Cisco MDS 9706 Multilayer Director

Contents

Product overview

The Cisco® MDS 9706 Multilayer Director is a director-class SAN switch designed for deployment in small to medium-sized storage networks to support enterprise clouds and business transformation. It layers a comprehensive set of intelligent features onto a high-performance, protocol-independent switch fabric.

The MDS 9706 addresses the stringent requirements of large virtualized data center storage environments. It delivers uncompromising availability, security, scalability, ease of management, and transparent integration of new technologies for extremely flexible data center SAN solutions. It shares the same operating system and management interface with other Cisco data center switches. The MDS 9706 lets you transparently deploy unified fabrics with Fibre Channel, IBM Fibre Connection (FICON), and Fibre Channel over Ethernet (FCoE) connectivity with a low Total Cost of Ownership (TCO).

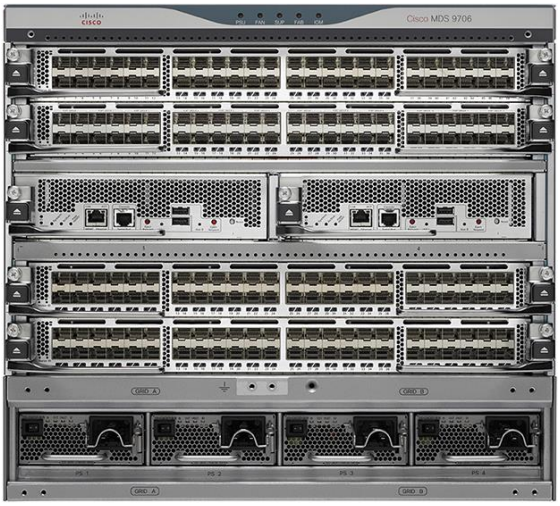

Figure 1.
Cisco MDS 9706 Multilayer Director

Main features

The MDS 9706 offers a number of important features.

Lower TCO with SAN consolidation

Organizations need efficient, cost-effective SANs to keep up with today's exponential data growth. The MDS 9706 lets you easily consolidate data assets into fewer, larger, and more manageable SANs to reduce your hardware footprint and associated Capital Expenditures (CapEx) and Operating Expenses (OpEx). It offers industry-leading scalability with:

- Up to 192 32-Gbps Fibre Channel or 10-Gbps FCoE ports or 96 40-Gbps FCoE ports per chassis
- Up to 11.5 Terabits per second (Tbps) front-panel, Fibre Channel, line-rate, nonblocking system-level switching capacity
- Exceptional capabilities with intelligent fabric services
- Virtual SANs (VSANs) for consolidating individual physical SAN islands while maintaining logical boundaries
- Inter-VSAN Routing (IVR) for sharing resources across VSANs

For unified fabric deployments with converged LAN and SAN environments using lossless Ethernet, the MDS 9706 provides multihop FCoE. Protect your organization's investments in existing storage infrastructure with any-to-any connectivity across multiple protocols.

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.

Scalable expansion with outstanding investment protection

The MDS 9706 is designed to make optimal use of valuable data center floor space. It is 9RU (rack units) tall (15.6 inches). This allows up to four MDS 9706 directors per standard 42 RU rack (7 feet). Its smaller footprint makes it an excellent candidate for deployment in smaller storage networks as well as in pod-based converged data center infrastructure solutions for the cloud.

Using Cisco MDS 9700 Series switching modules, the MDS 9706 supports up to 192 ports in a 6-slot modular chassis, with up to 768 ports in a single rack. You can configure ports as Fibre Channel (4/8/16-Gbps, 8/16/32-Gbps, or 10-Gbps), FCoE (10/40-Gbps), or a mix of both Fibre Channel and FCoE. The MDS 9706 supports the same Fibre Channel, FCoE, and Fibre Channel over IP (FCIP) SAN extension switching modules as the Cisco MDS 9710 and 9718 multilayer directors, providing a high degree of commonality between the three directors. Designed to grow with your storage environment, the MDS 9706 provides smooth migration, common sparing, and outstanding investment protection.

Enterprise-class availability

The MDS 9706 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 9706 software architecture offers outstanding availability. The MDS 9706 is the first in the industry to provide redundancy on all major hardware components, including the supervisor and fabric modules as well as the power supplies. The Cisco MDS 9700 Series Supervisor-3 Module automatically restarts failed processes, making the MDS 9706 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.

Business transformation with enterprise cloud deployment

Enterprise clouds provide organizations with elastic computing and network capabilities, enabling IT to scale resources up or down as needed in a quick and cost-efficient manner. The MDS 9706 provides industry-leading scalability and the following features for enterprise cloud deployments:

- Pay-as-you-grow flexibility to meet the scalability needs in the cloud
- Multihop FCoE to provision storage in a multiprotocol unified fabric
- Robust security for multitenant cloud applications
- Predictable performance to meet stringent Service-Level Agreements (SLAs)
- Resilient connectivity for an always-on cloud infrastructure
- Advanced traffic management capabilities, such as Quality of Service (QoS), to rapidly and cost-efficiently allocate network capabilities to cloud applications

Furthermore, Cisco Data Center Network Manager (DCNM) provides resource monitoring and capacity planning on a per-virtual machine basis. You can federate up to 10 DCNM servers to easily manage large clouds. Resource use information can be delivered through Storage Management Initiative Specification (SMI-S)–based developer APIs to deliver IT as a Service (ITaaS).

Convergence with multihop FCoE

FCoE allows an evolutionary approach to network and I/O convergence by preserving all Fibre Channel constructs, maintaining the latency, security, and traffic management attributes of Fibre Channel and preserving investments in Fibre Channel tools, training, and SANs. The MDS 9706 shares the same operating system and management plane as Cisco Nexus® Family switches to enable transparent coexistence in a unified fabric with any-to-any connectivity for Fibre Channel and FCoE.

Comprehensive solution for robust security

The MDS 9706 offers an extensive security framework to protect highly sensitive data crossing today's enterprise storage networks. It employs intelligent packet inspection at the port level, including the application of Access Control Lists (ACLs) for hardware enforcement of zones, VSANs, and advanced port-security features. It also uses Fibre Channel Security Protocol (FC-SP) and Cisco TrustSec® Fibre Channel link encryption mechanisms to provide comprehensive security for storage networks.

Investment protection with future readiness

The MDS 9706 switch can be used with either Fabric Switch module-1 and Fabric switch module-3[1]. Switches currently running Fabric-1 can be upgraded online and in-place to Fabric-3. Each Fabric-3 module provides double the bandwidth of Fabric-1. Thus three Fabric-3 can support 192 Fibre Channel ports running at 32-Gbps line-rate. With the new Fabric-3 modules, the switch can be upgraded to additionally support 64-Gbps modules when available.

[1] Upgrading to Fabric-3 requires use of new Supervisor-4 module running NX-OS 8.4.1 or later.

Features and benefits

Table 1 summarizes the main features and benefits of the MDS 9706.

Table 1. Features and benefits

Feature	Benefit
Performance and scalability	
Outstanding SAN performance	The combination of 16-Gbps, 32-Gbps Fibre Channel switching modules and Cisco Fabric-3 crossbar switching modules enables up to three Tbps of front-panel Fibre Channel throughput between modules in each direction for each of the four MDS 9706 payload slots. MDS 9706 architecture, based on central arbitration and crossbar fabric, provides 32-Gbps line-rate, nonblocking, predictable performance across all traffic conditions for every port in the chassis.
Industry-leading scalability	With up to 18 Tbps of Fibre Channel system bandwidth and 192 full line-rate autosensing Fibre Channel (8/16-Gbps, 8/16/32-Gbps, or 10-Gbps) or 192 10-Gbps FCoE ports or 96 40-Gbps FCoE ports in a single chassis, the MDS 9706 leads the industry in scalability and is designed to meet the requirements of large data center storage environments.
Reliability and availability	
High availability	The MDS 9706 combines nondisruptive software upgrades, stateful process restart and failover, and full redundancy of all major components for best-in-class availability. Redundancy is enabled on all major components, including the fabric card. It provides grid redundancy on the power supply and 1+1 redundant supervisors. Users can add fabric cards to enable N+1 fabric redundancy.
Multiprotocol connectivity	
Multiprotocol architecture	The multilayer architecture of the Cisco MDS 9700 Series Multilayer Directors enables a consistent feature set over a protocol-independent switch fabric. The MDS 9706 transparently integrates Fibre Channel, FCoE, FCIP, and FICON. • The MDS 9706 supports full line-rate Fibre Channel (2/4/8-Gbps, 4/8/16-Gbps, or 10-Gbps) ports on the Cisco MDS 9700 48-Port 16-Gbps Fibre Channel Switching Module for deployment in both open systems and FICON environments. The MDS 9710 supports 8/16/32-Gbps on the Cisco MDS 9700 48-Port 32-Gbps Fibre Channel Switching Module. • FICON: The MDS 9706 supports IBM System z FICON and Linux environments. • Multihop FCoE: The MDS 9706 supports 10-Gbps FCoE ports on the Cisco MDS 9700 48-Port FCoE Switching Module and 40-Gbps FCoE ports on the Cisco MDS 9700 24-Port FCoE Switching Module for deployment in multihop FCoE environments, extending connectivity from FCoE and Fibre Channel fabrics to FCoE and Fibre Channel storage devices. • SAN Extension FCIP: The Cisco MDS 9000 24/10-Port SAN Extension Module is supported on MDS 9700 Series Multilayer Directors. With 24 line-rate 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.
Integrated mainframe support2	The MDS 9706 will support the FICON protocol in both cascaded and noncascaded fabrics, as well as a mix of FICON and open-systems Fibre Channel Protocol traffic on the same switch. IBM Control Unit Port (CUP) support enables in-band management of Cisco MDS 9000 Family switches from mainframe management applications and supports a fabric-binding feature that helps ensure that Inter-Switch Links (ISLs) are enabled only between specified switches in the fabric-binding configuration.

Feature	Benefit
Software features	
Advanced traffic management	Advanced traffic management capabilities in the MDS 9706 simplify deployment and optimization of large-scale fabrics: • 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 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, optimizing 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 if a module fails. The MDS 9000 Family switch architecture helps ensure that frames can never be reordered within a switch. • Fabric Shortest Path First (FSPF)-based multipathing: Get 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): Prioritize critical traffic to manage bandwidth and control latency.
Intelligent network services	VSAN technology, ACLs for hardware-based intelligent frame processing, and fabric wide QoS enable migration from SAN islands to enterprise-wide storage networks. • Integrated hardware-based VSANs and Inter-VSAN Routing (IVR): Integrating VSANs into port-level hardware allows any port in a system or fabric to be partitioned to any VSAN. Integrated hardware-based IVR provides line-rate routing between any ports in a system or fabric without the need for external routing appliances. • Intelligent storage services: The MDS 9706 interoperates with intelligent service capabilities on other MDS 9000 Family platforms and the intelligent services switch. You can accelerate storage applications for data replication, backup, and data migration to hosts and targets attached to the MDS 9706. • Smart Zoning: Using this feature, MDS 9700 Series director fabrics can provision hardware access control entries specified by the zone set more efficiently. Avoid superfluous entries that allow servers (initiators) to talk to other servers or storage devices (targets) to talk to other storage devices. Large zones with multiple initiators and multiple targets are now possible without consuming excessive hardware resources. Smart zones can correspond to applications, application clusters, hypervisor clusters, or other data center entities. Automate zoning tasks and save the time previously spent creating many small zones.
Virtual machine transparency	The MDS 9700 Series provides deterministic hardware performance and a comprehensive feature set that allows virtual machines to have the same SAN attributes as a physical server. On a per-virtual machine basis, Cisco NX-OS Software offers VSANs, QoS policies, access control, performance monitoring, and data protection to promote virtual machine scalability and mobility. Cisco DCNM provides end-to-end visibility, from the virtual machine to the storage resource, with resource allocation, performance measurements, and predictions available on a per-virtual machine basis.
Security	
Comprehensive security	Comprehensive security services include VSANs, hardware-enforced zoning, ACLs, per-VSAN Role-Based Access Control (RBAC), and Cisco TrustSec Fibre Channel link encryption. The MDS 9700 Series also supports a comprehensive security framework with RADIUS and TACACS+, FC-SP, Secure File Transfer Protocol (SFTP), Secure Shell (SSH) Protocol, and Simple Network Management Protocol Version 3 (SNMPv3). FC-SP provides switch-to-switch and host-to-switch Diffie-Hellman Challenge Handshake Authentication Protocol (DH-CHAP) supporting RADIUS and TACACS+ to help ensure that only authorized devices access-protected storage networks. Cisco TrustSec Fibre Channel link encryption, available in the MDS 9700 Series 32-Gbps as well as 16-Gbps modules, lets you transparently encrypt ISLs at up to line-rate speeds, providing an additional layer of protection for traffic within and between data centers.

Feature	Benefit
Diagnostics and troubleshooting	
Sophisticated diagnostics	The MDS 9706 provides intelligent diagnostics, protocol decoding, and network analysis tools as well as integrated Cisco Smart Call Home capability for added reliability, faster problem resolution, and reduced service costs. • For diagnostics, the MDS 9706 supports the powerful Cisco Generic Online Diagnostics (GOLD) framework. GOLD is a suite of diagnostic facilities that you can use to verify that hardware and internal data paths are operating as designed. Boot-time diagnostics, continuous monitoring, standby fabric loopback tests, and on-demand and scheduled tests are part of the GOLD feature set. This industry-leading diagnostics subsystem enables the rapid fault isolation and continuous system monitoring critical in today's continuously operating environments. • The MDS 9706 provides the integrated functions required to implement diagnostic capabilities such as Fibre Channel traceroute to identify the exact path and timing of flows and Cisco Switched Port Analyzer (SPAN) and Remote SPAN (RSPAN) to intelligently capture network traffic. After traffic has been captured, it can be analyzed with the Cisco Fabric Analyzer, an embedded Fibre Channel analyzer. Comprehensive port-based and flow-based statistics enable sophisticated performance analysis and SLA accounting. With the MDS 9706, Cisco delivers a comprehensive tool set for troubleshooting and analysis of storage networks.
Management	
Ease of management	The MDS 9700 Series includes built-in storage network management with all features available through a Command-Line Interface (CLI) or Cisco 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. Adhering to the syntax of the widely known Cisco IOS® Software CLI, the MDS 9000 Family CLI is easy to learn and delivers broad management capabilities. This highly efficient direct interface optimizes management. 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 networking industry's first converged SAN and LAN management solution. It can manage all NX-OS devices, including the MDS 9000 Family and Cisco Nexus Family switches. The intuitive GUI simplifies day-to-day operations of Cisco unified fabrics in highly virtualized data center environments. DCNM supports: • Event and performance monitoring 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 the network and storage teams Cisco DCNM can federate up to 10 DCNM servers to manage up to 150,000 devices using a single management pane. The solution can scale to large enterprise deployments through scale-out server architecture with automated failover capability. Gain 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. DCNM can be installed on Linux and Microsoft Windows operating systems and supports both PostgreSQL and Oracle databases.

Licensing

Table 2 summarizes the optional licenses that can be purchased to enable additional features and capabilities on the MDS 9706.

Table 2. Optional licenses

License	Description
Cisco MDS 9000 Family Enterprise Package	• Includes advanced traffic-engineering and network security features such as IVR, QoS and zone-based QoS, FC-SP, port security, VSAN-based access control, and fabric binding for open systems • Licensed per switch for all the ports on the switch
Cisco DCNM for SAN Advanced Edition for Cisco MDS 9700 Series	• Includes advanced management capabilities such as VMware vCenter integration, performance trending, advanced provisioning, backup, and dashboards • Licensed per switch for all the ports on the switch
Cisco MDS 9700 Series Mainframe Package	• Includes FICON protocol support and allows IBM CUP management for in-band management from IBM S/390 and z/900 processors • Also includes FICON tape read-write acceleration • Licensed per switch for all the ports on the switch

Product specifications

Table 3 summarizes the Cisco MDS 9706 Multilayer Director specifications.

Table 3. Product specifications

Feature	Description
Product compatibility	• Cisco MDS 9000 Family
Software compatibility	• Cisco MDS NX-OS Software Release 6.2.9 or later[3] • Cisco MDS NX-OS Software Release 8.4.1 or later to support the new Fabric and Supervisor modules
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)

Feature	Description
	• 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) • 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 PFC • IEEE 802.1Qaz-2011: Enhanced transmission selection for bandwidth sharing between traffic classes (ETS and DCBX)

<table>
<tr><th>Feature</th><th>Description</th></tr>
<tr><td></td><td>• IP over Fibre Channel (RFC 2625)
• RFC 3643 and 3821 FCIP
• 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: 4
• Supervisor slots: 2
• Crossbar switching fabric slots: 6*
• Fan trays: 3 fan trays at the back of the chassis
• Power supply bays: 4</td></tr>
<tr><td>Switching capability per fabric</td><td>
<table>
<tr><th>Number of Fabric-3 cards</th><th>Front-panel Fibre Channel bandwidth per slot</th><th>FCoE bandwidth per slot</th></tr>
<tr><td>1</td><td>512 Gbps</td><td>440 Gbps</td></tr>
<tr><td>2</td><td>1024 Gbps</td><td>880 Gbps</td></tr>
<tr><td>3</td><td>1536 Gbps</td><td>1320 Gbps</td></tr>
<tr><td>4</td><td>2048 Gbps</td><td>1760Gbps</td></tr>
<tr><td>5</td><td>2560 Gbps</td><td>2200Gbps</td></tr>
<tr><td>6</td><td>3072 Gbps</td><td>2640 Gbps</td></tr>
</table>
</td></tr>
<tr><td>Performance and scalability</td><td>• Up to 11.5-Tbps front-panel Fibre Channel switching bandwidth and 10.5 Tbps 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 module
◦ Up to 500 per port (dedicated-mode ports) standard
◦ Up to 4095 on an individual port (dedicated-mode ports with optional Cisco MDS 9700 Series 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 192 ports, which can be Fibre Channel (2/4/8-Gbps, 4/8/16-Gbps, 8/16/32-Gbps, or 10-Gbps)
◦ Up to 192 ports of 10-Gbps FCoE
◦ Up to 96 ports of 40-Gbps FCoE
• Ports per rack
◦ Up to 768 Fibre Channel (2/4/8-Gbps, 4/8/16-Gbps, 8/16/32-Gbps, or 10-Gbps) or 10 Gigabit Ethernet FCoE ports
• Port channel: Up to 16 ports (The channel can span any speed-matched port on any module in the chassis.)</td></tr>
<tr><td colspan="2">Features and functions</td></tr>
<tr><td>Fabric services</td><td>• Name server
• Registered State Change Notification (RSCN)
• Login services</td></tr>
</table>

Feature	Description
	• Fabric Configuration Server (FCS) • Broadcast • In-order delivery
Advanced functions	• VSAN • IVR • Port channel with multipath load balancing • QoS: Flow-based and zone-based • N-port ID virtualization (NPIV)
Diagnostics and troubleshooting tools	• Power-on self-test (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
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
IBM FICON[1]	• 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 Smart 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 (2/4/8/10/16/32-Gbps Fibre Channel and 10 Gigabit Ethernet). 2G speeds not supported on 32-Gbps switching module • Hot-swappable switching modules • Stateful process restart • Any module, any port configuration for port channels • 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 Fibre 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

<table>
<tr><th>Feature</th><th>Description</th></tr>
<tr><td></td><td>• Cisco DCNM web services API
• Cisco DCNM GUI</td></tr>
<tr><td>Power and cooling</td><td>• Power supplies (3000W AC and DC)
• 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)
• Airflow: Front to back
The Cisco MDS 9706 provides x linear feet per minute (LFM) average system velocity, and y cubic feet per minute (CFM) total flow through each line-card slot, depending on the line-card type and fan-speed setting.</td></tr>
<tr><td>Power consumption (typical)</td><td>Cisco MDS 9706 with three fabrics (Watts)
<table><tr><th>Ports</th><th>Watts</th></tr><tr><td>96</td><td>1465</td></tr><tr><td>192</td><td>2425</td></tr></table></td></tr>
<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 (9RU): 15.6 x 17.3 x 32.0 in. (39.62 x 43.9 x 81.3 cm)
• Chassis depth including cable management and chassis doors is 38 in. (96.52 cm)
• Unit is rack mountable in a standard 19-inch (482.6-mm) EIA rack; unit is also 2-post rack mountable.</td></tr>
<tr><td>Weight</td><td>• Chassis only: 145 lb (65.8 kg)
• Fully configured: 325 lb</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
• VCCI Class A
• EN 55024</td></tr>
</table>

Feature	Description
	• 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 fabric modules 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 modules is needed to support a fully populated chassis with four Cisco MDS 9700 48-Port 32-Gbps Fibre Channel cards.

[1] IBM FICON will be officially supported on the Cisco MDS 9706 in a release after the First Customer Shipment (FCS).

Warranty information

Find warranty information on Cisco.com on the Product Warranties page.

Ordering information

To place an order, visit the Cisco Ordering homepage. To download software, visit the Cisco Software Center. Table 4 summarizes the ordering information.

Table 4. Ordering information

Product description	Part number
Cisco MDS 9700 Series Component	
Cisco MDS 9700 40-Gbps 24-Port FCoE Module	DS-X9824-960K9
MDS 9706 Chassis, No Power Supplies, Fans Included	DS-C9706
MDS 9700 Series Supervisor-4	DS-X97-SF4-K9
MDS 9706 Crossbar Switching Fabric-3 Module	DS-X9706-FAB3
MDS 9700 Series Supervisor-1	DS-X97-SF1-K9
MDS 9706 Crossbar Switching Fabric-1 Module	DS-X9706-FAB1
MDS 9700 3000W AC power supply	DS-CAC97-3KW
MDS 9700 3000W DC power supply	DS-CDC97-3KW
48-Port 16-Gbps Fibre Channel Switching Module	DS-X9448-768K9
MDS 9700 48-Port 32-Gbps Fibre Channel Switching Module	DS-X9648-1536K9
48-port 10-Gbps FCoE Switching Module	DS-X9848-480K9
Cisco MDS 9000 Family 24/10 SAN Extension Module	DS-X9334-K9
MDS 9706 V2 Base Config: Chassis, 2 Sup-4, 3 Fabric-3, 2 3K AC	DS-C9706-V2K9

Product description	Part number
MDS 9706 Config: Chassis, 2 Sup-4, 6 Fabric-3, 4 3K AC	DS-C9706-V3K9
MDS 9706 Base Config: Chassis, 2 Sup-1, 3 Fabric-1, 6 3K AC	DS-C9706-1K9
MDS 9706 Enhanced Config: Chassis, 2 Sup-1, 6 Fabric-1, 4 3K AC	DS-C9706-1EK9
MDS 9706 Bundle Config Chassis Sup-1 3 Fab-1 3 PS AC 3K 2 Modules 16G SFP+ Enterprise License	DS-C9706-2BSK9
MDS 9706 Bundle Config Chassis Sup-1 3 Fab-1 3 PS AC 3K 2 Modules 8G SFP+ Enterprise License	DS-C9706-2B8K9
32 Gbps Fibre Channel SW SFP+, LC	DS-SFP-FC32G-SW
32 Gbps Fibre Channel LW SFP+, LC	DS-SFP-FC32G-LW
16 Gbps Fibre Channel SW SFP+, LC	DS-SFP-FC16G-SW
16 Gbps Fibre Channel LW SFP+, LC	DS-SFP-FC16G-LW
16 Gbps Fiber Channel ELW SFP+, LC	DS-SFP-FC16GELW
10 Gbps Fibre Channel SW SFP+, LC	DS-SFP-FC10G-SW
10 Gbps Fibre Channel LW SFP+, LC	DS-SFP-FC10G-LW
8 Gbps Fibre Channel SW SFP+, LC	DS-SFP-FC8G-SW
8 Gbps Fibre Channel LW SFP+, LC	DS-SFP-FC8G-LW
8 Gbps Fibre Channel Extended Reach SFP+, LC	DS-SFP-FC8G-ER
10GBASE-SR SFP Module	DS-SFP-10GE-SR, SFP-10G-SR
10GBASE-LR SFP Module	DS-SFP-10GE-LR, SFP-10G-LR
10GBASE-ER SFP Module	SFP-10G-ER
Power cord 250VAC 16A, Australia, source plug AU20S3	CAB-9K16A-AUS
Power cord 250VAC 16A, China, source plug GB16C	CAB-9K16A-CH
Power cord 250VAC 16A, Europe, source plug CEE 7/7	CAB-9K16A-EU
Power cord 250VAC 16A, international, source plug IEC 309	CAB-9K16A-INT
Power cord 250VAC 16A, Israel, source plug SI16S3	CAB-9K16A-ISR
Power cord 250VAC 16A, South Africa, source plug EL 208, SABS 164-1	CAB-9K16A-SA
Power cord 250VAC 16A, Switzerland, source plug SEV 5934-2 Type 23	CAB-9K16A-SW
Power cord 250VAC 16A, United States/Japan, source plug NEMA 6-20	CAB-9K16A-US1
Power cord 250VAC 16A, United States/Japan, source plug NEMA L6-20	CAB-9K16A-US2

Product description	Part number
Power Cord, 125VAC 20A NEMA 5-20 Plug, North America/Japan	CAB-9K20A-NA
Power Cord 250VAC 16A, Korea, Src Plug	CAB-9K16A-KOR
Power Cord 250VAC 16A, Argentina, Src Plug IR2073-C19	CAB-9K16A-ARG
Power Cord 250VAC 16A, Brazil, Src Plug EL224-C19	CAB-9K16A-BRZ
Cabinet Jumper Power Cord, 250 VAC 16A, C20-C19 Connectors	CAB-C19-CBN
MDS 9706 - Front Door Kit	DS-C9706-FD-MB
Licensed software	
Enterprise package license for 1 MDS9700 switch	M97ENTK9
DCNM for SAN License for MDS 9700	DCNM-SAN-M97-K9
MDS 9700 Mainframe Package License for one MDS 9700 switch	M97FIC1K9
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	
MDS 9706 Chassis, Spare, No Power Supplies, Fans Included	DS-C9706=
MDS 9700 Series Supervisor-1	DS-X97-SF1-K9=
MDS 9700 Series Supervisor-4	DS-X97-SF4-K9=
MDS 9706 Crossbar Switching Fabric-1 Module	DS-X9706-FAB1=
MDS 9706 Crossbar Switching Fabric-3 Module	DS-X9706-FAB3=
MDS 9700 3000W AC power supply	DS-CAC97-3KW=
MDS 9700 3000W DC power supply	DS-CDC97-3KW=
MDS 9706 FAN Tray	DS-C9706-FAN=
48-Port 16-Gbps Fibre Channel Switching Module	DS-X9448-768K9=
MDS 9700 48-port 16Gbps FC Module + 48 8-Gbps SW SFP+, Spare	DS-X9448768B8K9=
MDS 9700 48-port 16Gbps FC Module + 48 16-Gbps SW SFP+, Spare	DS-X9448768BSK9=
MDS 9700 48-Port 32-Gbps Fibre Channel Switching Module, Spare	DS-X9648-1536K9=
MDS 9700 48-Port 32-Gbps Fibre Channel Switching Module and 48 16G SW SFP+	DS-X9648-1536K9B=
MDS 9706 Crossbar Switching Fabric-1 Module, Bundle of 3	DS-X9706-FAB1B

Product description	Part number
32 Gbps Fibre Channel SW SFP+, LC	DS-SFP-FC32G-SW=
32 Gbps Fibre Channel LW SFP+, LC	DS-SFP-FC32G-LW=
48-port 10-Gbps FCoE Switching Module, Spare	DS-X9848-480K9=
MDS 9700 48-port 10Gbps FCoE Module + 48 10-Gbps SR SFP, Spare	DS-X9848480BK9=
24-Port 40-Gbps Fiber Channel over Ethernet (FCoE) Module, Spare	DS-X9824-960K9=
Cisco MDS 9000 Family 24/10 SAN Extension Module, Spare	DS-X9334-K9=
16 Gbps Fibre Channel SW SFP+, LC	DS-SFP-FC16G-SW=
16 Gbps Fibre Channel LW SFP+, LC	DS-SFP-FC16G-LW=
16 Gbps Fiber Channel ELW SFP+, LC	DS-SFP-FC16GELW=
10 Gbps Fibre Channel SW SFP+, LC	DS-SFP-FC10G-SW=
10 Gbps Fibre Channel LW SFP+, LC	DS-SFP-FC10G-LW=
8 Gbps Fibre Channel SW SFP+, LC	DS-SFP-FC8G-SW=
8 Gbps Fibre Channel LW SFP+, LC	DS-SFP-FC8G-LW=
8 Gbps Fibre Channel Extended Reach SFP+, LC	DS-SFP-FC8G-ER=
10GBASE-SR SFP Module	DS-SFP-10GE-SR=, SFP-10G-SR=
10GBASE-LR SFP Module	DS-SFP-10GE-LR=, SFP-10G-LR=
10GBASE-ER SFP Module	SFP-10G-ER=
1470 nm CWDM 2/4/8-Gbps Fibre Channel SFP+	DS-CWDM8G1470=
1490 nm CWDM 2/4/8-Gbps Fibre Channel SFP+	DS-CWDM8G1490=
1510 nm CWDM 2/4/8-Gbps Fibre Channel SFP+	DS-CWDM8G1510=
1530 nm CWDM 2/4/8-Gbps Fibre Channel SFP+	DS-CWDM8G1530=
1550 nm CWDM 2/4/8-Gbps Fibre Channel SFP+	DS-CWDM8G1550=
1570 nm CWDM 2/4/8-Gbps Fibre Channel SFP+	DS-CWDM8G1570=
1590 nm CWDM 2/4/8-Gbps Fibre Channel SFP+	DS-CWDM8G1590=
1610 nm CWDM 2/4/8-Gbps Fibre Channel SFP+	DS-CWDM8G1610=
Cisco 10GBASE DWDM SFP+ Modules	DWDM-SFP10G-xx.xx=
Power cord 250VAC 16A, Australia, source plug AU20S3	CAB-9K16A-AUS=

Product description	Part number
Power cord 250VAC 16A, China, source plug GB16C	CAB-9K16A-CH=
Power cord 250VAC 16A, Europe, source plug CEE 7/7	CAB-9K16A-EU=
Power cord 250VAC 16A, international, source plug IEC 309	CAB-9K16A-INT=
Power cord 250VAC 16A, Israel, source plug SI16S3	CAB-9K16A-ISR=
Power cord 250VAC 16A, South Africa, source plug EL 208, SABS 164-1	CAB-9K16A-SA=
Power cord 250VAC 16A, Switzerland, source plug SEV 5934-2 Type 23	CAB-9K16A-SW=
Power cord 250VAC 16A, United States/Japan, source plug NEMA 6-20	CAB-9K16A-US1=
Power cord 250VAC 16A, United States/Japan, source plug NEMA L6-20	CAB-9K16A-US2=
Power Cord, 125VAC 20A NEMA 5-20 Plug, North America/Japan	CAB-9K20A-NA=
Power Cord 250VAC 16A, Korea, Src Plug	CAB-9K16A-KOR=
Power Cord 250VAC 16A, Argentina, Src Plug IR2073-C19	CAB-9K16A-ARG=
Power Cord 250VAC 16A, Brazil, Src Plug EL224-C19	CAB-9K16A-BRZ=
Cabinet Jumper Power Cord, 250 VAC 16A, C20-C19 Connectors	CAB-C19-CBN=
MDS 9706 - Front Door Kit	DS-C9706-FD-MB=
MDS 9706 - Rack Mount Kit	DS-C9706-RMK=
MDS 9706 - Bottom Support Kit	DS-C9706-BSK=
MDS 9706 - Cable Management and top LED kit	DS-C9706-CBTOP=
Licensed software spares	
Enterprise package license for 1 MDS9700 switch	M97ENTK9=
E-delivery Enterprise package license for 1 MDS9700 switch	L-M97ENTK9=
DCNM for SAN License for MDS 9700	DCNM-SAN-M97-K9=
E-delivery DCNM for SAN Package Advanced Edition for MDS 9700	L-DCNM-S-M97-K9=
MDS 9700 Mainframe Package License for one MDS 9700 switch, Spare	M97FIC1K9=
MDS 9700 Mainframe Package License for one MDS 9700 switch, Spare e-delivery	L-M97FIC1K9=
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 9706, visit https://www.cisco.com/go/storage or contact your local account representative.

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