

Cisco MDS 9509 Multilayer Director

PRODUCT OVERVIEW

The Cisco® MDS 9509 Multilayer Director (Figure 1) provides industry-leading availability, scalability, security, and management. The Cisco MDS 9509 allows you to deploy high-performance storage-area networks (SANs) with lowest total cost of ownership (TCO). Layering a rich set of intelligent features onto a high-performance, protocol-independent switch fabric, the Cisco MDS 9509 addresses the stringent requirements of large data center storage environments: uncompromising high availability, security, scalability, ease of management, and transparent integration of new technologies. Compatible with first and second generation Cisco MDS 9000 Family switching modules, the Cisco MDS 9509 provides advanced functionality and unparalleled investment protection, allowing the use of any Cisco MDS 9000 Family switching module in this very scalable system.

Figure 1. The Cisco MDS 9509 Multilayer Director



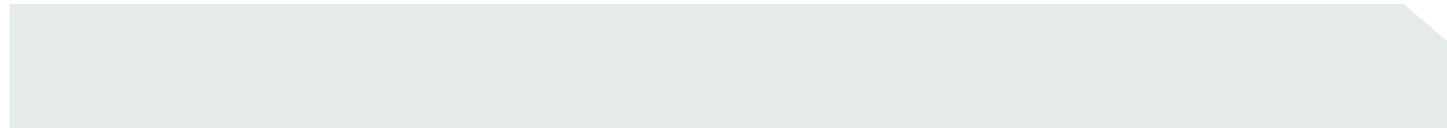
KEY FEATURES AND BENEFITS

The Cisco MDS 9509 offers the following benefits:

- **Scalability and Availability**—The Cisco MDS 9509 combines nondisruptive software upgrades, stateful process restart/failover, and full redundancy of all major components for best-in-class availability. Supporting up to 336 Fibre Channel ports in a single chassis, up to 1008 Fibre Channel ports in a single rack, and 1.4 Tbps of internal system bandwidth, the Cisco MDS 9509 is designed to meet the requirements of large data center storage environments.
- **1/2/4-Gbps and 10-Gbps Fibre Channel switching with full bandwidth redundancy**—Delivers highest available Fibre Channel performance with fully redundant bandwidth. Each crossbar integrated in the supervisor module offers full system bandwidth such that the loss or removal of a single supervisor module does not affect system performance. Ensures 100 percent system throughput even in the event of a crossbar failure.
- **Flexibility and investment protection**—Supports any mix of new and first generation Cisco MDS 9000 Family modules providing forward and backward compatibility and unparalleled investment protection.
- **TCO driven design**—The Cisco MDS 9509 offers advanced management tools for overall lowest TCO. It includes VSAN technology for hardware-enforced, isolated environments within a single physical fabric for secure sharing of physical infrastructure, further decreasing TCO.
- **Multiprotocol and multitransport**—The multilayer architecture of the Cisco MDS 9500 Series facilitates a consistent feature set over a protocol-independent switch fabric. The Cisco MDS 9509 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, 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-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. CUP (Control Unit Port) 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 9509 includes built-in storage network 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.

High Availability

The Cisco MDS 9509 Multilayer Director was designed from the beginning for high availability. Beyond meeting the basic requirements of nondisruptive software upgrades and redundancy of all critical hardware components, the Cisco MDS 9509 software architecture offers an unparalleled level of availability. The Cisco MDS 9500 Series supervisor 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.



High availability is implemented at the fabric level using robust and high-performance Inter-Switch Links (ISLs). PortChannel capability allows users to aggregate up to 16 physical links into one logical bundle. The bundle can consist of any speed-matched ports in the chassis, ensures that the bundle remains active in the event of a port, application-specific integrated circuit (ASIC), or module failure. The Cisco MDS 9509 Multilayer Director takes high availability to a new level, ensuring solutions that exceed the 99.999 percent uptime requirements of today's most demanding environments.

Scalable Expansion with Maximum Investment Protection

Using Cisco MDS 9000 Family switching modules, the Cisco MDS 9509 supports from 12 to 336 1/2/4-Gbps auto-sensing Fibre Channel ports, from 4 to 28 10-Gbps Fibre Channel ports, and from 8 to 48 1-Gbps Ethernet ports (user-configurable for iSCSI or FCIP) in a 9-slot modular chassis. The Cisco MDS 9509 provides up to 1008 Fibre Channel ports in a single rack. With 1.4 Tbps of internal bandwidth, the Cisco MDS 9509 easily supports 1/2/4-Gbps and 10-Gbps.

The Cisco MDS 9509 provides the highest possible level of system commonality. All Cisco MDS 9000 Family switching modules are compatible with each Cisco MDS 9500 Series Multilayer Director. Designed to grow with your storage environment, the Cisco MDS 9509 provides smooth migration, common sparing, and outstanding investment protection.

Virtual SANs

Ideal for efficient, secure SAN consolidation, VSANs allow more efficient storage network utilization by creating hardware-based isolated environments with a single physical SAN fabric or switch. Each VSAN can be zoned as a typical SAN and maintains its own fabric services for added scalability and resilience. VSANs allow the cost of SAN infrastructure to be shared among more users, while ensuring absolute segregation of traffic and retaining independent control of configuration on a VSAN-by-VSAN basis.

Integrated SAN Routing

In another step toward deploying efficient, cost-effective, consolidated storage networks, the Cisco MDS 9509 Multilayer Director supports IVR, the industry's first routing functionality for Fibre Channel. IVR allows selective transfer of data between specific initiators and targets on different VSANs while maintaining isolation of control traffic within each VSAN. With IVR, data can transit VSAN boundaries while maintaining control plane isolation, thereby maintaining fabric stability and availability. Integrated IVR eliminates the need for external routing appliances, greatly increasing routing scalability while delivering line-rate routing performance, simplifying management, and eliminating the challenges associated with maintaining separate systems. Integrated IVR means lower total cost of SAN ownership.

Multiprotocol Intelligence

As with all Cisco MDS 9500 Series Multilayer Directors, the MDS 9509 architecture enables multilayer and multiprotocol functionality, allowing it to transparently integrate multiple transport technologies for maximum flexibility. Beginning with Fibre Channel, FICON, iSCSI, and FCIP, the Cisco MDS 9509 is a robust multiprotocol platform designed for deployment of cost-optimized storage networks. 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.

Open Platform for Intelligent Storage Applications

The Cisco MDS 9509 multilayer director provides an open platform that delivers the intelligence and advanced features required to make multilayer intelligent SANs a reality, including hardware-enabled innovations to host or accelerate applications for data migration, data replication, serverless backup, network-hosted volume management and more. Hosting and/or accelerating these applications in the network can dramatically improve scalability, availability, security and manageability of the storage environment—resulting in increased utility and lower total cost of ownership (TCO).

Integrated Mainframe Support

The Cisco MDS 9509 multilayer directors is mainframe-ready with full support for IBM zSeries FICON and Linux environments. Qualified by IBM for attachment to all FICON-enabled devices in an IBM zSeries operating environment, the Cisco MDS 9509 multilayer directors supports transport of the FICON protocol in both cascaded and non-cascaded fabrics, as well as an intermix of FICON and open systems Fibre Channel Protocol traffic on the same switch. Virtual SANs simplify intermix of SAN resources between z/OS, mainframe Linux, and open systems environments, allowing for increased SAN utilization and simplified SAN management. VSAN-based intermix mode eliminates the uncertainty and instability often associated with zoning-based intermix techniques. VSANs also eliminate the possibility of a misconfiguration or a component failure in one VSAN affecting operation in other VSANs. VSAN-based management access control simplifies partitioning of SAN management responsibilities between mainframe and open systems environments, enhancing security. FICON VSANs can be managed using the integrated Cisco Fabric Manager, Cisco CLI, or IBM CUP-enabled management tools including SA/390 Resource Measurement Facility (RMF), or Dynamic Channel Path Management (DCM).

Advanced Traffic Management

Advanced traffic management capabilities integrated into the Cisco MDS 9509 Multilayer Director simplify deployment and optimization of large-scale fabrics.

- **Virtual output queuing**—Helps ensure line-rate performance on each port, independent of traffic pattern, by eliminating head-of-line blocking.
- **Up to 4095 buffer-to-buffer credits**—Can be assigned to an individual port for optimal bandwidth utilization across distance.
- **PortChannels**—Allow users to aggregate up to 16 physical ISLs into a single logical bundle, providing optimized bandwidth utilization across all links. The bundle can consist of any speed-matched ports from any module in the chassis, ensuring that the bundle can remain active even in the event of a module failure.
- **FSPF-based multipathing**—Provides the intelligence to load balance across up to 16 equal cost paths and, in the event of a switch failure, dynamically reroute traffic.
- **QoS**—Can be used to manage bandwidth and control latency to prioritize critical traffic.
- **Fibre Channel Congestion Control (FCC)**—An end-to-end feedback-based congestion control mechanism that augments the Fibre Channel buffer-to-buffer credit mechanism to provide enhanced traffic management.
- **Port Bandwidth Reservation**—Allows users to define dedicated bandwidth on a per port basis.

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 9509 integrates highly advanced analysis and debug tools. Power-on self test (POST) and online diagnostics provide proactive health monitoring. The Cisco MDS 9509 provides the integrated hardware 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. Comprehensive port-based and flow-based statistics enable sophisticated performance analysis and service-level agreement (SLA) accounting. With the Cisco MDS 9509, Cisco Systems® delivers the most comprehensive toolset for troubleshooting and analyzing storage networks.

Comprehensive Solution for Robust Security

Addressing the need for failproof security in storage networks, the Cisco MDS 9509 offers an extensive security framework to protect highly sensitive data crossing today's enterprise networks. The MDS 9509 employs intelligent packet inspection at the port level, including the application of ACLs for hardware enforcement of zones, VSANs, and advanced Port Security features.

Extended zoning capabilities are enabled to ensure that logical unit numbers (LUNs) are accessible only by specific hosts (LUN zoning), to limit SCSI read command for a certain zone (read-only zoning), and to restrict broadcasts to only the selected zones (broadcast zones). VSANs are used

to achieve higher security and greater stability by providing complete isolation among 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-switch and host-switch Diffie-Hellman Challenge Handshake Authentication Protocol (DH-CHAP) authentication supporting RADIUS or TACACS+, to help ensure that only authorized devices access protected storage networks.

Ease of Management

To meet the needs of all users, the Cisco MDS 9509 Multilayer Director provides three principal modes of management: Cisco MDS 9000 Family CLI, Cisco Fabric Manager, and integration with third-party storage management tools.

The Cisco MDS 9509 presents the user with a consistent, logical CLI. Adhering to the syntax of the widely known Cisco IOS® Software CLI, the Cisco MDS 9000 Family CLI is easy to learn and delivers broad management capabilities. This extremely efficient and direct interface provides optimal functionality to administrators in enterprise environments.

Cisco Fabric Manager is a responsive, easy-to-use Java application that simplifies management across multiple switches and fabrics. Cisco Fabric Manager helps administrators to perform vital tasks such as topology discovery, fabric configuration and verification, provisioning, monitoring, and fault resolution. All functions are available through a secure interface, which facilitates remote management from any location.

Cisco Fabric Manager can be used independently or in conjunction with third-party management applications. Cisco provides an extensive API for integration with third-party and user-developed management tools.

PRODUCT SPECIFICATIONS

Table 1 lists the product specifications for the Cisco MDS 9509 Multilayer Director.

Table 1. Technical Specifications

Feature	Description
Product Compatibility	• Cisco MDS 9000 Family
Software Compatibility	• Cisco MDS SAN-OS Release 1.0 or later
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)

Feature	Description
	– 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 • 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
Chassis Slot Configuration	• Module slots: 7 • Supervisor slots: 2 • Fan tray: front fan tray • Power supply bays: 2
Performance and Scalability	• 1.4-Tbps internal switching bandwidth • Supported Fibre Channel port speeds: – 1 / 2-Gbps auto-sensing – 1/2/4-Gbps auto-sensing – 10-Gbps fixed rate

Feature	Description
	- Supported Ethernet port speeds: 1-Gbps fixed rate - Buffer credits—16-port and 32-port modules: - Up to 255 per port - Buffer credits—multiprotocol services module: - Up to 255 per Fibre Channel port standard - Up to 3500 on an individual port with optional Enterprise License activation - Buffer credits—12-port, 24-port and 48-port modules: - Up to 250 per port standard - Up to 4095 on an individual port with optional Enterprise License activation - Ports per chassis: 12 to 336 1/2/4-Gbps auto-sensing Fibre Channel ports 16 to 224 1/2-Gbps auto-sensing Fibre Channel ports 4 to 28 10-Gbps Fibre Channel ports 4 to 48 1-Gbps Ethernet ports - Ports per rack: - Up to 1008 1/2/4-Gbps Fibre Channel ports - Up to 672 1/2-Gbps auto-sensing Fibre Channel ports - Up to 84 10-Gbps Fibre Channel ports - Up to 144 1-Gbps Ethernet ports - PortChannel: Up to 16 ports (the channel can span any speed-matched port on any module in the chassis)
Features and Functions	
Fabric Services	- Name server - Registered State Change Notification (RSCN) - Login services - Fabric Configuration Server (FCS) - 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

Feature	Description
	• Switch Port Analyzer (SPAN) and Remote SPAN (RSPAN) • Fibre Channel Traceroute • Fibre Channel Ping • Fibre Channel Debug • Cisco Fabric Analyzer • Syslog • Online system health • Port-level statistics • Real Time Protocol Debug
Network Security	• VSANs • Access control lists • Per-VSAN role-based access control • Fibre Channel Zoning – N_Port 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 – LUN – Read-only – Broadcast • Fibre Channel Security Protocol (FC-SP) – DH-CHAP switch-switch authentication – DH-CHAP host-switch authentication • Port Security and Fabric Binding • Management access – SSHv2 implementing AES – SNMPv3 implementing AES – SFTP
FICON	• FC-SB-3 Compliant • Cascaded FICON fabrics • Intermix of FICON and Fibre Channel FCP traffic • CUP management interface
Serviceability	• Configuration file management • Non-disruptive software upgrades for Fibre Channel interfaces • Call Home • Power-management LEDs

Feature	Description
	• Port beaconing • System LED • SNMP traps for alerts • Network boot
Reliability and Availability	• Online, non-disruptive software upgrades • Stateful non-disruptive supervisor module failover • Hot swappable redundant supervisor modules • Hot swappable 1+1 redundant power • Hot-swappable fan tray with integrated temperature and power management • Hot swappable small form-factor pluggable (SFP) optics • Hot swappable small pluggable (X2) optics (10-Gbps) • Hot swappable switching modules • Stateful process restart • Any module, any port configuration for PortChannels • Fabric-based multipathing • Per VSAN fabric services • Online diagnostics • Port tracking • Virtual Routing Redundancy Protocol (VRRP) for management

Feature	Description
Network Management	• Access methods through Cisco MDS 9500 Series Supervisor Module – Out-of-band 10/100 Ethernet port (Supervisor-1 Module) – Out-of-band 10/100/1000 Ethernet port (Supervisor-2 Module) – 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 – In-band FICON-CUP over-Fibre Channel • Access protocols – 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 – Per-VPAN role-based access control using RADIUS and TACACS+ based authentication, authorization, and accounting (AAA) functions – SFTP – SSH v2 implementing AES – SNMPv3 implementing AES • Management applications – Cisco MDS 9000 Family CLI – Cisco Fabric Manager – Cisco Device Manager – CiscoWorks Resource Manager Essentials (RME) and Device Fault Manager (DFM)
Programming Interfaces	• Scriptable CLI • Fabric Manager GUI • Device Manager GUI

Feature	Description
Power and Cooling	
Power Supplies (3000W AC)	• Input: – 100 to 240V AC nominal ($\pm 10\%$ for full range) – 16A maximum – 50–60Hz nominal (± 3 Hz for full range) • Output: – 1400W (100V AC at 16A) – 3000W (200V AC at 16A) • Airflow – 300 lfm through system fan assembly • Cisco recommends that you maintain a minimum air space of 2.5 inches (6.4 cm) between walls and the chassis air vents and a minimum horizontal separation of 6 inches (15.2 cm) between two chassis to prevent overheating.
Environmental	• 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 – Altitude, operating: –197 to 6500 feet (–60 to 2000m)
Physical Dimensions	• Dimensions (H x W x D) – 24.5 x 17.37 x 18.4 in (62.3 x 44.1 x 46.8 cm)—14 RU – Chassis depth including cable guide is 21.64 in. (55.0 cm). All units are rack-mountable in standard 19 inch EIA rack
Weight	• Chassis only: 55 lb (25 kg) • Chassis fully configured with two supervisor/fabric modules, seven switching modules, and two 3000W power supplies: 170 lb (78kg)
Approvals and Compliance	• Safety compliance – CE Marking – UL 60950 – CAN/CSA-C22.2 No. 60950 – EN 60950 – IEC 60950 – TS 001 – AS/NZS 3260 – IEC60825 – EN60825 – 21 CFR 1040 • EMC compliance – FCC Part 15 (CFR 47) Class A – ICES-003 Class A

Feature	Description
	– 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 9509 Multilayer Director.

Table 2. Ordering Information

Part Number	Product Description
Cisco MDS 9509 Components	
DS-C9509	Cisco MDS 9509 Chassis
DS-X9530-SF1-K9	Cisco MDS 9500 Series Supervisor/Fabric-1
DS-X9530-SF2-K9	Cisco MDS 9500 Series Supervisor/Fabric-2
DS-X9016	Cisco MDS 9000 Family 16-Port 1/2-Gbps Fibre Channel Switching Module
DS-X9032	Cisco MDS 9000 Family 32-Port 1/2-Gbps Fibre Channel Switching Module
DS-X9032-SSM	Cisco MDS 9000 Family 32-Port Storage Services Module
DS-X9302-14K9	Cisco MDS 9000 Family 14/2-Port Multiprotocol Services Module
DS-X9304-SMIP	Cisco MDS 9000 Family 4-Port 1-GE IP Storage Services Module
DS-X9308-SMIP	Cisco MDS 9000 Family 8-Port 1-GE IP Storage Services Module
DS-X9112	Cisco MDS 9000 Family 1/2/4-Gbps 12-Port Fibre Channel Switching Module
DS-X9124	Cisco MDS 9000 Family 1/2/4-Gbps 24-Port Fibre Channel Switching Module
DS-X9148	Cisco MDS 9000 Family 1/2/4-Gbps 48-Port Fibre Channel Switching Module
DS-X9704	Cisco MDS 9000 Family 10-Gbps 4-port Fibre Channel switching module
DS-SFP-FC4G-SW	1/2/4-Gbps Fibre Channel—Shortwave, Small Form-Factor Pluggable (SFP), LC
DS-SFP-FC4G-MR	1/2/4-Gbps Fibre Channel—Longwave, SFP, LC (4-km reach)
DS-SFP-FC4G-LW	1/2/4-Gbps Fibre Channel—Longwave, SFP, LC (10-km reach)
DS-X2-FC10G-SW	10-Gbps Fibre Channel—Shortwave X2, SC
DS-X2-FC10G-LW	10-Gbps Fibre Channel—Longwave X2, SC
DS-SFP-FCGE-SW	1-Gbps Ethernet and 1/2-Gbps Fibre Channel—Shortwave SFP, LC
DS-SFP-FCGE-LW	1-Gbps Ethernet and 1/2-Gbps Fibre Channel—Longwave SFP, LC
DS-SFP-GE-T	Gigabit Ethernet Copper SFP, RJ-45

Part Number	Product Description
DS-CAC-3000W	Cisco MDS 9509 3000W AC Power Supply
MEM-MDS-FLD512M	Cisco MDS 9500 Supervisor Compact Flash Disk, 512 MB
CAB-9K16A-CH	Power Cord 250VAC 16A, China, Src Plug GB16C
CAB-9K16A-EU	Power Cord 250VAC 16A, Europe, Src Plug CEE 7/7
CAB-9K16A-INT	Power Cord 250VAC 16A, International, Src Plug IEC 309
CAB-9K16A-ISR	Power Cord 250VAC 16A, Israel, Src Plug SI16S3
CAB-9K16A-SA	Power Cord 250VAC 16A, S Africa, Src Plug EL 208, SABS 164-1
CAB-9K16A-SW	Power Cord 250VAC 16A, Switzerland Src Plug SEV 5934-2 Type 23
CAB-9K16A-US1	Power Cord 250VAC 16A, U.S./Japan, Src Plug NEMA 6-20
CAB-9K16A-US2	Power Cord 250VAC 16A, U.S./Japan, Src Plug NEMA L6-20
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 Advanced Services Module or the Cisco MDS 9000 Family Storage Services Module
M9500ENT1K9	Cisco MDS 9500 Series Enterprise Package
M9500FMS1K9	Cisco MDS 9500 Series Fabric Manager Server Package
M9500FIC1K9	Cisco MDS 9500 Series Mainframe Package
Spare Components	
DS-C9509=	Cisco MDS 9509 Chassis, Spare
DS-X9530-SF1-K9=	Cisco MDS 9500 Series Supervisor/Fabric-1, Spare
DS-X9530-SF2-K9=	Cisco MDS 9500 Series Supervisor/Fabric-2, Spare
DS-X9016=	Cisco MDS 9000 Family 16-Port 1/2-Gbps Fibre Channel Switching Module, Spare
DS-X9032=	Cisco MDS 9000 Family 32-Port 1/2-Gbps Fibre Channel Switching Module, Spare
DS-X9032-SSM=	Cisco MDS 9000 Family 32-Port Storage Services Module, Spare
DS-X9112=	Cisco MDS 9000 Family 1/2/4-Gbps 12-Port Fibre Channel Switching Module, Spare
DS-X9124=	Cisco MDS 9000 Family 1/2/4-Gbps 24-Port Fibre Channel Switching Module, Spare
DS-X9148=	Cisco MDS 9000 Family 1/2/4-Gbps 48-Port Fibre Channel Switching Module, Spare
DS-X9302-14K9=	Cisco MDS 9000 Family 14/2-Port Multiprotocol Services Module, Spare
DS-X9304-SMIP=	Cisco MDS 9000 Family 4-Port 1-GE IP Storage Services Module, Spare
DS-X9308-SMIP=	Cisco MDS 9000 Family 8-Port 1-GE IP Storage Services Module, Spare
DS-X9704=	Cisco MDS 9000 Family 10-Gbps 4-port Fibre Channel switching module, Spare
DS-SFP-4G-SW-4=	1/2/4-Gbps Fibre Channel—Shortwave, SFP, LC, Four Pack, Spare
DS-SFP-FC4G-MR=	1/2/4-Gbps Fibre Channel—Longwave, SFP, LC (4 Km reach), Spare

Part Number	Product Description
DS-SFP-FC4G-LW=	1/2/4-Gbps Fibre Channel—Longwave, SFP, LC (10 Km reach), Spare
DS-X2-FC10G-SW=	10-Gbps Fibre Channel—Shortwave, X2, SC, Spare
DS-X2-FC10G-LW=	10-Gbps Fibre Channel—Longwave, X2, SC, Spare
DS-SFP-FCGE-SW=	1-Gbps Ethernet and 1/2-Gbps Fibre Channel—Shortwave, SFP, LC, Spare
DS-SFP-FCGE-LW=	1-Gbps Ethernet and 1/2-Gbps Fibre Channel—Longwave, SFP, LC, Spare
DS-SFP-GE-T=	Gigabit Ethernet Copper SFP, RJ-45, Spare
DS-CWDM-1470=	Cisco 1470 nm CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
DS-CWDM-1490=	Cisco 1490 nm CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
DS-CWDM-1510=	Cisco 1510 nm CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
DS-CWDM-1530=	Cisco 1530 nm CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
DS-CWDM-1550=	Cisco 1550 nm CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
DS-CWDM-1570=	Cisco 1570 nm CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
DS-CWDM-1590=	Cisco 1590 nm CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
DS-CWDM-1610=	Cisco 1610 nm CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
DS-C9509-CL=	Cisco MDS 9509 Clock Module, Spare
DS-9SL0T-FAN=	Cisco MDS 9509 Fan Tray, Spare
DS-CAC-3000W=	Cisco MDS 9509 3000W AC Power Supply, Spare
MEM-MDS-FLD512M=	Cisco MDS 9500 Supervisor Compact Flash Disk, 512MB, Spare
CAB-9K16A-CH=	Power Cord 250VAC 16A, China, Src Plug GB16C, Spare
CAB-9K16A-EU=	Power Cord 250VAC 16A, Europe, Src Plug CEE 7/7, Spare
CAB-9K16A-INT=	Power Cord 250VAC 16A, International, Src Plug IEC 309, Spare
CAB-9K16A-ISR=	Power Cord 250VAC 16A, Israel, Src Plug SI16S3, Spare
CAB-9K16A-SA=	Power Cord 250VAC 16A, South Africa, Src Plug EL 208, SABS 164-1, Spare
CAB-9K16A-SW=	Power Cord 250VAC 16A, Switzerland, Src Plug SEV 5934-2 Type 23, Spare
CAB-9K16A-US1=	Power Cord 250VAC 16A, U.S./Japan, Src Plug NEMA 6-20, Spare
CAB-9K16A-US2=	Power Cord 250VAC 16A, U.S./Japan, Src Plug NEMA L6-20, 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 Advanced Services Module or 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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