Cisco MDS 9710 Multilayer Director

Product Overview

Enable enterprise clouds. Transform large storage networks. Lower operating costs. Deploy Fibre Channel, IBM Fibre Connectivity (FICON), 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 Cisco 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, scalability, simplified management, and the capability to flexibly integrate new technologies.

Figure 1. Cisco MDS 9710 Multilayer Director

Product Highlights

The Cisco MDS 9710 offers the following features:

- Outstanding SAN performance: The combination of the 16-Gbps Fibre Channel switching module and Fabric-1 crossbar switching modules enables up to 1.5 Tbps of front-panel Fibre Channel throughput between modules in each direction for each of the eight Cisco MDS 9710 payload slots. This is twice the bandwidth needed to support a 48-port 16-Gbps Fibre Channel module at full line rate. Based on central arbitration and a crossbar fabric, the Cisco MDS 9710 architecture provides 16-Gbps line-rate, nonblocking, predictable performance across all traffic conditions for every port in the chassis.

- High availability: Simply best-in-class availability. The Cisco MDS 9710 is the first director-class switch in which all major components, even the fabric card, are redundant. Obtain grid redundancy on the power supply and 1+1 redundant supervisors, and add an additional fabric card to enable N+1 fabric redundancy. The Cisco MDS 9710 combines nondisruptive software upgrades, stateful process restart and failover, and full redundancy of all major components for best-in-class availability.
- Industry-leading scalability: Power the largest storage environments with up to 24 terabits per second (Tbps) of Fibre Channel bandwidth. A single chassis delivers 384 2/4/8-Gbps, 4/8/16-Gbps, or 10-Gbps full line-rate autosensing Fibre Channel ports, and a single rack supports up to 1152 Fibre Channel ports.
- Intelligent network services: Migrate your SAN islands to enterprisewide storage networks with VSAN technology, access control lists (ACLs) for hardware-based intelligent frame processing, and fabricwide 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 external routing appliances.
    - Intelligent storage services: Interoperability with intelligent service capabilities on other Cisco MDS 9000 Family platforms and the intelligent services switch provides 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 Prime™ Data Center Network Manager (DCNM) provides end-to-end visibility all the way from the virtual machine down to the storage, 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® 1 Fibre Channel link encryption, the Cisco MDS 9700 Series supports a comprehensive security framework consisting of RADIUS and TACACS+, Fibre Channel Security Protocol (FC-SP) 1, 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 line-rate encryption of Fibre Channel data on 16-Gbps Fibre Channel switching modules in addition to 10-Gbps line-rate encryption.
- Unified SAN management: The Cisco MDS 9700 Series includes built-in storage network management with all features available through a command-line interface (CLI) or Cisco Prime DCNM, a centralized management tool that simplifies management of unified fabrics. Cisco DCNM supports integration with third-party storage management applications to allow seamless interaction with existing management tools. Cisco DCNM supports federation of up to 10 Cisco 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 6.2, the Cisco Generic Online Diagnostics (GOLD) framework replaces the Cisco Online Health Management System (OHMS) diagnostic framework on the new Cisco MDS 9700 Series Multilayer Director chassis. Cisco GOLD is a suite of diagnostic verifies 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 Cisco MDS 9710 transparently integrates Fibre Channel, FCoE, and IBM FICON.
  - 2/4/8-Gbps, 4/8/16-Gbps, 10-Gbps Fibre Channel, and 10 Gigabit Ethernet: The Cisco 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 Cisco MDS 9710 also supports 10 Gigabit Ethernet clocked optics carrying Fibre Channel traffic.
  - FICON: The Cisco 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.

Main Benefits

Reduce TCO with SAN Consolidation

With data growing exponentially, organizations need efficent, cost-effective, large-scale SANs. Scale while managing TCO with industry-leading port densities of up to 384 16-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 and operating expenses. On unified fabrics with converged LAN and SAN using lossless Ethernet, multihop FCoE protects investments in existing storage infrastructure with any to-any connectivity across multiple protocols.

Enterprise-Class Availability

The Cisco 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 Cisco MDS 9710 software architecture offers outstanding availability. The Cisco MDS 9700 Series Supervisor Modules automatically restart failed processes, making the Cisco 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.

Cisco MDS 9710 provides the industry's first redundancy on all major hardware components, as detailed in Table 1.

Table 1. Redundancy Details for Cisco MDS 9710

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 PortChannel 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 PortChannel 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 Cisco 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 Cisco 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, like quality of service (QoS), quickly and cost-efficiently allocate elastic network capabilities to cloud applications

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

- Consolidate enterprise cloud deployments
- Federate up to 10 Cisco Prime 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): Helps 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, allows up to 4095 buffer credits from a pool of more than 6000 buffer credits for a module to be allocated to ports as needed to greatly extend the distance for Fibre Channel SANs; alternatively, 4095 buffer credits can be assigned to an individual port for optimal bandwidth utilization across distance.

- PortChannels: Allow users to 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, and the Cisco MDS 9000 Family switch architecture helps ensure that frames can never be reordered within a switch.
- Fabric Shortest Path First (FSPF)-based multipathing: Provides the intelligence to load balance across up to 16 Fibre Channel or FCoE equal-cost paths and, in the event of a switch failure, dynamically reroute traffic.
- QoS: Can be used to manage bandwidth and control latency to prioritize critical traffic.

Ease of Management

The Cisco MDS 9710 provides three modes of management: the Cisco MDS 9000 Family CLI, Cisco Prime 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, easy to learn, and delivers broad management capabilities. The Cisco MDS 9000 Family CLI provides optimal capabilities, such as enabling debugging modes for each switch feature and allowing you to view a real-time updated activity log of control protocol exchanges. Each log entry is time-stamped and listed in chronological order.

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

The Cisco Prime DCNM offers such functionality as:

- Monitoring of events and performance historically and at scale
- Wizard- and template-based provisioning of Cisco 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
- Role-based access control 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 Cisco Prime 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 Cisco MDS 9710 protects sensitive data crossing enterprise networks. It features intelligent, port-level packet inspection, including the use of access control lists (ACLs) for hardware enforcement of zones, VSANs, and advanced port security features. Virtual SANS (VSANs) are used to achieve greater security and stability by providing complete isolation of devices that are connected to the same physical SAN. Inter-VSAN routing (IVR) enables controlled sharing of resources between VSANs. In addition, Fibre Channel Security Protocol (FC-SP) provides switch-to-switch and host-to-switch Diffie-Hellman Challenge Handshake Authentication Protocol (DH-CHAP) supporting RADIUS or TACACS+. This ensures 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 Cisco MDS 9700 Series 16-Gbps modules, lets you transparently encrypt ISLs at up to line-rate speeds.

Advanced Diagnostics and Troubleshooting Tools

Managing large-scale storage networks requires proactive diagnostics, tools to verify connectivity and route latency, and traffic analysis. 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 like Fibre Channel traceroute. Capture network traffic using Cisco Switched Port Analyzer (SPAN) and Remote SPAN (RSPAN). Then analyze traffic with the Cisco Fabric Analyzer, an embedded Fibre Channel analyzer. You'll gain sophisticated performance analysis and SLA accounting by collecting port-based and flow-based statistics.

Convergence with Multihop FCoE

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

Integrated Mainframe Support

The Cisco MDS 9710 fully supports IBM System z FICON and Linux environments. It supports IBM FICON protocol transport in both cascaded and noncascaded fabrics, as well as an intermix of IBM FICON and open-systems Fibre Channel Protocol traffic on the same switch. IBM Control Unit Port (CUP) enables in-band management of Cisco 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
Indicators	Power supply LED FAN LED Supervisor LED Fabric LED Line-card module LED
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) ◦ FC-GS-5, Revision 8.51 (ANSI INCITS 427-2007) ◦ FC-GS-6, Revision 9.4 (ANSI INCITS 463-2010) ◦ 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)

<table>
<tr><th>Feature</th><th>Description</th></tr>
<tr><td></td><td>
◦ 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)
◦ 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
</td></tr>
<tr><td>Chassis slot configuration</td><td>
• Line-card slots: 8
• Supervisor slots: 2
• Crossbar switching fabric slots: 6*
• Fan trays: 3 fan trays at the back of the chassis
• Power supply bays: 8
</td></tr>
<tr><td>Switching capability per fabric</td><td>
<table>
<tr><th>Number of Fabric Cards</th><th>Front Panel Fibre Channel Bandwidth per Slot</th><th>FCoE Bandwidth per Slot</th></tr>
<tr><td>1</td><td>256 Gbps</td><td>220 Gbps</td></tr>
<tr><td>2</td><td>512 Gbps</td><td>440 Gbps</td></tr>
<tr><td>3</td><td>768 Gbps</td><td>660 Gbps</td></tr>
<tr><td>4</td><td>1024 Gbps</td><td>880 Gbps</td></tr>
<tr><td>5</td><td>1280 Gbps</td><td>1100 Gbps</td></tr>
<tr><td>6</td><td>1536 Gbps</td><td>1320 Gbps</td></tr>
</table>
</td></tr>
<tr><td>Performance and scalability</td><td>
• 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
◦ 4/8/16-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)
• Ports per chassis
◦ Up to 384 2/4/8-Gbps, 4/8/16-Gbps, or 10-Gbps Fibre Channel ports
• Ports per rack
◦ Up to 1152 2/4/8-Gbps, 4/8/16-Gbps, or 10-Gbps Fibre Channel ports
• PortChannel: Up to 16 ports (the channel can span any speed-matched port on any module in the chassis)
</td></tr>
</table>

Feature	Description
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 • PortChannel with multipath load balancing • QoS-flow-based, zone-based • N-Port ID virtualization
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 Debug
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-switch authentication ◦ DH-CHAP host-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-3 compliant • Cascaded FICON fabrics • Intermix of FICON and Fibre Channel FCP traffic • FICON CUP management interface • Exchange Based Routing Ready

Feature	Description
Serviceability	• Configuration file management • Nondisruptive software upgrades for Fibre Channel interfaces • Cisco Call Home • 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-Gbps Fibre Channel and 10 Gigabit Ethernet) • Hot-swappable switching modules • Stateful process restart • Any module, any port configuration for PortChannels • Fabric-based multipathing • Per-VSAN fabric services • Online diagnostics • Port tracking • Virtual Routing Redundancy Protocol (VRRP) for management
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 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 Prime DCNM
Programming interface	• Scriptable CLI • Cisco Prime Data Center Network Manager web services API • Cisco Prime DCNM GUI

<table>
<tr><th>Feature</th><th>Description</th></tr>
<tr><td>Power and cooling</td><td>

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.

</td></tr>
<tr><td>Power consumption (typical)</td><td>
Cisco MDS 9710 with 3 Fabrics (Watts [W])
<table>
<tr><th>Ports</th><th>Watts</th></tr>
<tr><td>192</td><td>2695</td></tr>
<tr><td>288</td><td>3655</td></tr>
<tr><td>384</td><td>4615</td></tr>
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<tr><td>Environmental</td><td>

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)

</td></tr>
<tr><td>Physical dimensions (H x W x D)</td><td>

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)
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)
Supervisor-1 module: 2.04 x 7.5 x 21.8 in. (5.18 x 19.05 x 55.37 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)

</td></tr>
<tr><td>Weight</td><td>

Chassis (includes fans): 185.5 lb (84.2 kg)
48-port 16-Gbps Fibre Channel line card: 17 lb (7.71 kg)
Power supply (3000W AC): 6 lb (2.7 kg)
Fabric-1 module: 11 lb (5.0 kg)
Supervisor-1 module: 7 lb (3.2 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)

</td></tr>
<tr><td>Approvals and compliance</td><td>

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

</td></tr>
</table>

Feature	Description
	◦ 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

* A minimum of three fabrics are needed to support a fully populated chassis with eight Cisco MDS 9700 48-Port 16-Gbps Fibre Channel cards; four fabrics are needed to provide N+1 redundancy.

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-SF1-K9	MDS 9700 Series Supervisor-1
DS-X9710-FAB1	MDS 9710 Crossbar Switching Fabric-1 Module
DS-CAC97-3KW	MDS 9700 3000W AC power supply
DS-CDC97-3KW	MDS 9700 3000W DC power supply
DS-X9448-768K9	48-Port 16-Gbps Fibre Channel Switching Module
DS-X9848-480K9	48-Port 10-Gbps Fibre Channel over Ethernet (FCoE) Module
DS-C9710-1K9	MDS 9710 Base Config: Chassis, 2 Sup-1, 3 Fabric-1, 6 3K AC
DS-C9710-1EK9	MDS 9710 Enhanced Config: Chassis, 2 Sup-1, 6 Fabric-1, 8 3K AC
DS-C9710-4BSK9	MDS 9710 Bundle Config Chassis Sup-1 3 Fab-1 6 PS AC 3K 4 Modules 16G SFP+ Licenses Enterprise
DS-C9710-4B8K9	MDS 9710 Bundle Config Chassis Sup-1 3 Fab-1 6 PS AC 3K 4 Modules 8G SFP+ Licenses Enterprise
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

Part Number	Product Description
CAB-9K16A-SW	Power cord 250VAC 16A, Switzerland, source plug SEV 5934-2 Type 23
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	Mainframe package license for 1 MDS9700 switch
Spare Component	
DS-C9710=	MDS 9710 Chassis, Spare, No Power Supplies, Fans Included
DS-X97-SF1-K9=	MDS 9700 Series Supervisor-1
DS-X9710-FAB1=	MDS 9710 Crossbar Switching Fabric-1 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-X9448-768K9=	48-Port 16-Gbps Fibre Channel Switching Module
DS-X9448768B8K9=	MDS 9700 48-port 16Gbps FC Module + 48 8-Gbps SW SFP+, Spare
DS-X9448768BSK9=	MDS 9700 48-port 16Gbps FC Module + 48 16-Gbps SW SFP+, Spare
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
DS-SFP-10GE-SR= **SFP-10G-SR=**	10GBASE-SR SFP Module
DS-SFP-10GE-LR= **SFP-10G-LR=**	10GBASE-LR SFP Module
SFP-10G-ER=	10GBASE-ER SFP Module
DS-CWDM8G1470=	1470 nm CWDM 2/4/8-Gbps Fibre Channel SFP+
DS-CWDM8G1490=	1490 nm CWDM 2/4/8-Gbps Fibre Channel SFP+
DS-CWDM8G1510=	1510 nm CWDM 2/4/8-Gbps Fibre Channel SFP+
DS-CWDM8G1530=	1530 nm CWDM 2/4/8-Gbps Fibre Channel SFP+
DS-CWDM8G1550=	1550 nm CWDM 2/4/8-Gbps Fibre Channel SFP+
DS-CWDM8G1570=	1570 nm CWDM 2/4/8-Gbps Fibre Channel SFP+
DS-CWDM8G1590=	1590 nm CWDM 2/4/8-Gbps Fibre Channel SFP+

Part Number	Product Description
DS-CWDM8G1610=	1610 nm CWDM 2/4/8-Gbps Fibre Channel SFP+
DWDM-SFP10G-xx.xx=	Cisco 10GBASE DWDM SFP+ Modules
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
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
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=	Mainframe package license for 1 MDS9700 switch
L-M97FIC1K9=	E-delivery Mainframe package license for 1 MDS9700 switch

[1] This feature will be supported in a future software release.

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For More Information

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

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

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