensing 40-Gbps FCoE ports
Slots	<ul style="list-style-type: none"> • Can be used in any and all of 16 payload slots of the Cisco MDS 9718 Multilayer Director • Can be used in any and all of 8 payload slots of the Cisco MDS 9710 Multilayer Director • Can be used in any and all of 4 payload slots of the Cisco MDS 9706 Multilayer Director
Features and Functions	
Fabric services	<ul style="list-style-type: none"> • Name server • RSCN • Login services • Cisco Fabric Configuration Server (FCS) • Public loop • Broadcast • In-order delivery
Advanced capabilities	<ul style="list-style-type: none"> • VSAN • Port channel with multipath load balancing • QoS: Flow based and zone based
Diagnostics and troubleshooting tools	<ul style="list-style-type: none"> • Power-on self-test (POST) diagnostics • Online diagnostics • Fibre Channel ping • Fibre Channel debug • Cisco Fabric Analyzer

Item	Specification
	<ul style="list-style-type: none"> • FCoE to FCoE SPAN • Syslog • Port-level statistics • Cisco Generic Online Diagnostics (GOLD)
Security	<ul style="list-style-type: none"> • VSANs • ACLs • Per-VSAN role-based access control (RBAC) • Fibre Channel zoning • Port security and fabric binding • Cisco Switched Port Analyzer (SPAN) • Management access <ul style="list-style-type: none"> ◦ Secure Shell (SSH) Protocol Version 2 (v2) implementing Advanced Encryption Standard (AES) ◦ Simple Network Management Protocol (SNMP) Version 3 implementing AES ◦ Secure FTP (SFTP)
Serviceability	<ul style="list-style-type: none"> • Nondisruptive, concurrent code load and activation • Configuration file management • Nondisruptive software upgrades • Cisco Call Home • Power-management LEDs • Port beaconing • System LED • SNMP traps for alerts • Network boot
Performance	<ul style="list-style-type: none"> • Port speed: 40-Gbps fixed bandwidth • PortChannel: Up to 16 ports
Reliability and availability	<ul style="list-style-type: none"> • Hot-swappable module • Hot-swappable Small Form-Factor Pluggable (SFP) optics • Online diagnostics • Stateful process restart • Nondisruptive supervisor failover • Any module, any port configuration for port channels • Fabric-based multipathing • Per-VSAN fabric services • Port tracking
Network management	<ul style="list-style-type: none"> • Access methods through Cisco MDS 9700 Series supervisor module: <ul style="list-style-type: none"> ◦ Out-of-band 10/100/1000 Ethernet port (Supervisor-1/Supervisor-1E) ◦ RS-232 serial console port ◦ In-band IPFC ◦ DB-9 COM port • Access protocols <ul style="list-style-type: none"> ◦ 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 • Network security <ul style="list-style-type: none"> ◦ Per-VSAN RBAC using RADIUS-based and TACACS+-based authentication, authorization, and accounting (AAA) functions ◦ SFTP ◦ SSHv2 implementing AES ◦ SNMPv3 implementing AES • Management applications <ul style="list-style-type: none"> ◦ Cisco MDS 9000 Family CLI ◦ Cisco Data Center Network Manager (DCNM) for SAN ◦ Cisco Device Manager ◦ CiscoWorks Resource Manager Essentials (RME) and Device Fault Manager (DFM)
Programming	<ul style="list-style-type: none"> • Scriptable CLI

Item	Specification
interfaces	<ul style="list-style-type: none"> • Cisco DCNM for SAN GUI • Cisco Device Manager GUI • NX-API
Environmental	<ul style="list-style-type: none"> • Temperature, ambient operating: 32 to 104°F (0 to 40°C) • Temperature, ambient nonoperating and storage: –40 to 158°F (–40 to 70°C) • Relative humidity, ambient (noncondensing) operating: 5 to 90% • Relative humidity, ambient (noncondensing) nonoperating and storage: 5 to 95% • Altitude, operating: –197 to 6500 ft (–60 to 2000m)
Physical dimensions	<ul style="list-style-type: none"> • Dimensions: 1.75 x 15.9 x 21.8 in. (4.4 x 40.39 x 55.37 cm) • Occupies one I/O module slot in a Cisco MDS 9700 Series chassis • Weight: 17 lb (7.7 kg)
Power	Typical: 680 watts (W)
Approvals and compliance	<ul style="list-style-type: none"> • Safety compliance: <ul style="list-style-type: none"> ◦ 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: <ul style="list-style-type: none"> ◦ 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 ◦ KN22 Class A ◦ CNS13438 Class A ◦ CISPR24 ◦ EN 55024 ◦ EN 50082-1 ◦ EN 61000-6-1 ◦ EN 61000-3-2 ◦ EN 61000-3-3 ◦ EN300 386

Ordering Information

Table 2 provides ordering information for the MDS 9700 40-Gbps 24-Port FCoE Module.

Table 2. Ordering Information

Description	Part Number
Cisco MDS 9700 40-Gbps 24-Port FCoE Module	DS-X9824-960K9
Cisco MDS 9700 40-Gbps 24-Port FCoE Module, spare	DS-X9824-960K9=
MDS 9706 24-port 40G module, 24 QSFP-40G-SR-BD,2 Fab1, spare	DS-X9824960BDC06=
MDS 9706 24-port 40G module, 24 QSFP-40G-SR4, 2 Fab1, spare	DS-X9824960SRC06=
MDS 9710 24-port 40G module, 24 QSFP-40G-SR-BD,2 Fab1, spare	DS-X9824960BDC10=
MDS 9710 24-port 40G module, 24 QSFP-40G-SR4, 2 Fab1, spare	DS-X9824960SRC10=
MDS 9718 24-port 40G module, 24 QSFP-40G-SR-BD,2 Fab1, spare	DS-X9824960BDC18=

Description	Part Number
MDS 9718 24-port 40G module, 24 QSFP-40G-SR4, 2 Fab1, spare	DS-X9824960SRC18=
40GBASE-SR QSFP+ Module, 150M	QSFP-40G-SR4
40GBASE-SR QSFP+ Module, 150M, spare	QSFP-40G-SR4=
40GBASE-CSR QSFP+ Module, 400M	QSFP-40G-CSR4
40GBASE-CSR QSFP+ Module, 400M, spare	QSFP-40G-CSR4=
40GBASE-QSFP BiDi	QSFP-40G-SR-BD
40GBASE-QSFP BiDi, spare	QSFP-40G-SR-BD=
Active optical cable assembly	QSFP-H40G-AOCxM (x=1, 2, 3, 5, 7, or 10)

See SFP optics data sheet for additional product numbers and information:
http://www.cisco.com/c/en/us/products/collateral/interfaces-modules/transceiver-modules/data_sheet_c78-660083.html.

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.

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For More Information

For more information about the Cisco MDS 9700 Family Fibre Channel switching modules, visit <http://www.cisco.com/go/storage> or contact your local account representative.



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