

Cisco MDS 9500 Series Supervisor-1 Module

PRODUCT OVERVIEW

The Cisco® MDS 9500 Series Supervisor-1 Module delivers advanced switching technology with proven Cisco MDS 9000 SAN-OS Software to power a new generation of scalable and intelligent multilayer switching solutions for storage area networks (SANs).

Designed to integrate multiprotocol switching and routing, intelligent SAN services, and storage applications onto highly scalable SAN switching platforms, the Supervisor-1 Module enables intelligent, resilient, scalable, and secure high-performance multilayer SAN switching solutions. The Cisco MDS 9000 Family lowers the total cost of ownership (TCO) for storage networking by combining robust and flexible hardware architecture, multiple layers of network and storage intelligence, and compatibility between all Cisco MDS 9000 Family switching modules. This powerful combination helps organizations to build highly available, scalable storage networks with comprehensive security and unified management.

The Cisco MDS Supervisor-1 Module is supported in the MDS 9506 and 9509 multilayer directors. Figure 1 shows the Cisco MDS 9500 Series Supervisor-1 Module.

Figure 1. The Cisco MDS 9500 Series Supervisor-1 Module



KEY FEATURES AND BENEFITS

The Cisco MDS 9500 Series Supervisor-1 Module offers the following benefits:

- **Scalability and Availability**—The Cisco MDS 9500 Series Supervisor-1 Module combines industry-leading scalability and performance, intelligent SAN services, nondisruptive software upgrades, stateful process restart and failover, and fully redundant operation for a new standard in director-class SAN switching. The module supports up to 252 Fibre Channel ports in a single chassis, 756 Fibre Channel ports in a single rack, and 1.4 Tbps of internal system bandwidth when combined with a Cisco MDS 9509 chassis.
- **Flexibility and investment protection**—Supports any mix of new and/or first generation Cisco MDS 9000 Family switching modules providing forward compatibility and unparalleled investment protection.
- **TCO driven design**—Offers advanced management tools for overall lowest TCO. It supports Cisco Systems® virtual SAN (VSAN) technology for hardware-enforced, isolated environments within a single physical fabric for secure sharing of physical infrastructure, further decreasing TCO.
- **Multiprotocol and multitransport architecture**—The multilayer architecture of the Cisco MDS 9000 Family enables a consistent feature set over a protocol-independent switch fabric. The Supervisor-1 Module transparently integrates Fibre Channel, IBM Fiber Connection (FICON), Small Computer System Interface over IP (iSCSI), and Fibre Channel over IP (FCIP) in one system.

- **Intelligent network services**—Provides integrated support for VSAN technology, Inter-VSAN Routing (IVR), access control lists (ACLs) for hardware-based intelligent frame processing, and advanced traffic management features such as Fibre Channel Congestion Control (FCC) and fabric-wide quality of service (QoS) to enable migration from SAN islands to enterprise-wide storage networks.
- **Open platform for intelligent storage applications**—Provides the intelligent services necessary for hosting and/or accelerating storage applications such as network-hosted volume management, data migration and backup.
- **Integrated hardware-based VSANs and Inter-VSAN Routing (IVR)**—Enables deployment of large-scale multisite and heterogeneous SAN topologies. Integration into port-level hardware allows any port within a system or fabric to be partitioned into any VSAN. Integrated hardware-based inter-VSAN routing provides line-rate routing between any ports within a system or fabric without the need for external routing appliances.
- **Advanced FICON services**—Supports 1,2, 4, and 10-Gbps FICON environments, including cascaded FICON fabrics, VSAN-enabled intermix of mainframe and open systems environments, and N_Port ID Virtualization for mainframe Linux partitions. Control Unit Port (CUP) support enables in-band management of Cisco MDS 9000 Family switches from the mainframe management console.
- **Comprehensive security framework**—Supports 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) implementing Advanced Encryption Standard (AES), VSANs, hardware-enforced zoning, ACLs, and per-VSAN role-based access control.
- **Sophisticated diagnostics**—Provides intelligent diagnostics, protocol decoding, and network analysis tools as well as integrated Call Home capability for added reliability, faster problem resolution, and reduced service costs.
- **Unified SAN management**—The Cisco MDS 9000 Family includes built-in storage management, with all features available through a command-line interface (CLI) or Cisco Fabric Manager, a centralized management tool that simplifies management of multiple switches and fabrics. Integration with third party storage management platforms allows seamless interaction with existing management tools.

Integrated Performance

The Cisco MDS 9500 Series Supervisor-1 Module combines an intelligent control module and high-performance crossbar switch fabric in a single unit. Sitting at the core of the Cisco MDS 9506 and MDS 9509, the Supervisor-1 Module enables industry-leading availability, scalability, security, and flexibility. Its architecture allows the Cisco MDS 9500 Series to be protocol-independent—integrating Fibre Channel, FICON, iSCSI, and FCIP protocols. When combined with the Cisco MDS 9509 Multilayer Director and new Cisco 4-Gbps and 10-Gbps Fibre Channel switching modules, chassis densities of up to 252 ports can be achieved.

High Availability

The Cisco MDS 9500 Series Supervisor-1 Module and MDS 9500 Series Multilayer Directors were designed from the beginning for high availability. Beyond meeting the basic requirements of non-disruptive software upgrades and redundancy of all critical hardware components, the Cisco MDS 9500 Series software architecture offers an unparalleled level of availability. Cisco MDS 9500 Series Supervisor-1 Module has the unique ability to automatically restart failed processes, making it exceptionally robust. In the rare event that a supervisor module is reset, complete synchronization between the active and standby supervisor modules ensures stateful failover with no disruption to traffic.

The Supervisor-1 Module also provides Fabric Shortest Path First (FSPF)-based multipathing to help ensure high availability at the fabric level. With the intelligence to load balance across up to 16 equal-cost paths, the Supervisor-1 Module can dynamically reroute traffic in the event of a switch failure. The Cisco MDS 9500 Series Supervisor-2 Module combined with Cisco MDS 9500 Series Multilayer Directors takes high availability to a new level, ensuring solutions that exceed the 99.999 percent uptime requirements of today's most demanding environments.

Fully Redundant System Bandwidth

Each Supervisor-1 Module provides the necessary crossbar bandwidth to deliver full system performance in Cisco MDS 9506 and MDS 9509 multilayer directors, ensuring that loss or removal of a single crossbar module has no impact on system performance. The modules enable Cisco MDS 9506 and 9509 multilayer directors to deliver maximum system performance, even in the event of a crossbar failure.

Scalability

The Cisco MDS 9500 Series Supervisor-1 Module—can supply up to 1.4 Tbps of non-blocking performance. Compatible with the Cisco MDS 9506 and 9509 multilayer directors, the robust switching performance of the Supervisor-1 Module enables the Cisco MDS 9500 Series to provide best-in-class 1, 2, 4, and 10-Gbps Fibre Channel port density.

Multiprotocol Intelligence for Investment Protection

The crossbar switching architecture of the Supervisor-1 Module enables multilayer and multiprotocol functionality, allowing the Cisco MDS 9506 and MDS 9509 to easily integrate multiple transport protocols for maximum flexibility. Beginning with Fibre Channel, FICON, iSCSI, and FCIP, the Cisco MDS 9500 Series is a robust multiprotocol platform designed for deployment of cost-optimized storage networks. Today, users can implement up to 10-Gbps Fibre Channel or FICON for high-performance applications, iSCSI over Ethernet for cost-effective connectivity to shared storage pools, and FCIP for connectivity between data centers.

Advanced Diagnostics and Troubleshooting Tools

Management of large-scale storage networks requires proactive diagnostics, tools to verify connectivity and route latency, and mechanisms for capturing and analyzing traffic. The Cisco MDS 9000 Family integrates advanced, industry-leading analysis and debug tools. Power-on self test (POST) and online diagnostics provide proactive health monitoring. The Supervisor-1 Module provides the integrated functionality required to implement diagnostic capabilities such as Fibre Channel Traceroute for detailing the exact path and timing of flows, and Switched Port Analyzer (SPAN) and Remote Switched Port Analyzer (RSPAN) to intelligently capture network traffic. After traffic has been captured, it can then be analyzed with the Cisco Fabric Analyzer, an embedded Fibre Channel analyzer. The Supervisor-1 Module provides for collection and management of comprehensive port-based and flow-based statistics enabling sophisticated performance analysis and service-level agreement (SLA) accounting. In addition, integrated Call Home capability is provided for added reliability, faster problem resolution, and reduced service costs. With the Cisco MDS 9500 Series, Cisco delivers a comprehensive toolset for troubleshooting and analysis of an organization's storage network.

PRODUCT SPECIFICATIONS

Table 1 lists the product specifications for the Cisco MDS 9500 Series Supervisor-1 Module.

Table 1. Product Specifications

Technical Specifications	
Product Compatibility	<ul style="list-style-type: none">• Cisco MDS 9506 and MDS 9509 multilayer directors
Software Compatibility	<ul style="list-style-type: none">• Cisco MDS 9000 SAN-OS Software Release 1.0(1) or later
Interfaces	<ul style="list-style-type: none">• (1) RS-232 RJ-45 Console Port• (1) 10/100 Ethernet Management Port• (1) DB-9 COM Port• (1) CompactFlash Interface
Indicators	<ul style="list-style-type: none">• Status LED• System LED• Power management LED• Active/standby LED
Switching Bandwidth	<ul style="list-style-type: none">• Cisco MDS 9509 Chassis• 700 Gbps per Supervisor-1 Module (1.4 Tbps when both supervisor modules are present)

Technical Specifications

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-FS, Revision 1.9 (ANSI/INCITS 373-2003)
 - FC-FS-2, Revision 0.91
 - FC-LS, Revision 1.2
 - FC-AL, Revision 4.5 (ANSI/INCITS 272-1996)
 - FC-AL-2, Revision 7.0 (ANSI/INCITS 332-1999)
 - FC-AL-2, Amendment 1 (ANSI/INCITS 332-1999/AM1-2003)
 - FC-AL-2, Amendment 2 (ANSI/INCITS 332-1999/AM2-2006)
 - 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-GS-3, Revision 7.01 (ANSI/INCITS 348-2001)
 - FC-GS-4, Revision 7.91 (ANSI/INCITS 387-2004)
 - FC-GS-5, Revision 8.2
 - FC-BB, Revision 4.7 (ANSI/INCITS 342-2001)
 - FC-BB-2, Revision 6.0 (ANSI/INCITS 372-2003)
 - FC-BB-3, Revision 6.8 (ANSI/INCITS 414-2006)
 - FCP, Revision 12 (ANSI/INCITS 269-1996)
 - FCP-2, Revision 8 (ANSI/INCITS 350-2003)
 - FCP-3, Revision 4 (ANSI/INCITS 416-2006)
 - FC-SB-2, Revision 2.1 (ANSI/INCITS 349-2001)
 - FC-SB-3, Revision 1.6 (ANSI/INCITS 374-2003)
 - FC-VI, Revision 1.84 (ANSI/INCITS 357-2002)
 - 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-SP, Revision 1.6
 - FC-DA, Revision 3.1 (INCITS TR-36-2004)
 - FAIS, Revision 0.7

Technical Specifications

- IP over Fibre Channel (RFC 2625)
- IPv6, IPv4 and ARP over FC (RFC 4338)
- Extensive IETF-standards based TCP/IP, SNMPv3, and remote monitoring (RMON) MIBs
- Class of Service: Class 2, Class 3, Class F
- Fibre Channel standard port types: E, F, FL, B
- Fibre Channel enhanced port types: SD, ST, TE

Cards/Ports/Slots

- Two Cisco MDS 9500 Series supervisor modules required per system

Features and Functions

Fabric Services

- Name server
- Registered State Change Notification (RSCN)
- Login services
- Fabric Configuration Server (FCS)
- Public loop
- Broadcast
- In-order delivery

Advanced Functionality

- VSAN
- Inter-VSAN Routing
- PortChannel with Multipath Load Balancing
- QoS—flow-based, zone-based
- Fibre Channel Congestion Control
- N_Port ID Virtualization

Diagnostics and Troubleshooting Tools

- Power-on-self-test (POST) diagnostics
- Online diagnostics
- Internal port loopbacks
- SPAN and Remote SPAN
- 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
- Access control lists
- Per-VSAN role-based access control
- Fibre Channel Zoning
 - N_Port WWN

Technical Specifications

	<ul style="list-style-type: none"> – 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 – LUN – Read-only – Broadcast • Fibre Channel Security Protocol (FC-SP) <ul style="list-style-type: none"> – DH-CHAP switch-switch authentication – DH-CHAP host-switch authentication • Port Security and Fabric Binding • Management access <ul style="list-style-type: none"> – SSHv2 implementing AES – SNMPv3 implementing AES – SFTP
FICON	<ul style="list-style-type: none"> • FC-SB-3 compliant • Cascaded FICON fabrics • Intermix of FICON and Fibre Channel FCP traffic • CUP management interface
Serviceability	<ul style="list-style-type: none"> • Configuration file management • Call Home • Power-management LEDs • Port beaconing • System LED • SNMP traps for alerts • Network boot
Cisco MDS 9000 Family Interoperability	<ul style="list-style-type: none"> • Interoperable with Cisco MDS 9506 and MDS 9509 chassis—must be installed in pairs • Interoperable with all Cisco MDS 9000 Family switching and intelligent services modules
Reliability and Availability	<ul style="list-style-type: none"> • Hot-swappable module • Active-active redundancy • Stateful Process Restart • Stateful, Nondisruptive Supervisor Failover • Online, nondisruptive software upgrades • Virtual Routing Redundancy Protocol (VRRP) for management • Per-VSAN fabric services • Power management

Technical Specifications

	<ul style="list-style-type: none">• Thermal management• Fabric-based multipathing
Network Management	<ul style="list-style-type: none">• Access methods through Cisco MDS 9500 Series Supervisor Module<ul style="list-style-type: none">– Out-of-band 10/100 Ethernet port– RS-232 serial console port– In-band IP over Fibre Channel– DB-9 COM port• Access methods through Cisco MDS 9500 Series Fibre Channel Switching Module<ul style="list-style-type: none">– In-band FICON-CUP over Fibre Channel• Access protocols<ul style="list-style-type: none">– CLI—via console and Ethernet ports– SNMPv3—via Ethernet port and in-band IP over-Fibre Channel access– Storage Networking Industry Association (SNIA) Storage Management Initiative Specification (SMI-S)– FICON CUP• Distributed Device Alias service• Network security<ul style="list-style-type: none">– Per-VSAN role-based access control using RADIUS and TACACS+ based authentication, authorization, and accounting (AAA) functions, –SFTP, –SSHv2 implementing AES, –SNMPv3 implementing AES• Management applications<ul style="list-style-type: none">– Cisco MDS 9000 Family CLI– Cisco Fabric Manager– Cisco Device Manager– CiscoWorks Resource Manager Essentials (RME) and Device Fault Manager (DFM)
Programming Interfaces	<ul style="list-style-type: none">• Scriptable CLI• Fabric Manager GUI• Device Manager GUI
Environmental	<ul style="list-style-type: none">• Temperature, ambient operating: –32 to 104°F (0 to 40°C)• Temperature, ambient non-operating and storage: –40 to 167°F (–40 to 75°C)• Relative humidity, ambient (non-condensing) operating: –10 to 90 percent• Relative humidity, ambient (non-condensing) non-operating and storage: –10 to 95 percent<ul style="list-style-type: none">– Altitude, operating: –197 to 6500 feet (–60 to 2000m)
Physical Dimensions	<ul style="list-style-type: none">• Dimensions (H x W x D)<ul style="list-style-type: none">– 1.75 x 14.4 x 16 in (3.0 x 35.6 x 40.6 cm)– Occupies one supervisor slot in a Cisco MDS 9506 and MDS 9509 chassis• Weight<ul style="list-style-type: none">– 10 lb (4.5 kg)
Approvals and Compliance	<ul style="list-style-type: none">• Safety compliance<ul style="list-style-type: none">– CE Marking

Technical Specifications

- UL 60950
- CAN/CSA-C22.2 No. 60950
- EN 60950
- IEC 60950
- TS 001
- AS/NZS 3260
- IEC60825
- EN60825
- 21 CFR 1040
- EMC compliance
 - FCC Part 15 (CFR 47) Class A
 - ICES-003 Class A
 - EN 55022 Class A
 - CISPR 22 Class A
 - AS/NZS 3548 Class A
 - VCCI Class A
 - EN 55024
 - EN 50082-1
 - EN 61000-6-1
 - EN 61000-3-2
 - EN 61000-3-3

ORDERING INFORMATION

Table 2 provides ordering information for the Cisco MDS 9500 Series Supervisor-1 Module.

Table 2. Ordering Information

Part Number	Product Description
DS-X9530-SF1-K9	Cisco MDS 9500 Series Supervisor-1 Module
MEM-MDS-FLD512M	Cisco MDS 9500 Series external 512 MB Compact Flash for Supervisor Module
Advanced Software Packages	
M9500EXT12K9	Cisco MDS 9500 Series SAN Extension over IP Package for Cisco MDS 9000 Family 14/2-Port Multiprotocol Services Module
M9500EXT1K9	Cisco MDS 9500 Series SAN Extension over IP Package for Cisco MDS 9000 Family 8-Port 1-GE IP Storage Services Module
M9500EXT14K9	Cisco MDS 9500 Series SAN Extension over IP Package for Cisco MDS 9000 Family 4-Port 1-GE IP Storage Services Module
M9500SSE1K9	Cisco MDS 9500 Series Storage Services Enabler Package for the Cisco MDS 9000 Family Storage Services Module
M9500ENT1K9	Cisco MDS 9500 Series Enterprise Package

Part Number	Product Description
M9500FMS1K9	Cisco MDS 9500 Series Fabric Manager Server Package
M9500FIC1K9	Cisco MDS 9500 Series Mainframe Package
Spare Components	
DS-X9530-SF1-K9=	Cisco MDS 9500 Series Supervisor-1 Module, Spare
MEM-MDS-FLD512M=	Cisco MDS 9500 Series external 512 MB Compact Flash for Supervisor Module, Spare
M9500EXT12K9=	Cisco MDS 9500 Series SAN Extension over IP Package for Cisco MDS 9000 Family 14/2-Port Multiprotocol Services Module, Spare
M9500EXT1K9=	Cisco MDS 9500 Series SAN Extension over IP Package for Cisco MDS 9000 Family 8-Port 1-GE IP Storage Services Module, Spare
M9500EXT14K9=	Cisco MDS 9500 Series SAN Extension over IP Package for Cisco MDS 9000 Family 4-Port 1-GE IP Storage Services Module, Spare
M9500SSE1K9=	Cisco MDS 9500 Series Storage Services Enabler Package for the Cisco MDS 9000 Family Storage Services Module, Spare
M9500ENT1K9=	Cisco MDS 9500 Series Enterprise Package, Spare
M9500FMS1K9=	Cisco MDS 9500 Series Fabric Manager Server Package, Spare
M9500FIC1K9=	Cisco MDS 9500 Series Mainframe Package, Spare



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