Cisco MDS 9718 Multilayer Director

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Product overview

The Cisco® MDS 9718 Multilayer Director (Figure 1) has the industry's highest port density for a SAN director, with 768 line-rate 32-Gbps Fibre Channel ports. The Cisco® MDS 9718 supports 768 line-rate 32-Gbps Fibre Channel ports. This new 32-Gbps line card couples the next-generation port ASICs with a fully dedicated Network Processing Unit designed to complete analytics calculations in real time on the 32-Gbps line card. The MDS 9718 also supports the Cisco 24-port 40-Gbps Fibre Channel over Ethernet (FCoE) line card and Cisco MDS 9000 24/10-Port SAN Extension Module. It is designed for deployment in midsize to large enterprises. The MDS 9718 enables SAN consolidation and collapsed-core solutions for large enterprises, thereby reducing the number of managed switches and leading to easy-to-manage solutions, providing more front-panel ports by reducing the number of ports used on Inter-Switch Links (ISLs), and offering room for future growth.

The MDS 9718 addresses the stringent storage requirements for large virtualized data centers. As a director-class SAN switch, the MDS 9718 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 gain uncompromising availability, security, and scalability; simplified management; and the capability to flexibly integrate new technologies. The MDS 9718 lets you transparently deploy unified fabrics with Fibre Channel and FCoE connectivity with a low Total Cost of Ownership (TCO).

Figure 1.
Cisco MDS 9718 Multilayer Director

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Product highlights

The MDS 9718 offers the following features:

- Outstanding SAN performance: 6 Cisco Fabric-3 crossbar switching modules enables up to 3 Terabits per second (Tbps) of Fibre Channel throughput in each direction for each of the 16 MDS 9718 payload slots.

  Based on central arbitration and a crossbar fabric, the MDS 9718 architecture provides 64-Gbps line-rate, nonblocking, predictable performance across all traffic conditions for every port in the chassis. The MDS 9718 ships with six fabric modules and is ready for 768 line-rate 64-Gbps Fibre Channel ports.

  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 768 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.

- High availability: The MDS 9718 provides best-in-class availability. The director meets the same industry-leading availability standards as the other Cisco MDS 9700 Series Multilayer Directors. All major components, including the fabric card, are redundant. You get grid redundancy with the power supply and 1+1 redundant supervisors, and you can add a fabric card to enable N+1 fabric redundancy. The MDS 9718 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 Processing Unit 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 48 Tbps of Fibre Channel bandwidth. A single chassis delivers 768 2/4/8-Gbps, 4/8/16-Gbps, 8/16/32-Gbps or 10-Gbps full line-rate autosensing Fibre Channel ports, or 768 10-Gbps FCoE or 384 full-line-rate 40-Gbps FCoE ports.

- Intelligent network services: Migrate your SAN islands to enterprise-wide storage networks with Virtual SAN (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.

[1] Upgrading to Fabric-3 requires use of new Supervisor-4 module running NX-OS 8.4.2 or later.

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- 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 gain larger zones with multiple initiators and targets without consuming excessive hardware resources. Automate zoning tasks and avoid the creation of many small zones.
- Enhanced zoning: With basic zoning, two or more administrators can make simultaneous configuration changes. Upon activation, one administrator can overwrite the changes of another administrator. With enhanced zoning, all configuration is performed within a single configuration session. When a session begins, the switch locks down the entire fabric to implement the change, helping ensure consistency with the fabric.

- 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 to the storage device, 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, the MDS 9700 Series supports 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 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 MDS 9700 Series includes built-in storage network management with all features available through a Command-Line Interface (CLI) or Cisco DCNM, a centralized network management tool that simplifies management of unified fabrics. The network manager supports integration with third-party storage management applications to allow transparent interaction with existing management tools. The network manager 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 Software 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. The Generic Online Diagnostics framework is a suite of diagnostic tools that 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. It enables the rapid fault isolation and systems monitoring that are critical in today's continuously evolving operating environments.

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- Multiprotocol architecture: A multilayer architecture enables a consistent feature set over a protocol-independent switch fabric. The MDS 9718 transparently integrates Fibre Channel, FCoE and FCIP.
    - 2/4/8-Gbps, 4/8/16-Gbps, 8/16/32-Gbps, 10-Gbps Fibre Channel, and 10 Gigabit Ethernet: The MDS 9718 supports 2/4/8/16-Gbps and 10-Gbps ports on the Cisco MDS 9700 48-Port 16-Gbps Fibre Channel Switching Module. The MDS 9718 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.
    - 10/40-Gbps FCoE: The MDS 9718 supports 10-Gbps FCoE with the 48-port 10-Gbps FCoE switching module and 40-Gbps FCoE with the 24-port 40-Gbps FCoE switching module.
    - Multihop FCoE: Extend connectivity from FCoE and Fibre Channel fabrics to FCoE and Fibre Channel storage devices.
    - SAN Extension FCIP support: The 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 1/10 Gigabit Ethernet FCIP ports, this module enables deployment of large and scalable SAN extension solutions.

Main benefits

Reduce TCO with SAN Consolidation

With the amount of data growing exponentially, organizations need efficient, cost-effective, large-scale SANs. Scale while managing TCO with industry-leading port densities of up to 768 32-Gbps Fibre Channel ports per chassis, which gives you more room to grow in the future. Consolidate and collapse the data center architecture from edge-core-edge to edge-core or collapsed-core architectures. Deploy 1.5-Tbps front-panel Fibre Channel performance per slot and up to 48-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 LANs and SANs using lossless Ethernet, multihop FCoE protects investments in existing storage infrastructure with any-to-any connectivity across multiple protocols.

Enterprise-Class Availability

The MDS 9718 is designed from the foundation for high availability. In addition to meeting the basic requirements of nondisruptive software upgrades and redundancy of all critical hardware components, the MDS 9718 software architecture offers outstanding availability. The supervisor modules automatically restart failed processes, making the MDS 9718 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 9718 supports the Cisco MDS 9700 Series Supervisor-1E Module for heavier workloads. It does not support the Cisco MDS 9700 Series Supervisor-1 Module, which is supported on the Cisco MDS 9706 and 9710 platforms (and the MDS 9706 and 9710 do not support the MDS 9700 Series Supervisor-1E).

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The MDS 9718 is the first in the industry to provide redundancy on all major hardware components, as detailed in Table 1.

Table 1. Cisco MDS 9718 Multilayer Director Redundancy

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

High availability is implemented at the fabric level using robust and high-performance ISLs. The port-channel capability allows you to 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 9718 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 9718 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 (ITaaS).

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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 for the DS-X9448-768K9 from a pool of more than 6000 buffer credits for a module. These credits can be allocated to ports as needed, greatly extending the distance of Fibre Channel SANs. Alternatively, 4095 buffer credits can be assigned 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: 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.
- QoS: Manage bandwidth and control latency to prioritize critical traffic.

Ease of Management

The MDS 9718 provides three modes of management: the Cisco NX-API, the MDS 9000 Family CLI, Cisco DCNM, and integration with third-party storage management tools.

Starting with MDS NX-OS Release 7.3, the MDS 9700 Series supports the NX-API, a Representational State Transfer (REST) API-based framework for NX-OS. The NX-API provides programmatic access to the MDS 9700 Series over HTTP and HTTPS, letting users control the switch using a web browser. It provides CLI output in easy-to-read XML or JavaScript Object Notation (JSON) format, simplifying scripting. NX-API data collection from a switch is considerably faster than with SNMP queries, and the NX-API can be used by Cisco DCNM and third-party management tools.

Adhering to the syntax of the widely known Cisco IOS® Software CLI, the 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, it enables debugging modes for each switch feature and allows you to view a real-time updated activity log of control protocol exchanges. Each log entry is time-stamped, and entries are listed in chronological order.

Cisco DCNM is the industry's first unified SAN and LAN management solution. The network manager provides comprehensive management of NX-OS devices, including the MDS 9000 Family and Cisco Nexus® Family products. The manager provides an intuitive GUI that simplifies day-to-day operations and management of Cisco unified fabrics in data center environments.

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The Cisco DCNM features include:

- End-to-end performance management of SAN and LAN networks
- Self-service provisioning of intelligent and scalable fabrics
- Centralized fabric management to facilitate resource movements, additions, and changes
- Proactive monitoring of the SAN and LAN and detection of performance degradation
- Easier diagnosis and troubleshooting of data center outages
- Simplified operational management of virtualized data centers
- Intuitive, large-scale fabric visualization along with domain views
- Fibre Channel slow-drain analysis and host-path redundancy
- Scale-out architecture with the use of server-based federation
- Rule-based event notification and filtering
- RBAC to provide separation between network and storage teams

Cisco DCNM provides large-scale deployments through the use of scale-out server-federated architecture with automated failover capability. The network manager's DCNM base management function is available at no charge. In addition, advanced features can be unlocked with a server- or switch-based license. The network manager DCNM can be delivered on Linux and Microsoft Windows operating systems and supports both PostgreSQL and Oracle databases. It also offers an ISO or OVA virtual appliance, which allows rapid deployment of the DCNM management infrastructure.

The MDS 9718 also supports Power-On Autoprovisioning (POAP) to automate software image upgrades and configuration file installation on newly deployed switches.

Comprehensive Solution for Robust Security

The extensive security framework of the MDS 9718 protects sensitive data crossing enterprise networks. It offers 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, Fibre Channel Security Protocol (FC-SP) provides switch-to-switch and host-to-switch Diffie-Hellman Challenge Handshake Authentication Protocol (DH-CHAP) supporting 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

Management of 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. You can identify the exact path and timing of flows with capabilities such as Fibre Channel traceroute. You can capture network traffic using Cisco Switched Port Analyzer (SPAN) and Remote SPAN (RSPAN).

Then you can analyze traffic with Cisco Fabric Analyzer, an embedded Fibre Channel analyzer. You can perform sophisticated performance analysis and SLA accounting by collecting port-based and flow-based statistics.

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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 MDS 9718 coexists invisibly in a unified fabric with any-to-any connectivity for Fibre Channel and FCoE.

Product specifications

Table 2 lists the product specifications for the MDS 9718.

Table 2. Technical Specifications for Cisco MDS 9718 Multilayer Director

Feature	Description
Product compatibility	Cisco MDS 9000 Family
Software compatibility	Cisco MDS NX-OS Software Release 7.3 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)

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Feature	Description
	• 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) • 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: 16 • Supervisor slots: 2 • Crossbar switching fabric slots: 6 • Fan trays: 3 fan trays at the back of the chassis • Power supply bays: 16

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<table>
<tr><th>Feature</th><th colspan="3">Description</th></tr>
<tr><td>Switching capability per fabric</td><td>Number of Fabric-3 Cards</td><td>Front-Panel Fibre Channel Bandwidth per Slot</td><td>FCoE Bandwidth per Slot</td></tr>
<tr><td></td><td>1</td><td>512 Gbps</td><td>440 Gbps</td></tr>
<tr><td></td><td>2</td><td>1024 Gbps</td><td>880 Gbps</td></tr>
<tr><td></td><td>3</td><td>1536 Gbps</td><td>1320 Gbps</td></tr>
<tr><td></td><td>4</td><td>2048 Gbps</td><td>1760Gbps</td></tr>
<tr><td></td><td>5</td><td>2560 Gbps</td><td>2200Gbps</td></tr>
<tr><td></td><td>6</td><td>3072 Gbps</td><td>2640 Gbps</td></tr>
<tr><td>Performance and scalability</td><td colspan="3">• Up to 48-Tbps front-panel Fibre Channel switching bandwidth and 42 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 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 768 2/4/8-Gbps, 4/8/16-Gbps, 8/16/32-Gbps, 10-Gbps Fibre Channel, or 10-Gbps FCoE ports, or up to 384 40-Gbps FCoE 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)</td></tr>
<tr><td colspan="4">Features and Functions</td></tr>
<tr><td>Fabric services</td><td colspan="3">• Name server
• Registered State Change Notification (RSCN)
• Login services
• Fabric Configuration Server (FCS)
• Broadcast
• In-order delivery</td></tr>
<tr><td>Advanced functions</td><td colspan="3">• VSAN
• IVR
• Port channel with multipath load balancing
• QoS: flow based and zone based
• N-Port ID Virtualization (NPIV)</td></tr>
</table>

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Feature	Description
Diagnostics and troubleshooting tools	• POST diagnostics • Online diagnostics • Internal port loopbacks • SPAN and RSPAN • Fibre Channel traceroute • Fibre Channel ping • Fibre Channel debug • 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 World Wide 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 ◦ 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
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

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Feature	Description
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 • Online diagnostics • Port tracking • Virtual Routing Redundancy Protocol (VRRP) for management
Network management	• Access methods through Cisco MDS 9700 Series Supervisor-1E 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 • Access protocols ◦ CLI using console and Ethernet ports ◦ SNMPv3 using Ethernet port and in-band IP over Fibre Channel access • Distributed device alias service • Network security ◦ Per-VSAN RBAC using RADIUS-based and TACACS+-based Authentication, Authorization, and Accounting (AAA) functions ◦ SFTP ◦ SSHv2 implementing AES ◦ SNMPv3 implementing AES • Management applications ◦ Cisco MDS 9000 Family CLI ◦ Cisco DCNM
Programming interface	• REST API-based NX-API • Scriptable CLI • Cisco DCNM web services API • Cisco DCNM GUI

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Feature	Description
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 MDS 9718 provides 30 to 100 Cubic Feet per Minute (CFM) total flow through each line-card slot depending on the line-card type and fan-speed setting. ◦ With the MDS 9718 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, on the sides, and on the top and bottom of the chassis. The chassis front air vents need a clearance of 12 inches, and the back air vents need a clearance of 36 inches from a solid obstruction such as a solid wall.
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 (26 Rack Units [26RU]): 45.25 x 17.3 x 35 in. (114.9 x 43.9 x 88.9 cm) • Cisco MDS 9700 48-Port 16-Gbps Fibre Channel Switching Module: 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: 32.40 x 2.02 x 10.22 in. (82.3 x 5.13 x 25.96 cm) • Fabric-3 module: 32.40 x 2.02 x 10.22 in. (82.3 x 5.13 x 25.96 cm) • Supervisor-1E module: 2.04 x 7.94 x 21.85 in. (5.18 x 20.17 x 55.5 cm) • Supervisor-4 module: 2.04 x 7.94 x 21.85 in. (5.18 x 20.17 x 55.5 cm) • Fan tray: 36.17 x 5.15 x 1.87 in. (91.87 x 13.08 x 4.75 cm) • SFP+: 0.49 x 0.54 x 2.22 in. (1.25 x 1.36 x 5.65 cm)
Weight	• Chassis (includes fans): 300 lb (136 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: 20 lb (9.07 kg) • Fabric-3 module: 20 lb (9.07 kg) • Supervisor-1E module: 8.5 lb (3.86 kg) • Supervisor-4 module: 8.5 lb (3.86 kg) • Fan tray: 12.7 lb (5.76 kg) • Supervisor blank cover: 1.1 lb (0.5 kg) • Line-card blank cover: 4.5 lb (2.04 kg)

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Feature	Description
Approvals and compliance	• Safety compliance ◦ CE Marking ◦ UL 60950 ◦ CAN/CSA-C22.2 No. 60950 ◦ EN 60950 ◦ IEC 60950 ◦ 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

Ordering information

Table 3 provides ordering information for the MDS 9718.

Table 3. Ordering Information for Cisco MDS 9718 Multilayer Director

Part Number	Description
Cisco MDS 9700 Series Component	
DS-C9718	MDS 9718 Chassis, No Power Supplies, Fans Included
DS-X97-SF4-K9	MDS 9700 Series Supervisor-4
DS-X97-SF1E-K9	MDS 9700 Series Supervisor-1E
DS-X9718-FAB3*	MDS 9718 Crossbar Switching Fabric-3 Module
DS-X9718-FAB1	MDS 9718 Crossbar Switching Fabric-1 Module
DS-CAC97-3KW	MDS 9700 3000W AC power supply
DS-CDC97-3KW	MDS 9700 3000W DC power supply
DS-X9648-1536K9	MDS 9700 48-Port 32-Gbps Fibre Channel Switching Module

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Part Number	Description
DS-X9848-480K9	48-Port 10-Gbps Fibre Channel over Ethernet (FCoE) Module
DS-X9824-960K9	24-Port 40-Gbps Fiber Channel over Ethernet (FCoE) Module
DS-X9334-K9	Cisco MDS 9000 Family 24/10 SAN Extension Module
DS-C9718-V3K9	MDS 9718 Config Chassis 2 Sup-4 6 Fab-3 and 8 3k AC PS
DS-C9718-1K9	MDS 9718 Base Config: Chassis, 2 Sup-1, 6 Fabric-1, 12 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
QSFP-40G-SR4	40GBASE-SR SFP Module
QSFP-40G-SR-BD	40GBASE-SR BiDi Module
QSFP-40G-CSR4	40GBASE-CSR QSFP+ Module
QSFP-H40G-AOCXM	QSFP to QSFP active optical cables (X = 1,2,3,5,7,10)
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

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Part Number	Description
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-C9718-FD-MB	MDS 9718 - Front Door Kit
Licensed Software	
M97ENTK9	Enterprise package license for 1 MDS9700 switch
DCNM-SAN-M97-K9	DCNM for SAN License for MDS 9700
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-C9718=	MDS 9718 Chassis, Spare, No Power Supplies, Fans Included
DS-X97-SF4-K9=	MDS 9700 Series Supervisor-4
DS-X97-SF1E-K9=	MDS 9700 Series Supervisor-1E
DS-X9718-FAB3=	MDS 9718 Crossbar Switching Fabric-3 Module
DS-X9718-FAB1=	MDS 9718 Crossbar Switching Fabric-1 Module
DS-CAC97-3KW=	MDS 9700 3000W AC power supply
DS-CDC97-3KW=	MDS 9700 3000W DC power supply
DS-C9718-FAN=	MDS 9718 FAN Tray
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-X9848-480K9=	48-Port 10-Gbps Fibre Channel over Ethernet (FCoE) Module, Spare

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Part Number	Description
DS-X9824-960K9=	24-Port 40-Gbps Fiber Channel over Ethernet (FCoE) Module, Spare
DS-X9334-K9=	Cisco MDS 9000 Family 24/10 SAN Extension Module, Spare
DS-X9648-1536K9=	MDS 9700 48-Port 32-Gbps Fibre Channel Switching Module, spare
DS-X9648-1536K9B=	MDS 9700 48-Port 32-Gbps Fibre Channel Switching Module and 48 16G SW SFP+
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
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
QSFP-40G-SR4=	40GBASE-SR SFP Module, spare
QSFP-40G-SR-BD=	40GBASE-SR BiDi Module, spare
QSFP-40G-CSR4=	40GBASE-CSR QSFP+ Module, spare
QSFP-H40G-AOCXM=	QSFP to QSFP active optical cables (X = 1,2,3,5,7,10), spare
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+

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Part Number	Description
DS-CWDM8G1590=	1590 nm CWDM 2/4/8-Gbps Fibre Channel SFP+
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-C9718-FD-MB=	MDS 9718 – Front Door Kit
DS-C9718-CBTOP=	MDS 9718 – Cable Management and Top LED Kit
DS-C9718-BSK=	MDS 9718 – Chassis Bottom Support Kit
DS-C9718-RMK=	MDS 9718 – Rack Mount Kit
DS-C9718-FDAFLT=	MDS 9718 – Front Door Filter Replacement
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

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Part Number	Description
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

* Minimum NS-OS version 8.4(2) required to support these modules

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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 9718, visit https://www.cisco.com/go/storage or contact your local account representative.

Americas Headquarters
Cisco Systems, Inc.
San Jose, CA

Asia Pacific Headquarters
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