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Cisco MDS 9710 Multilayer Director

Contents

Product overview

Enable enterprise clouds. Transform large storage networks. Lower operating costs. Deploy Fibre Channel, IBM Fibre Connectivity (FICON), Fibre Channel over IP (FCIP), and Fibre Channel over Ethernet (FCoE) on a single fabric. With the Cisco® MDS 9710 Multilayer Director (Figure 1), you'll meet the stringent requirements of large virtualized storage environments. As a director-class SAN switch, the MDS 9710 uses the same operating system and management interface as other Cisco data center switches. It brings intelligent capabilities to a high-performance, protocol-independent switch fabric. You'll gain uncompromising availability, security, and scalability; simplified management; and the capability to flexibly integrate new technologies.

Figure 1.
Cisco MDS 9710 Multilayer Director

Product highlights

The MDS 9710 offers the following features:

- **Outstanding speed:** The combination of the 16-Gbps, 32-Gbps Fibre Channel switching module and MDS 9710 Crossbar Switching Fabric-3 Module enables up to 3.5 Terabits per second (Tbps) of front-panel Fibre Channel throughput between modules in each direction for each of the eight MDS 9710 payload slots. Based on central arbitration and a crossbar fabric, the MDS 9710 architecture provides line-rate, nonblocking, predictable performance for all traffic conditions for every port up to the future 64-Gbps speed in the chassis.

- **High availability:** Get best-in-class availability. The MDS 9710 is the first director-class switch in which all major components, even the fabric card, are redundant. Obtain grid redundancy with the power supply and 1+1 redundant supervisors, and add another fabric card to enable N+1 fabric redundancy (32-Gbps).

- The MDS 9710 combines nondisruptive software upgrades, stateful process restart and failover, and full redundancy of all major components for best-in-class availability.

- **Fully integrated SAN analytics:** This best-in-class enterprise switch also offers state-of-the-art SAN analytics and telemetry capabilities that have been built into this next-generation hardware platform. This new state-of-the-art technology couples the next-generation port ASIC with a fully dedicated network processor (NPU) designed to complete analytics calculations in real time on the 32-Gbps line card. This new capability is extended due to the hardware capabilities of the 48-port 32-Gbps line card (DS-X9648-1536K9). The telemetry data extracted from the inspection of the frame headers are calculated on board (within the switch) and, using an industry-leading open format, can be streamed to any analytics-visualization platform.

- **Industry-leading scalability:** Power the largest storage environments with up to 24 Tbps of Fibre Channel bandwidth. A single chassis delivers 384 2/4/8-Gbps, 4/8/16-Gbps, 8/16/32-Gbps full line-rate, or 10-Gbps full line-rate autosensing Fibre Channel over Ethernet ports, and a single rack supports up to 1152 Fibre Channel ports.

- **Future readiness:** With the long-lasting chassis, customers have the flexibility of doing in-place, online upgrades to the new fabric module, MDS 9710 Crossbar Switching Fabric-3 Module. With the new fabric switching modules, the switch can be upgraded to support 64-Gbps line-rate ports. MDS 9710 Crossbar Switching Fabric-3 Module supports double the bandwidth of Fabric-1 and thus only half the number is needed to support currently shipping 32-Gbps line cards.

- **Intelligent network services:** Migrate your SAN islands to enterprise-wide storage networks with VSAN technology, Access Control Lists (ACLs) for hardware-based intelligent frame processing, and fabric-wide Quality of Service (QoS).

  ◦ **Integrated hardware-based VSANs and Inter-VSAN Routing (IVR):** Integration of VSANs into port-level hardware allows any port in a system or fabric to be partitioned to any VSAN. Deliver line-rate routing between any ports in a system or fabric without the need for external routing appliances.

  ◦ **Intelligent storage services:** Interoperability with intelligent service capabilities on other Cisco MDS 9000 Family platforms and the intelligent services switch provide services such as acceleration of storage applications for data replication, backup, and data migration to hosts and targets.

  ◦ **Smart Zoning:** Efficiently provision hardware access control entries specified by the zone set. Match smart zones to applications, application clusters, hypervisor clusters, or other data center entities. Avoid superfluous entries that allow servers (initiators) to talk to other servers or storage devices (targets) to talk to other storage devices. You'll gain larger zones with multiple initiators and targets without consuming excessive hardware resources. Automate zoning tasks and avoid creating many small zones.

- **Virtual machine transparency:** Deterministic hardware performance and a comprehensive feature set allow virtual machines to have the same SAN attributes as a physical server. On a per-virtual machine basis, the Cisco NX-OS Software offers VSANs, QoS policies, access control, performance monitoring, and data protection to promote the scalability and mobility of virtual machines. Cisco Data Center Network Manager (DCNM) provides end-to-end visibility all the way from the virtual machine down to the storage resource, with resource allocation, performance measurements, and predictions available on a per-virtual machine basis to enable rapid troubleshooting in mission-critical virtualized environments.

- **Comprehensive security:** In addition to support for services such as VSANs, hardware-enforced zoning, ACLs, per-VSAN Role-Based Access Control (RBAC), and Cisco TrustSec® Fibre Channel link encryption, Cisco MDS 9700 Series Multilayer Directors support a comprehensive security framework consisting of RADIUS and TACACS+, Fibre Channel Security Protocol (FC-SP), Secure File Transfer Protocol (SFTP), Secure Shell (SSH) Protocol, and Simple Network Management Protocol Version 3 (SNMPv3). Cisco TrustSec Fibre Channel link-encryption delivers transparent, hardware-based 16-Gbps or 32-Gbps line-rate encryption of Fibre Channel data in addition to 10-Gbps line-rate encryption.

- **Unified SAN management:** The MDS 9700 Series includes built-in storage network management with all features available through a Command-Line Interface (CLI) or Cisco Data Center Network Manager (DCNM), a centralized management tool that simplifies management of unified fabrics. DCNM supports integration with third-party storage management applications to allow transparent interaction with existing management tools. DCNM supports federation of up to 10 DCNM servers to manage up to 150,000 devices using a single management pane.

- **Sophisticated diagnostics:** Intelligent diagnostics, protocol decoding, network analysis tools, and the Cisco Call Home capability give you reliability, faster problem resolution, and reduced service costs. Starting with Cisco MDS 9000 NX-OS Release 6.2, the Cisco Generic Online Diagnostics (GOLD) framework replaces the Cisco Online Health Management System (OHMS) diagnostic framework on the new MDS 9700 Series chassis. GOLD is a suite of diagnostic tools that you can use to verify that hardware and internal data paths are operating properly. It offers boot-time diagnostics, continuous monitoring, standby fabric loopback tests, and on-demand and scheduled tests. Enable the rapid fault isolation and system monitoring that are critical in today's continuously operating environments.

- **Multiprotocol architecture:** A multilayer architecture enables a consistent feature set over a protocol-independent switch fabric. The MDS 9710 transparently integrates Fibre Channel, FCoE, and FICON.

  - 2/4/8-Gbps, 4/8/16-Gbps, 8/16/32-Gbps, 10-Gbps Fibre Channel, and 10 Gigabit Ethernet: The MDS 9710 supports 2/4/8/16-Gbps and 10-Gbps ports on the Cisco MDS 9700 48-Port 16-Gbps Fibre Channel Switching Module for both open-systems and FICON environments. The MDS 9710 also supports 10 Gigabit Ethernet clocked optics carrying Fibre Channel traffic. The MDS 9710 supports 4/8/16/32-Gbps on the Cisco MDS 9700 48-Port 32-Gbps Fibre Channel Switching Module.

  - **FICON:** The MDS 9710 is mainframe ready and supports for IBM System z FICON and Linux environments.

  - **Multihop FCoE:** Extend connectivity from FCoE and Fibre Channel fabrics to FCoE and Fibre Channel storage devices.

  - **SAN Extension FCIP support:** The Cisco MDS 9000 24/10-Port SAN Extension Module is supported on MDS 9700 Series Multilayer Directors. With 24 line-rate 2/4/8/10/16-Gbps Fibre Channel ports and eight 1- and 10-Gigabit Ethernet FCIP ports, this module enables deployment of large and scalable SAN extension solutions.

Main benefits

Reduce total cost of ownership with SAN consolidation

With the amount of data growing exponentially, organizations need efficient, cost-effective, large-scale SANs. Scale while managing your Total Cost of Ownership (TCO) with industry-leading port densities of up to 384 32-Gbps Fibre Channel ports per chassis. Deploy 1.5-Tbps front-panel Fibre Channel performance per slot and up to 24-Tbps front-panel Fibre Channel line-rate nonblocking system-level switching. Deploy intelligent fabric services, VSANs for consolidating physical SAN islands while maintaining logical boundaries, and IVR for sharing resources across VSANs. Consolidate your data into fewer, larger, and more manageable SANs, thus reducing the hardware footprint and associated Capital Expenditures (CapEx) and Operating Expenses (OpEx). On unified fabrics with converged LAN and SAN environments using lossless Ethernet, multihop FCoE protects your investments in existing storage infrastructure with any-to-any connectivity across multiple protocols.

Enterprise-class availability

The MDS 9710 is designed from the beginning for high availability. In addition to meeting the basic requirements of nondisruptive software upgrades and redundancy of all critical hardware components, the MDS 9710 software architecture offers outstanding availability. The Cisco MDS 9700 Series Supervisor-1 Module automatically restarts failed processes, making the MDS 9710 exceptionally robust. In the rare event that a supervisor module is reset, complete synchronization between the active and standby supervisor modules helps ensure stateful failover with no disruption of traffic.

The MDS 9710 is the first in the industry to provide redundancy on all major hardware components, as detailed in Table 1.

Table 1.   Cisco MDS 9710 redundancy

Component	Redundancy
Supervisors	1+1
Power supplies	Grid redundancy
Fabrics	N+1 redundancy

High availability is implemented at the fabric level using robust and high-performance Inter-Switch Links (ISLs). The port-channel capability allows you aggregate up to 16 physical links into one logical bundle. The bundle can consist of any speed-matched ports in the chassis, helping ensure that the bundle can remain active in the event of a port, Application-Specific Integrated Circuit (ASIC), or module failure. ISLs in a port channel can have significantly different lengths. This capability is valuable in campus and Metropolitan Area Network (MAN) environments, because logical links can now be spread over multiple physical paths, helping ensure uninterrupted connectivity even if one of the physical paths is disrupted. The MDS 9710 provides outstanding high availability, helping ensure that solutions exceed the 99.999 percent uptime requirements of today's most demanding environments.

Business transformation with enterprise cloud deployment

With industry-leading scalability and pay-as-you-grow flexibility, the MDS 9710 enables you to quickly scale enterprise clouds up or down as needed. You also receive these benefits:

- Multihop FCoE provisions storage in a multiprotocol unified fabric.

- Robust security protects multitenancy cloud applications.

- Predictable high performance meets stringent Service-Level Agreements (SLAs).

- Resilient connectivity helps ensure always-on cloud infrastructure.

- Advanced traffic management capabilities, such as QoS, quickly and cost-efficiently allocate elastic network capabilities to cloud applications.

Furthermore, Cisco DCNM provides resource monitoring and capacity planning on a per-virtual machine basis. You can efficiently:

- Consolidate enterprise cloud deployments.

- Federate up to 10 DCNM servers to easily manage large-scale clouds.

- Use information through Storage Management Initiative Specification (SMI-S)–based developer APIs to deliver IT as a service.

Advanced traffic management

Deploy and optimize large-scale fabrics more easily:

- **Virtual Output Queue (VOQ):** Help ensure line-rate performance on each port, independent of traffic pattern, by eliminating head-of-line blocking.

- **Up to 4095 buffer-to-buffer credits:** Using extended credits, allocate up to 4095 buffer credits from a pool of more than 6000 buffer credits for a module to ports as needed to greatly extend the distance for Fibre Channel SANs. Alternatively, assign up to 4095 buffer credits to an individual port for optimal bandwidth utilization across distances.

- **Port channels:** Aggregate up to 16 physical ISLs into a single logical bundle, providing optimized bandwidth utilization across all links. The bundle can consist of any speed-matched ports from any module in the chassis, helping ensure that the bundle can remain active even in the event of a module failure. The MDS 9000 Family switch architecture helps ensure that frames can never be reordered within a switch.

- **Fabric Shortest Path First (FSPF)–based multipathing:** Provide the intelligence to load-balance traffic across up to 16 Fibre Channel or FCoE equal-cost paths and, in the event of a switch failure, dynamically reroute traffic.

- **Quality of Service (QoS):** Use QoS to manage bandwidth and control latency to prioritize critical traffic.

Ease of management

The MDS 9710 provides three modes of management: the Cisco MDS 9000 Family CLI, Cisco DCNM, and integration with third-party storage management tools.

Adhering to the syntax of the widely known Cisco IOS® Software CLI, the Cisco MDS 9000 Family CLI is consistent and easy to learn and delivers broad management capabilities. The MDS 9000 Family CLI provides optimal capabilities: for instance, you can enable debugging modes for each switch feature and view a real-time updated activity log of control protocol exchanges. Log entries are time-stamped and listed in chronological order.

Cisco DCNM is the network's industry's first converged SAN and LAN management solution. It lets you manage all NX-OS devices, including the MDS 9000 Family and Cisco Fabric-3 Family products. Its intuitive GUI simplifies day-to-day operations of Cisco unified fabrics in virtualized data center environments.

DCNM offers such functions as:

- Monitoring of events and performance historically and at scale.
- Wizard- and template-based provisioning of NX-OS technologies and services.
- Cisco VMpath analytics, with dynamic topology views for extended visibility into virtual infrastructure.
- Resource management through trend analysis of inventory and performance.
- Rule-based event notification and filtering.
- RBAC to provide separation between network and storage teams.

You can scale to large deployments through scale-out server architecture with automated failover capability. Provide a resilient management system that centralizes infrastructure and path monitoring across geographically dispersed data centers. The DCNM base management function is available at no charge, and advanced features are unlocked with a license. The application can be installed on Linux and Microsoft Windows operating systems and supports both PostgreSQL and Oracle databases.

Comprehensive solution for robust security

The extensive security framework of the MDS 9710 protects sensitive data crossing enterprise networks. It provides intelligent, port-level packet inspection, including the use of ACLs for hardware enforcement of zones, VSANs, and advanced port security features. VSANs are used to achieve greater security and stability by providing complete isolation of devices that are connected to the same physical SAN. IVR enables controlled sharing of resources between VSANs. In addition, FC-SP provides switch-to-switch and host-to-switch Diffie-Hellman Challenge Handshake Authentication Protocol (DH-CHAP) support for RADIUS and TACACS+. This feature helps ensure that only authorized devices access protected storage networks. To further protect traffic within and between data centers, Cisco TrustSec Fibre Channel link encryption, available in the MDS 9700 Series 16-Gbps and 32-Gbps modules, lets you transparently encrypt ISLs at up to line-rate speeds.

Advanced diagnostics and troubleshooting tools

To manage large-scale storage networks, you need proactive diagnostics tools, tools to verify connectivity and route latency, and traffic analysis tools. We deliver a comprehensive tool set for analyzing, troubleshooting, and debugging storage networks. Power-On Self-Test (POST) and online diagnostics proactively monitor system health. Identify the exact path and timing of flows with capabilities such as Fibre Channel traceroute. Capture network traffic using Cisco Switched Port Analyzer (SPAN) and Remote SPAN (RSPAN). Then analyze traffic with the Cisco Fabric Manager – Cisco Traffic Analyzer, an embedded Fibre Channel analyzer. You'll gain sophisticated performance analysis and SLA-accounting capabilities by collecting port-based and flow-based statistics.

Convergence with multihop FCoE

FCoE allows an evolutionary approach to network and I/O convergence and lets you preserve all Fibre Channel constructs; maintain the latency, security, and traffic management attributes of Fibre Channel; and preserve your investments in Fibre Channel tools, training, and SANs. Sharing the same operating system and management plane as the Cisco Nexus switches, the MDS 9710 coexists invisibly in a unified fabric with any-to-any connectivity for Fibre Channel and FCoE.

Integrated mainframe support

The MDS 9710 fully supports IBM System z FICON and Linux environments. It supports FICON protocol transport in both cascaded and noncascaded fabrics, as well as an intermix of FICON and open-systems Fibre Channel Protocol (FCP) traffic on the same switch. IBM Control Unit Port (CUP) enables in-band management of MDS 9000 Family switches from mainframe management applications. A fabric-binding feature helps ensure that ISLs are enabled only between specified switches in the fabric-binding configuration.

Product specifications

Table 2 lists the product specifications for the Cisco MDS 9710 Multilayer Director.

Table 2.   Technical specifications

Feature	Description
Product compatibility	Cisco MDS 9000 Family
Software compatibility	Cisco MDS NX-OS Software Release 6.2.1 or later Cisco MDS NX-OS Software Release 8.4.1 or later for Supervisor-4/Fabric-3 support
Indicators	Power supply LED FAN LED Supervisor LED Fabric LED Line-card module LED

Feature	Description
Protocols	• Fibre Channel standards
	• FC-PH, Revision 4.3 (ANSI INCITS 230-1994)
	• FC-PH, Amendment 1 (ANSI INCITS 230-1994/AM1-1996)
	• FC-PH, Amendment 2 (ANSI INCITS 230-1994/AM2-1999)
	• FC-PH-2, Revision 7.4 (ANSI INCITS 297-1997)
	• FC-PH-3, Revision 9.4 (ANSI INCITS 303-1998)
	• FC-PI, Revision 13 (ANSI INCITS 352-2002)
	• FC-PI-2, Revision 10 (ANSI INCITS 404-2006)
	• FC-PI-3, Revision 4 (ANSI INCITS 460-2011)
	• FC-PI-4, Revision 8 (ANSI INCITS 450-2008)
	• FC-PI-5, Revision 6 (ANSI INCITS 479-2011)
	• FC-FS, Revision 1.9 (ANSI INCITS 373-2003)
	• FC-FS-2, Revision 1.01 (ANSI INCITS 424-2007)
	• FC-FS-2, Amendment 1 (ANSI INCITS 424-2007/AM1-2007)
	• FC-FS-3, Revision 1.11 (ANSI INCITS 470-2011)
	• FC-LS, Revision 1.62 (ANSI INCITS 433-2007)
	• FC-LS-2, Revision 2.21 (ANSI INCITS 477-2011)
	• FC-SW-2, Revision 5.3 (ANSI INCITS 355-2001)
	• FC-SW-3, Revision 6.6 (ANSI INCITS 384-2004)
	• FC-SW-4, Revision 7.5 (ANSI INCITS 418-2006)
	• FC-SW-5, Revision 8.5 (ANSI INCITS 461-2010)
	• FC-GS-3, Revision 7.01 (ANSI INCITS 348-2001)
	• FC-GS-4, Revision 7.91 (ANSI INCITS 387-2004)
	• FCP, Revision 12 (ANSI INCITS 269-1996)
	• FCP-2, Revision 8 (ANSI INCITS 350-2003)
	• FCP-3, Revision 4 (ANSI INCITS 416-2006)
	• FCP-4, Revision 2b (ANSI INCITS 481-2011)
	• FC-SB-2, Revision 2.1 (ANSI INCITS 349-2001)
	• FC-SB-3, Revision 1.6 (ANSI INCITS 374-2003)
	• FC-SB-3, Amendment 1 (ANSI INCITS 374-2003/AM1-2007)
	• FC-SB-4, Revision 3.0 (ANSI INCITS 466-2011)
	• FC-SB-5, Revision 2.00 (ANSI INCITS 485-2014)
	• FC-BB-6, Revision 2.00 (ANSI INCITS 509-2014)
	• FC-BB-2, Revision 6.0 (ANSI INCITS 372-2003)
	• FC-BB-3, Revision 6.8 (ANSI INCITS 414-2006)
	• FC-BB-4, Revision 2.7 (ANSI INCITS 419-2008)
	• FC-BB-5, Revision 2.0 (ANSI INCITS 462-2010)
	• FC-VI, Revision 1.84 (ANSI INCITS 357-2002)
	• FC-SP, Revision 1.8 (ANSI INCITS 426-2007)
	• FC-SP-2, Revision 2.71 (ANSI INCITS 496-2012)
	• FAIS, Revision 1.03 (ANSI INCITS 432-2007)
	• FAIS-2, Revision 2.23 (ANSI INCITS 449-2008)
	• FC-IFR, Revision 1.06 (ANSI INCITS 475-2011)
	• FC-FLA, Revision 2.7 (INCITS TR-20-1998)
	• FC-PLDA, Revision 2.1 (INCITS TR-19-1998)

Feature	Description
	• FC-Tape, Revision 1.17 (INCITS TR-24-1999)
	• FC-MI, Revision 1.92 (INCITS TR-30-2002)
	• FC-MI-2, Revision 2.6 (INCITS TR-39-2005)
	• FC-MI-3, Revision 1.03 (INCITS TR-48-2012)
	• FC-DA, Revision 3.1 (INCITS TR-36-2004)
	• FC-DA-2, Revision 1.06 (INCITS TR-49-2012)
	• FC-MSQS, Revision 3.2 (INCITS TR-46-2011)
	• Fibre Channel classes of service: Class 2, Class 3, and Class F
	• Fibre Channel standard port types: E, F, FL, and B
	• Fibre Channel enhanced port types: SD, ST, and TE
	• FCoE standard port types: VE and VF
	• IEEE 802.1Qbb-2011: Priority-based Flow Control (PFC)
	• IEEE 802.3db-2011: MAC address control frame for priority-based flow control
	• IEEE 802.1Qaz-2011: Enhanced transmission selection for bandwidth sharing between traffic classes (ETS and DCBX)
	• IP over Fibre Channel (RFC 2625)
	• IPv6, IPv4, and Address Resolution Protocol (ARP) over Fibre Channel (RFC 4338)
	• Extensive IETF-standards-based TCP/IP, SNMPv3, and Remote Monitoring (RMON) MIBs
	• RFC 3643 and 3821 FCIP
Chassis slot configuration	• Line-card slots: 8
	• Supervisor slots: 2
	• Crossbar switching fabric slots: 6* (3 fabric modules for 16-Gbps line rate and 6 fabric modules for 32-Gbps line rate)
	• Fan trays: 3 fan trays at the back of the chassis
	• Power supply bays: 8

Switching capability per fabric	Number of Fabric-3 cards	Front-panel Fibre Channel bandwidth per slot	FCoE bandwidth per slot
	1	512 Gbps	440 Gbps
	2	1024 Gbps	880 Gbps
	3	1536 Gbps	1320 Gbps
	4	2048 Gbps	1760 Gbps
	5	2560 Gbps	2200 Gbps
	6	3072 Gbps	2640 Gbps

Feature	Description
Performance and scalability	- Up to 24-Tbps front-panel Fibre Channel switching bandwidth and 21Tbps of FCoE bandwidth - Supported Fibre Channel port speeds 2/4/8-Gbps autosensing; optionally configurable (2G not supported on 32-Gbps module) 4/8/16-Gbps autosensing; optionally configurable 8/16/32-Gbps autosensing; optionally configurable 10-Gbps Fibre Channel - Buffer credits: 48-port line-rate 16-Gbps advanced Fibre Channel modules: - Up to 500 per port (dedicated-mode ports) standard - Up to 4095 on an individual port (dedicated-mode ports with optional Cisco MDS 9700 Enterprise Package license activated) - Buffer credits: 48-port line-rate 32-Gbps Fibre Channel modules: - Up to 500 per port (dedicated-mode ports) standard - Up to 8191 on an individual port (dedicated-mode ports with optional Cisco MDS 9700 Enterprise Package license activated) - Ports per chassis - Up to 384 2/4/8-Gbps, 4/8/16-Gbps, 8/16/32-Gbps, or 10-Gbps Fibre Channel ports - Ports per rack - Up to 1152 2/4/8-Gbps, 4/8/16-Gbps, 8/16/32-Gbps, or 10-Gbps Fibre Channel ports - Port channel: Up to 16 ports (The channel can span any speed-matched port on any module in the chassis.)
Features and functions	
Fabric services	- Name server - Registered State Change Notification (RSCN) - Login services - Fabric Configuration Server (FCS) - Broadcast - In-order delivery
Advanced functions	- VSAN - IVR - Port channel with multipath load balancing - QoS-flow-based, zone-based - N-port ID Virtualization (NPIV)
Diagnostics and troubleshooting tools	- POST diagnostics - Online diagnostics - Internal port loopbacks - SPAN and RSPAN - Fibre Channel traceroute - Fibre Channel ping - Fibre Channel debug - Cisco Fabric Analyzer - Syslog - Online system health - Port-level statistics - Real-Time Protocol (RTP) debug

Feature	Description

Network security	• VSANs
	• ACLs
	• Per-VSAN RBAC
	• Fibre Channel zoning
	  ◦ N-Port Worldwide Name (WWN)
	  ◦ N-port FC-ID
	  ◦ Fx-port WWN
	  ◦ Fx-port WWN and interface index
	  ◦ Fx-port domain ID and interface index
	  ◦ Fx-port domain ID and port number
	• FC-SP[1]
	  ◦ DH-CHAP switch-to-switch authentication
	  ◦ DH-CHAP host-to-switch authentication
	• Port security and fabric binding
	• Management access
	  ◦ SSHv2 implementing Advanced Encryption Standard (AES)
	  ◦ SNMPv3 implementing AES
	  ◦ SFTP
	• Cisco TrustSec Fibre Channel link encryption[1]

FICON	• FC-SB-6 compliant • Cascaded FICON fabrics • Intermix of FICON and Fibre Channel FCP traffic • FICON CUP management interface • Exchange-based routing ready
Serviceability	• Configuration file management • Nondisruptive software upgrades for Fibre Channel interfaces • Cisco Call Home feature • Power-management LEDs • Port beaconing • System LEDs • SNMP traps for alerts • Network boot
Reliability and availability	• Online, nondisruptive software upgrades • Stateful nondisruptive supervisor module failover • Hot-swappable redundant supervisor modules • Hot-swappable redundant fabric modules* • Hot-swappable 2N redundant power • Hot-swappable fan trays with integrated temperature and power management • Hot-swappable Enhanced Small Form-Factor Pluggable (SFP+) optics (2/4/8/10/16/32-Gbps Fibre Channel and 10 Gigabit Ethernet). 2G speeds not supported on 32G switching module. • Hot-swappable switching modules • Stateful process restart • Any module, any port configuration for port channels • Fabric-based multipathing • Per-VSAN fabric services

Feature	Description
	• Online diagnostics • Port tracking • Virtual Routing Redundancy Protocol (VRRP) for management

* A minimum of three fabric modules either Fabric-1 or Fabric-3 is needed to support a fully populated chassis with four Cisco MDS 9700 48-Port 16-Gbps Fibre Channel cards; four fabric modules are needed to provide N+1 redundancy. A minimum of six Fabric-1 or three Fabric-3 modules is needed to support a fully populated chassis with four Cisco MDS 9700 48-Port 32-Gbps Fibre Channel cards.

[1] This feature is supported from software release NX-OS 6.2(9) onward.

Feature	Description

Network management	• Access methods through Cisco MDS 9700 Series Supervisor-1 Module
	  ◦ Out-of-band 10/100/1000 Ethernet port
	  ◦ RS-232 serial console port
	  ◦ In-band IP over Fibre Channel
	• Access methods through Cisco MDS 9700 Series Fibre Channel switching module
	  ◦ In-band FICON CUP over any IBM System z FICON Channel
	• Access protocols
	  ◦ CLI using console and Ethernet ports
	  ◦ SNMPv3 using Ethernet port and in-band IP over Fibre Channel access
	  ◦ FICON CUP
	• Distributed Device Alias service
	• Network security
	  ◦ Per-VSAN role-based access control 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

Programming interface	• Scriptable CLI • Cisco Data Center Network Manager web services API • Cisco DCNM GUI

Power and cooling	• Power supplies (3000W AC)
	  ◦ Input: 100 to 240V AC nominal (±10% for full range); 16A nominal; 50 to 60 Hz nominal (±3 Hz for full range)
	  ◦ Output: 1451W 50V ±4% 28A, 3.4V ±4% 15A (100 to 120V AC input), 3051W 50V ±4% 60A, and 3.4V ±-4% 15A (200 to 240V AC input)
	• Air flow
	  ◦ The Cisco MDS 9710 provides 700 Linear Feet Per Minute (LFM) average system velocity, and between 40 and 160 Cubic Feet Per Minute (CFM) total flow through each line-card slot depending on the line-card type and fan-speed setting.
	  ◦ With the Cisco MDS 9710 using front-to-back cold-aisle and hot-aisle air flow, Cisco recommends that you maintain a minimum air space of 7 inches (17.78 cm) between walls, such as in a cabinet, and the chassis front and back air vents.

Feature	Description	
Power consumption (typical)	**Cisco MDS 9710 Multilayer Director with three fabrics (Watts)**	
	Ports	**Watts**
	192	2695
	288	3655
	384	4615
Environmental	- 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: 10 to 90% - Relative humidity, ambient (noncondensing) nonoperating and storage: 10 to 95% - Altitude, operating: –197 to 6500 ft (–60 to 2000m)	
Physical dimensions (H x W x D)	- Chassis dimensions (14 rack units [14RU]): 24.35 x 17.3 x 34.0 in. (61.9 x 43.9 x 86.4 cm) - Cisco MDS 9700 48-Port 16-Gbps Fibre Channel line card: 1.75 x 15.9 x 21.8 in. (4.4 x 40.39 x 55.37 cm) - Cisco MDS 9700 48-Port 32-Gbps Fibre Channel line card; 1.75 x 15.9 x 21.8 in. (4.4 x 40.39 x 55.37 cm) - Power supply (3000W AC): 22.04 x 3.95 x 1.6 in. (55.98 x 10.03 x 4.06 cm) - Power supply (3000W DC): 23.54 x 3.95 x 1.6 in. (59.79 x 10.03 x 4.06 cm) - Fabric-1 module: 18.09 x 2.02 x 9.22 in. (45.95 x 5.13 x 23.42 cm) - Fabric-3 module: 18.09 x 2.02 x 9.22 in. (45.95 x 5.13 x 23.42 cm) - Supervisor-1 module: 2.04 x 7.5 x 21.8 in. (5.18 x 19.05 x 55.37 cm) - Supervisor-4 module: 2.04 x 7.94 x 21.85 in. (5.18 x 20.17 x 55.5 cm) - Fan tray: 23.54 x 5.15 x 4.09 in. (59.79 x 13.08 x 10.39 cm) - SFP+: 0.49 x 0.54 x 2.22 in. (1.25 x 1.36 x 5.65 cm)	
Weight	- Chassis (includes fans): 185.5 lb (84.2 kg) 48-port 16-Gbps Fibre Channel line card: 17 lb (7.71 kg) 48-port 32-Gbps Fibre Channel line card: 17.5 lb (7.94 kg) - Power supply (3000W AC): 6 lb (2.7 kg) - Fabric-1 module: 11 lb (5.0 kg) - Fabric-3 module: 20 lb (9.07 kg) - Supervisor-1 module: 7 lb (3.2 kg) - Supervisor-4 module: 7.72 lb (3.5 kg) - Fan tray: 8.5 lb (3.86 kg) - Supervisor blank cover: 1.25 lb (0.57 kg) - Line-card blank cover: 4.5 lb (2.04 kg)	

Feature	Description
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 - FIPS certified - FIPS 140-2 Level 2

Ordering information

Table 3 provides ordering information for the Cisco MDS 9710 Multilayer Director.

Table 3.   Ordering information

Part number	Product description
Cisco MDS 9700 Series component	
DS-C9710	MDS 9710 Chassis, No Power Supplies, Fans Included
DS-X97-SF4-K9[1]	MDS 9700 Series Supervisor-4
DS-X9710-FAB3[1]	MDS 9710 Crossbar Switching Fabric-3 Module
DS-CAC97-3KW	MDS 9700 3000W AC power supply

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[1] Requires MDS NX-OS version 8.4.1 or later

Part number	Product description
DS-CDC97-3KW	MDS 9700 3000W DC power supply
DS-X9748-3072-TK9	MDS 9700 48-port 64-Gbps FC module with 48x 32Gbps SW Optics
DS-X9748-3072-VK9	MDS 9700 48-port 64-Gbps FC module with 48x64 Gbps SW Optics
DS-X9648-1536K9	MDS 9700 48-Port 32-Gbps Fibre Channel Switching Module
DS-X9334-K9	Cisco MDS 9000 Family 24/10 SAN Extension Module
DS-C9710-V2K9	MDS 9710 V2 Base Config: Chassis, 2 Sup-4, 3 Fabric-3, 4 3K AC
DS-C9710-V3K9	MDS 9710 Config: Chassis, 2 Sup-4, 6 Fabric-3, 6 3K AC
DS-SFP-FC32G-SW	32 Gbps Fibre Channel SW SFP+, LC
DS-SFP-FC32G-LW	32 Gbps Fibre Channel LW SFP+, LC
DS-SFP-FC16G-SW	16 Gbps Fibre Channel SW SFP+, LC
DS-SFP-FC16G-LW	16 Gbps Fibre Channel LW SFP+, LC
DS-SFP-FC16GELW	16 Gbps Fiber Channel ELW SFP+, LC
DS-SFP-FC10G-SW	10 Gbps Fibre Channel SW SFP+, LC
DS-SFP-FC10G-LW	10 Gbps Fibre Channel LW SFP+, LC
DS-SFP-FC8G-SW	8 Gbps Fibre Channel SW SFP+, LC
DS-SFP-FC8G-LW	8 Gbps Fibre Channel LW SFP+, LC
DS-SFP-FC8G-ER	8 Gbps Fibre Channel Extended Reach SFP+, LC
SFP-10G-SR	10GBASE-SR SFP Module
SFP-10G-LR	10GBASE-LR SFP Module
SFP-10G-ER	10GBASE-ER SFP Module
CAB-9K16A-AUS	Power cord 250VAC 16A, Australia, source plug AU20S3
CAB-9K16A-CH	Power cord 250VAC 16A, China, source plug GB16C
CAB-9K16A-EU	Power cord 250VAC 16A, Europe, source plug CEE 7/7
CAB-9K16A-INT	Power cord 250VAC 16A, international, source plug IEC 309
CAB-9K16A-ISR	Power cord 250VAC 16A, Israel, source plug SI16S3
CAB-9K16A-SA	Power cord 250VAC 16A, South Africa, source plug EL 208, SABS 164-1
CAB-9K16A-SW	Power cord 250VAC 16A, Switzerland, source plug SEV 5934-2 Type 23

Part number	Product description
CAB-9K16A-US1	Power cord 250VAC 16A, United States/Japan, source plug NEMA 6-20
CAB-9K16A-US2	Power cord 250VAC 16A, United States/Japan, source plug NEMA L6-20
CAB-9K20A-NA	Power Cord, 125VAC 20A NEMA 5-20 Plug, North America/Japan
CAB-9K16A-KOR	Power Cord 250VAC 16A, Korea, Src Plug
CAB-9K16A-ARG	Power Cord 250VAC 16A, Argentina, Src Plug IR2073-C19
CAB-9K16A-BRZ	Power Cord 250VAC 16A, Brazil, Src Plug EL224-C19
CAB-C19-CBN	Cabinet Jumper Power Cord, 250 VAC 16A, C20-C19 Connectors
DS-C9710-FD-MB	MDS 9710 - Front Door Kit
Licensed software	
M97ENTK9	Enterprise package license for 1 MDS9700 switch
DCNM-SAN-M97-K9	DCNM for SAN License for MDS 9700
M97FIC1K9[2]	Mainframe package license for 1 MDS9700 switch
L-D-M97S-AXK9	DCNM License for SAN Analytics on MDS9700 3 year
L5-D-M97S-AXK9	DCNM License for SAN Analytics on MDS9700 5 year
Spare component	
DS-C9710=	MDS 9710 Chassis, Spare, No Power Supplies, Fans Included
DS-X97-SF4-K9=	MDS 9700 Series Supervisor-4
DS-X9710-FAB3=	MDS 9710 Crossbar Switching Fabric-3 Module
DS-CAC97-3KW=	MDS 9700 3000W AC power supply
DS-CDC97-3KW=	MDS 9700 3000W DC power supply
DS-C9710-FAN=	MDS 9710 FAN Tray
DS-X9334-K9=	Cisco MDS 9000 Family 24/10 SAN Extension Module, Spare
DS-X9748-3072-TK9=	MDS 9700 48-port 64-Gbps FC module with 48x 32Gbps SW Optics, Spare
DS-X9748-3072-VK9=	MDS 9700 48-port 64-Gbps FC module with 48x64 Gbps SW Optics, Spare
DS-X9648-1536K9=	MDS 9700 48-Port 32-Gbps Fibre Channel Switching Module, Spare

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[2] The Mainframe license is required for pre-9.4.1a Cisco MDS NX-OS FICON Qualified releases. 9.4.1a onwards Mainframe feature set is included in the base NX-OS software, and it doesn't require a license.

Part number	Product description
DS-SFP-FC64G-SW=	64 Gbps Fibre Channel SW SFP+, LC, Spare
DS-SFP-FC32G-SW=	32 Gbps Fibre Channel SW SFP+, LC, Spare
DS-SFP-FC32G-LW=	32 Gbps Fibre Channel LW SFP+, LC, Spare
DS-SFP-FC16G-SW=	16 Gbps Fibre Channel SW SFP+, LC, Spare
DS-SFP-FC16G-LW=	16 Gbps Fibre Channel LW SFP+, LC, Spare
DS-SFP-FC16GELW=	16 Gbps Fiber Channel ELW SFP+, LC, Spare
DS-SFP-FC10G-SW=	10 Gbps Fibre Channel SW SFP+, LC, Spare
DS-SFP-FC10G-LW=	10 Gbps Fibre Channel LW SFP+, LC, Spare
DS-SFP-FC8G-SW=	8 Gbps Fibre Channel SW SFP+, LC, Spare
DS-SFP-FC8G-LW=	8 Gbps Fibre Channel LW SFP+, LC, Spare
DS-SFP-FC8G-ER=	8 Gbps Fibre Channel Extended Reach SFP+, LC, Spare
DS-SFP-10GE-SR=SFP-10G-SR=	10GBASE-SR SFP Module, Spare
DS-SFP-10GE-LR=SFP-10G-LR=	10GBASE-LR SFP Module, Spare
SFP-10G-ER=	10GBASE-ER SFP Module, Spare
DS-CWDM8G1470=	1470 nm CWDM 2/4/8-Gbps Fibre Channel SFP+, Spare
DS-CWDM8G1490=	1490 nm CWDM 2/4/8-Gbps Fibre Channel SFP+, Spare
DS-CWDM8G1510=	1510 nm CWDM 2/4/8-Gbps Fibre Channel SFP+, Spare
DS-CWDM8G1530=	1530 nm CWDM 2/4/8-Gbps Fibre Channel SFP+, Spare
DS-CWDM8G1550=	1550 nm CWDM 2/4/8-Gbps Fibre Channel SFP+, Spare
DS-CWDM8G1570=	1570 nm CWDM 2/4/8-Gbps Fibre Channel SFP+, Spare
DS-CWDM8G1590=	1590 nm CWDM 2/4/8-Gbps Fibre Channel SFP+, Spare
DS-CWDM8G1610=	1610 nm CWDM 2/4/8-Gbps Fibre Channel SFP+, Spare
DWDM-SFP10G-xx.xx=	Cisco 10GBASE DWDM SFP+ Modules, Spare
CAB-9K16A-AUS=	Power cord 250VAC 16A, Australia, source plug AU20S3, Spare
CAB-9K16A-CH=	Power cord 250VAC 16A, China, source plug GB16C, Spare
CAB-9K16A-EU=	Power cord 250VAC 16A, Europe, source plug CEE 7/7, Spare
CAB-9K16A-INT=	Power cord 250VAC 16A, international, source plug IEC 309, Spare

Part number	Product description
CAB-9K16A-ISR=	Power cord 250VAC 16A, Israel, source plug SI16S3, Spare
CAB-9K16A-SA=	Power cord 250VAC 16A, South Africa, source plug EL 208, SABS 164-1, Spare
CAB-9K16A-SW=	Power cord 250VAC 16A, Switzerland, source plug SEV 5934-2 Type 23, Spare
CAB-9K16A-US1=	Power cord 250VAC 16A, United States/Japan, source plug NEMA 6-20, Spare
CAB-9K16A-US2=	Power cord 250VAC 16A, United States/Japan, source plug NEMA L6-20, Spare
CAB-9K20A-NA=	Power Cord, 125VAC 20A NEMA 5-20 Plug, North America/Japan, Spare
CAB-9K16A-KOR=	Power Cord 250VAC 16A, Korea, Src Plug, Spare
CAB-9K16A-ARG=	Power Cord 250VAC 16A, Argentina, Src Plug IR2073-C19, Spare
CAB-9K16A-BRZ=	Power Cord 250VAC 16A, Brazil, Src Plug EL224-C19, Spare
CAB-C19-CBN=	Cabinet Jumper Power Cord, 250 VAC 16A, C20-C19 Connectors, Spare
DS-C9710-FD-MB=	MDS 9710 - Front Door Kit, Spare
Licensed software	
M97ENTK9=	Enterprise package license for 1 MDS9700 switch
L-M97ENTK9=	E-delivery Enterprise package license for 1 MDS9700 switch
DCNM-SAN-M97-K9=	DCNM for SAN License for MDS 9700
L-DCNM-S-M97-K9=	E-delivery DCNM for SAN Package Advanced Edition for MDS 9700
M97FIC1K9=[2]	Mainframe package license for 1 MDS9700 switch
L-M97FIC1K9=[2]	E-delivery Mainframe package license for 1 MDS9700 switch
L-D-M97S-AXK9=	DCNM License for SAN Analytics on MDS9700 3 year spare
L5-D-M97S-AXK9=	DCNM License for SAN Analytics on MDS9700 5 year spare

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For more information

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

For more information about the Cisco MDS 9710, visit https://www.cisco.com/go/storage or contact your local account representative.

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