



## Cisco MDS 9509 Multilayer Director

### Cisco MDS 9509 Highlights

- High availability director: The Cisco MDS 9509 combines non-disruptive software upgrades, stateful process restart/failover, and full redundancy of all major components for a new standard in director-class availability; supports up to 256 1 / 2-Gbps auto-sensing Fibre Channel ports in a single chassis and up to 768 Fibre Channel ports in a single rack—1.44 Tbps of internal system bandwidth ensures smooth integration of future 10-Gbps modules.
- TCO driven design: The Cisco MDS 9509 offers advanced management tools for overall lowest total cost of ownership (TCO). Introduces Virtual SAN (VSAN) technology for hardware-enforced, isolated environments within a single physical fabric for secure sharing of physical infrastructure, further decreasing TCO.
- Multiprotocol/multitransport: The multilayer architecture of the Cisco MDS 9509 enables a consistent feature set over a protocol agnostic switch fabric; seamlessly integrates Fibre Channel, iSCSI, and FCIP in one system. Flexible architecture allows integration of future storage protocols.
- Intelligent network services: The Cisco MDS 9509 introduces VSAN technology, Access Control Lists (ACLs) for hardware-based intelligent frame processing, and advanced traffic management features such as Forward Congestion Control (FCC) and fabric-wide QoS to enable migration from SAN islands to multilayer storage networks.
- Open platform for intelligent storage services: The Cisco MDS 9509 provides an open platform for hosting intelligent storage services such as network-based virtualization and replication.

### Figure 1

The Cisco MDS 9509 Multilayer Director—Layering Intelligent Features onto a High Performance Core to Provide Uncompromising High Availability, Security, Scalability, Ease of Management and Seamless Integration of New Technologies





- Comprehensive security framework: The Cisco MDS 9509 supports RADIUS authentication, SNMPv3, role-based access control, SSH, SFTP, FC-SP, VSANs, hardware-enforced zoning, LUN zoning, and ACLs.
- Sophisticated diagnostics: Provides industry-first 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 storage management: The Cisco MDS 9509 includes built-in storage network management with all features available via CLI or Cisco Fabric Manager, a centralized management tool that simplifies management of multiple switches and fabrics.
- Industry's highest performance Inter Switch Links (ISLs): The Cisco MDS 9509 supports up to sixteen 2-Gbps links in a single PortChannel—links may span any port on any module within a chassis for added scalability and resilience.
- Flexibility and investment protection: The MDS 9509 shares common switching modules across all Cisco MDS 9500 Series products as well as the MDS 9216 Multilayer Fabric Switch.

### Cisco MDS 9509—Defining the Multilayer Director

Part of the Cisco MDS 9500 Series, the Cisco MDS 9509 Multilayer Director elevates the standard for director-class switches. Providing industry-leading availability, scalability, security, and management, the Cisco MDS 9509 allows you to deploy high performance storage-area networks with lowest total cost of ownership. Layering a rich set of intelligent features onto a high performance, protocol agnostic switch fabric, the Cisco MDS 9509 Multilayer Directors addresses the stringent requirements of large data center storage environments: uncompromising high availability, security, scalability, ease of management, and seamless integration of new technologies.

### High Availability

The Cisco MDS 9509 Multilayer Director was designed from the ground up for high availability. Beyond meeting the basic requirements of non-disruptive 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 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 via the industry's most robust and highest performance ISLs. PortChannel capability allows users to aggregate up to 16 physical links into one logical bundle. The bundle can consist of any port in the chassis, ensuring that the bundle remains active in the event of a port, ASIC, or module failure. The bundle can sustain the failure of any physical link without causing a reset. Additionally, Fabric Shortest Path First (FSPF) multipathing provides the intelligence to load balance across up to 16 equal cost paths and, in the event of a switch failure, to dynamically reroute traffic. The Cisco MDS 9509 takes high availability to a new level, ensuring ultra-high availability that exceeds the 99.999 percent uptime requirements of today's most demanding environments.



### Scalable Expansion with Maximum Investment Protection

Leveraging Cisco MDS 9000 Family switching modules, the Cisco MDS 9509 supports from 16 to 224 1 / 2-Gbps auto-sensing 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 Multilayer Director provides up to 448 Fibre Channel ports in a single rack. With 1.44 Tbps of internal bandwidth, the Cisco MDS 9509 is ready for future 10-Gbps integration.

The Cisco MDS 9509 Multilayer Director provides the highest possible level of system commonality. The Cisco MDS 9509 power supplies can be migrated between Cisco MDS 9500 Series chassis using the power management feature. 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.

### Introducing the VSAN

Another industry first for the Cisco MDS 9509 Multilayer Directors, VSANs allow more efficient SAN utilization by creating hardware-based isolated environments within a single SAN fabric. 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 assuring absolute segregation and security of traffic and retaining independent control of configuration on a VSAN-by-VSAN basis.

### Multiprotocol Intelligence for Investment Protection

The Cisco MDS 9509 Multilayer Directors' unique architecture allows seamless integration of new transport protocols for maximum flexibility. Beginning with Fibre Channel, iSCSI, and FCIP, the Cisco MDS 9509 is a robust multiprotocol platform designed for deployment of cost-optimized storage networks. Today, users can implement 2-Gbps Fibre Channel for high performance applications, iSCSI over Ethernet for cost-effective connectivity to shared storage pools, and FCIP for connectivity between data centers. The Cisco MDS 9509 is designed to support future storage protocols so that users can seamlessly migrate to new technologies while retaining a consistent set of features, services, and management tools.

### Comprehensive Security

Recognizing the need for airtight security in storage networks, the Cisco MDS 9509 Multilayer Director applies extensive security measures at all possible points of attack. SSH, RADIUS, SNMPv3, and Role Based Access Control are employed against unauthorized management access. To guard against compromising control traffic, Fibre Channel Security Protocol is employed. FC-SP provides confidentiality, data origin authentication, and connectionless integrity across the fabric. Data plane traffic is secured with VSANs, guaranteeing segregation of traffic across shared fabrics, and with zoning to satisfy traffic segregation requirements within a VSAN. Hardware-based ACLs provide further granularity for advanced security options. The Cisco MDS 9509 leverages Cisco's experience securing the world's most sensitive data networks to deliver the industry's most secure storage networking platform.



## Advanced Diagnostics and Troubleshooting Tools

Multilayer intelligence within the Cisco MDS 9509 Multilayer Director includes advanced network analysis and debug tools. For fault management in large-scale storage networks, the Cisco MDS 9509 delivers commands such as FC Traceroute for detailing the exact path and timing of flows and uses Switched Port Analyzer (SPAN) to efficiently capture network traffic. Once traffic has been captured, it can then be analyzed with Cisco Fabric Analyzer, an embedded Fibre Channel analyzer. In addition, integrated Call Home capability is provided for added reliability, faster problem resolution, and reduced service costs. With the Cisco MDS 9509 Multilayer Director, Cisco delivers the most comprehensive toolset for troubleshooting and analysis of an organization's storage network.

## Ease-of-Management

Delivering on the promise of SANs means delivering on management capabilities. To meet the needs of all users, the Cisco MDS 9509 Multilayer Director provides three principal modes of management: Cisco MDS 9000 Family Command Line Interface (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 widely known Cisco IOS® CLI, the Cisco MDS 9000 Family CLI is easy to learn and delivers broad management functionality. The Cisco MDS 9000 Family CLI is an extremely efficient and direct interface designed to provide 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 enables 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 enables remote management from any location.

Cisco Fabric Manager may 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.

## Specifications

### Availability

- Online, non-disruptive software upgrades
- Stateful Supervisor Module failover
- Hot swappable redundant Supervisor Module
- 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 switching modules
- Stateful process restart
- Any module, any port configuration for PortChannels
- Fabric-based multipathing
- Per VSAN fabric services
- Passive backplane
- Online diagnostics



## Performance/Scalability

- Port speed: 1 / 2-Gbps auto-sensing, optionally configurable
- Buffer credits: Up to 255 per port
- Ports per chassis: 16 to 224 1 / 2-Gbps FC ports, up to 48 1-Gbps Ethernet ports
- Ports per rack: 448 1 / 2-Gbps Fibre Channel ports
- PortChannel: Up to 16 2-Gbps ports (the channel can span any port on any module in the chassis)
- Supported optics, media, and transmission distances:

Optics	Media	Distance
1-Gbps—SW, LC SFP	50/125 micron multimode	500 m
1-Gbps—SW, LC SFP	62.5/125 micron multimode	300 m
1-Gbps—LW, LC SFP	9/125 micron single-mode	10 km
2-Gbps—SW, LC SFP	50/125 micron multimode	300 m
2-Gbps—SW, LC SFP	62.5/125 micron multimode	150 m
2-Gbps—LW, LC SFP	9/125 micron single-mode	10 km

## Security

- Virtual SANs (VSANs)
- Zoning
  - N\_Port WWN
  - N\_Port FC-ID
  - F\_Port
  - SCSI LUN(s)
- Fibre Channel Security Protocol (FC-SP)
- Management access
  - SSH v2
  - SNMP v3

## Compatibility

- Fibre Channel Protocols
  - FC-PH, Revision 4.3
  - FC-PH-2, Revision 7.4
  - FC-PH-3, Revision 9.4
  - FC-GS-2, Revision 5.3
  - FC-GS-3, Revision 7.01
  - FC-FLA, Revision 2.7
  - FC-FG, Revision 3.5
  - FC-SW-2, Revision 5.3



- FC-AL, Revision 4.5
- FC-AL-2, Revision 7.0
- FC-PLDA, Revision 2.1
- FC-VI, Revision 1.61
- FCP, Revision 12
- FCP-2, Revision 7a
- FC-SB-2, Revision 2.1
- FC-BB, Revision 4.7
- FC-FS, Revision 1.7
- FC-PI, Revision 13
- FC-MI, Revision 1.99
- FC-Tape, Revision 1.17
- IP over Fibre Channel (RFC 2625)
- Extensive IETF-standards based TCP/IP, SNMP v3, and RMON MIBs
- Class of service: Class 2, Class 3, Class F
- Fibre Channel standard port types: E, F, FL
- Fibre Channel enhanced port types: SD, TE, TL

#### **Fabric Services**

- Name server
- Registered State Change Notification (RSCN)
- Login services
- Private loop
- Public loop
- Translative loop
- Broadcast
- In-order delivery
- Name server zoning

#### **Diagnostics and Troubleshooting Tools**

- Power-on-self-test (POST) diagnostics
- Online diagnostics
- Internal loopbacks
- SPAN
- FC Traceroute



- FC Ping
- FC Debug
- Cisco Fabric Analyzer
- Syslog
- Online system health
- Port-level statistics

### **Storage Management**

- Access methods
  - Out-of-band 10/100 Ethernet port
  - RS-232 serial console port
  - In-band IP-over-FC
  - DB-9 COM port
- Access protocols
  - CLI—via console and Ethernet ports
  - SNMPv3—via Ethernet port and in-band IP-over-FC access
- Security
  - Role-based access control using RADIUS based AAA functions
  - SSHv2
  - SNMPv3
- Management Applications
  - Cisco MDS 9000 Family CLI
  - Cisco Fabric Manager
  - CiscoWorks 2000 Resource Manager Essentials
- One Compact Flash drive per Supervisor Module for onboard storage of management files

### **Serviceability**

- Non-disruptive software upgrades
- Configuration file management
- Call Home
- Power management
- Port beaconing
- System LEDs
- SNMP traps for alerts
- Network boot



## Environmental

- Temperature, ambient operating
  - 32 F (0 C) to 104 F (40 C)
- Temperature, ambient non-operating and storage
  - -40 F (-40 C) to 158 F (70 C)
- Humidity (RH), ambient (non-condensing) operating
  - 10% to 90%
- Humidity (RH), ambient (non-condensing) non-operating and storage
  - 5% to 95%
- Altitude, operating
  - sea level to 6500 feet (2000 m)

## Physical Characteristics

- Dimensions (H x W x D)
  - 25.5 x 17.25 x 18.8 x 43.1 x 46.0 cm—15 RU
  - Chassis depth including cable guide is 21.64 in. (55.0 cm). All units rack mountable in standard 19 inch EIA rack.
- Weight
  - Chassis only: 55 lb (25 kg)
  - Chassis fully configured with 2 supervisor/fabric modules, 7 switching modules, and (2) 2500W power supplies: 170 lb (78kg)

## Power and Cooling

- Power Supplies (2500W AC)
  - Input: 100–240VAC nominal ( 10% for full range)  
16A maximum  
50-60Hz nominal ( 3 Hz for full range)
  - Output: 1300W (100VAC @ 16A)  
2500W (200VAC @ 16A)
  - Input: -48 to -60VDC continuous @ 80A
  - Output: 2500W (-48 to -60VDC)
- Airflow
  - 300 lfm<sup>1</sup> through system fan assembly
  - Cisco recommends that you maintain a minimum air space of 6 inches (16 cm) between walls and the chassis air vents and a minimum separation of 12 inches (30.5 cm) between two chassis to prevent overheating.





### **Safety Compliance**

- CE Marking
- UL 60950
- CAN/CSA-C22.2 No. 60950
- EN 60950
- IEC 60950
- TS 001
- AS/NZS 3260
- IEC60825
- EN60825
- 21 CFR 1040

### **EMC Compliance**

- FCC Part 15 (CFR 47) Class A
- ICES-003 Class A
- EN 55022 Class A
- CISPR 22 Class A
- AS/NZS 3548 Class A
- VCCI Class A
- EN 55024
- EN 50082-1
- EN 61000-6-1
- EN 61000-3-2
- EN 61000-3-3

### **Industry EMC, Safety, and Environmental Standards**

- GR-63-Core NEBS Level 3
- GR-1089-Core NEBS Level 3
- ETS 300 019 Storage Class 1.1
- ETS 300 019 Transportation Class 2.3
- ETS 300 019 Stationary Use Class 3.1
- ETS 300 386

## Ordering Information

Part Number	Description
332306-B21	MDS 9509 base unit includes a 14U, nine slot chassis, fans, dual supervisor modules, firmware and documentation. Supports up to seven optional expansion port modules.
<b>Power Supply Options (Two Required)</b>	
333739-B21	2500 watt AC Power Supply for MDS 9509 w/power cord
332309-B21	2500 watt DC Power Supply for MDS 9509
332310-B21	4000 watt AC Power Supply for MDS 9000 Series, US
332311-B21	4000 watt AC Power Supply for MDS 9000 Series, Int'l
<b>Optional Switching Modules, Required SFPs</b>	
332307-B21	Cisco MDS 9000 Series 16-port Card
332308-B21	Cisco MDS 9000 Series 32-port Card
332312-B21	Optical Transceivers, Small Form Factor Pluggable, Short Wave
332313-B21	Optical Transceivers, Small Form Factor Pluggable, Long Wave
<b>Other Options</b>	
332317-B21	MDS 9000 Port Analyzer Adapter
332314-B21	MDS 9500 Sup Compact Flash Disk, 512MB
<b>Installation Services</b>	
HA113A1#5D1	Cisco MDS 9509 Installation Service

For more information on the HP offering of Cisco products, please visit:  
<http://h18006.www1.hp.com/storage/saninfrastructure.html>



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