Data Sheet

Cisco MDS 9506 Multilayer Director

Cisco MDS 9506 Highlights

- High availability director: The Cisco MDS 9506 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 128 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.
- Compact design: The Cisco MDS 9506 provides high port density in a small footprint, saving valuable data center floor space. The seven rack unit chassis allows up to six MDS 9506 Multilayer Directors in a standard rack, maximizing the number of available Fibre Channel ports. Cable management is facilitated by the single-side position of both interface and power terminations.
- TCO driven design: The Cisco MDS 9506 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 9506 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.

Figure 1

The Cisco MDS 9506 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

- Intelligent network services: The Cisco MDS 9506 introduces 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 QoS to enable migration from SAN islands to multilayer storage networks.
- Open platform for network-hosted storage applications: The Cisco MDS 9506 provides an open platform for hosting intelligent storage services such as network-based virtualization and replication. Storage services modules can be installed in any MDS 9500 Series or MDS 9200 Series chassis to provide scalable distributed application intelligence in the fabric.
- Comprehensive security framework: The Cisco MDS 9506 supports RADIUS authentication, SNMPv3, role-based access control, SSH, SFTP, FC-SP, VSANs, hardware-enforced 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 9506 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 9506 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 9506 shares common switching modules across all Cisco MDS 9500 Series products as well as the MDS 9216 Multilayer Fabric Switch.

Cisco MDS 9506—Defining the Multilayer Director

Part of the Cisco MDS 9500 Series, the Cisco MDS 9506 Multilayer Director elevates the standard for director-class switches. Providing industry-leading availability, scalability, security, and management, the Cisco MDS 9506 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 9506 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 9506 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 9506 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 9506 takes high availability to a new level, ensuring ultra-high availability solutions that exceed the 99.999 percent uptime requirements of today's most demanding environments.

Scalable Expansion with Maximum Investment Protection

The MDS 9506 was designed to make optimal use of valuable data center floor space. Understanding the need to use space efficiently, the MDS 9506 is just 12.25 inches tall (seven rack units), with single side connection management for both interface and power terminations. This space-efficient design allows deployment of up to six MDS 9506 Multilayer Directors per standard 7-foot rack (forty two rack unit), maximizing the number of available Fibre Channel ports per rack.

Leveraging Cisco MDS 9000 Family switching modules, the Cisco MDS 9506 supports from 16 to 128 1/2-Gbps auto-sensing Fibre Channel ports and from 8 to 24 1-Gbps Ethernet ports (user configurable for iSCSI and FCIP) in a 6-slot modular chassis. The Cisco MDS 9506 Multilayer Director provides up to 768 Fibre Channel ports in a single rack. With 1.44 Tbps of internal bandwidth, the Cisco MDS 9506 is ready for future 10-Gbps integration.

The Cisco MDS 9506 Multilayer Director 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 9506 provides smooth migration, common sparing, and outstanding investment protection.

Introducing the VSAN

Another industry first for the Cisco MDS 9506 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 9506 Multilayer Directors' unique architecture allows seamless integration of new transport protocols for maximum flexibility. Beginning with Fibre Channel, iSCSI, and FCIP, the Cisco MDS 9506 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 9506 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.

Open Platform for Network-Hosted Storage Applications

The Cisco MDS 9000 platform provides the open platform that delivers the intelligence and advanced features required to make multilayer intelligent storage area networks a reality, including hardware-enabled innovations that dramatically improve scalability, availability, security, and manageability of storage networks—resulting in increased utility and lower total cost of ownership (TCO).

Comprehensive Security

Recognizing the need for airtight security in storage networks, the Cisco MDS 9506 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 data origin authentication. 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 9506 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 9506 Multilayer Director includes advanced network analysis and debug tools. For fault management in large-scale storage networks, the Cisco MDS 9506 delivers commands such as FC Traceroute for detailing the exact path and timing of flows and uses Switched Port Analyzer (SPAN) and Remote Switched Port Analyzer (RSPAN) 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 9506 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 9506 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 9506 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 128 1/2-Gbps FC ports, 8 to 24 1-Gbps Ethernet ports
- Ports per rack: 768 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:

Table 1 Fiber Channel Optics

Fibre Channel 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

Table 2 Gigabit Ethernet Optics

Gigabit Ethernet Optics	Media	Distance
1000Base-SX, LC SFP	50/125 micron multimode	550 m
1000Base-SX, LC SFP	62.5/125 micron multimode	275 m
1000Base-LX/LH, LC SFP	9/125 or 10/125 micron single-mode	10 km

Security

- Virtual SANs (VSANs)
- Zoning
  - N_Port worldwide name (WWN)
  - N_Port FC-ID
  - Fx_Port WWN
  - LUN
  - Read/Write Privilege
- 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, RSPAN
- FC Traceroute
- FC Ping
- FC Debug
- Cisco Fabric Analyzer
- Syslog
- Online system health
- Port-level statistics

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
  - 10% to 95%
- Altitude, operating
  - -197 to 6500 ft (-60 to 2000 m)

Physical Characteristics

- Dimensions (H x W x D)
  - 12.25 x 17.37 x 21.75 in (31.11 x 44.12 x 55.25 cm)—7RU
  - Chassis depth including cable guide is 26.75 in (67.9 cm). All units rack mountable in standard 19 in EIA rack.
- Weight
  - Chassis only: 46 lb (20.91 kg)
  - Chassis fully configured with two supervisor/fabric modules, four switching modules, and two 1900W power supplies: 124 lb (56 kg)

Power and Cooling

- Power Supplies (1900W AC)
  - Input: 100-240V AC (10% for full range)
  - 12A maximum
  - 50-60Hz nominal (3 Hz for full range)
- Output: 1050W (110V AC @ 12A)
  - 1900W (220V AC @ 12A)
- Power Supplies (1900W DC)
  - Input: -48V DC to -60V DC continuous @ 50A
- Output: 1900W (50V DC)
- Airflow
- 300 linear feet per minute (lfm) through system fan assembly
- Cisco recommends that you maintain a minimum air space of 2.5 inches (6.4cm) between walls and the chassis air vents and a minimum horizontal separation of 6 inches (15.2 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

Ordering Information

Part Number	Description
DS-C9506	MDS 9506 chassis
DS-X9530-SF1-K9	MDS 9500 Supervisor 1
DS-CAC-1900W	MDS 9500 Power Supply, 1900W AC
DS-CDC-1900W	MDS 9500 Power Supply, 1900W DC
Switching Modules, SFPs	
DS-X9016	Cisco MDS 9000 Family 16-port 1/2-Gbps FC Module, SFP/LC
DS-X9032	Cisco MDS 9000 Family 32-port 1/2-Gbps FC Module, SFP/LC
DS-X9032-SMV	Cisco MDS 9000 Advanced Services Module
DS-X9560-SMC	Cisco MDS 9000 Caching Services Module
DS-SFP-FC-2G-SW	1/2-Gbps Fibre Channel-SW, Small Form Factor Pluggable, LC
DS-SFP-FC-2G-LW	1/2-Gbps Fibre Channel-LW, Small Form Factor Pluggable, LC
DS-X9308-SMIP	Cisco MDS 9000 Family 8-port 1-Gbps IP Storage Services Module, SFP/LC
DS-SFP-FCGE-SW	1-Gbps Ethernet and 1/2-Gbps Fibre Channel-SW, Small Form Factor Pluggable, LC
DS-SFP-FCGE-LW	1-Gbps Ethernet and 1/2-Gbps Fibre Channel-LW, Small Form Factor Pluggable, LC
CWDM-SFP-1470-2G	1470 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP
CWDM-SFP-1490-2G	1490 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP
CWDM-SFP-1510-2G	1510 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP
CWDM-SFP-1530-2G	1530 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP
CWDM-SFP-1550-2G	1550 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP
CWDM-SFP-1570-2G	1570 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP
CWDM-SFP-1590-2G	1590 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP
CWDM-SFP-1610-2G	1610 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP
Spare Components	
DS-C9506=	MDS 9506 Chassis (spare)
DS-X9530-SF1-K9=	MDS 9500 Supervisor 1 (spare)
DS-6SLOT-FAN=	MDS 9506 Fan Module (spare)
DS-CAC-1900W=	MDS 9506 Power Supply, 1900W AC (spare)
PEM-20A-AC=	MDS 9506 AC Power Entry Module (spare)
DS-CDC-1900W=	MDS 9506 Power Supply, 1900W DC (spare)
PEM-DC=	MDS 9506 DC Power Entry Module (spare)
DS-X9016=	Cisco MDS 9000 Family 16-port 1/2-Gbps FC Module, SFP/LC (spare)

Part Number	Description
DS-X9032=	Cisco MDS 9000 Family 32-port 1/2-Gbps FC Module, SFP/LC (spare)
DS-X9032-SMV=	Cisco MDS 9000 Advanced Services Module (spare)
DS-X9560-SMC=	Cisco MDS 9000 Caching Services Module (spare)
DS-SFP-FC-2G-SW=	1/2-Gbps Fibre Channel-SW, Small Form Factor Pluggable, LC (spare)
DS-SFP-FC-2G-LW=	1/2-Gbps Fibre Channel-LW, Small Form Factor Pluggable, LC (spare)
DS-X9308-SMIP=	Cisco MDS 9000 Family 8-port 1-Gbps IP Storage Services Module, SFP/LC (spare)
DS-SFP-FCGE-SW=	1 Gbps Ethernet and 2 Gbps Fibre Channel-SW, Small Form Factor Pluggable, LC (spare)
CWDM-SFP-1470-2G=	1470 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP (spare)
CWDM-SFP-1490-2G=	1490 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP (spare)
CWDM-SFP-1510-2G=	1510 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP (spare)
CWDM-SFP-1530-2G=	1530 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP (spare)
CWDM-SFP-1550-2G=	1550 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP (spare)
CWDM-SFP-1570-2G=	1570 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP (spare)
CWDM-SFP-1590-2G=	1590 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP (spare)
CWDM-SFP-1610-2G=	1610 NM CWDM Gigabit Ethernet and 2 Gbps Fibre Channel SFP (spare)

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