Cisco MDS Series Fabric Switches and Directors

The Cisco MDS 9000 Family of multilayer directors and fabric switches is a comprehensive line of SAN switches that fulfills the needs of storage networks of all sizes and architectures to help customers drive SAN consolidation, increase data availability and more efficiently manage their storage resources.

The Cisco MDS 9000 Family expands on the broad HP portfolio of storage area networking (SAN) infrastructure solutions. These solutions offer high performance and scalability and deliver intelligent network services such as multi-protocol/multi-transport integration, virtual SANs (VSANs), advanced traffic management, embedded diagnostics and role-based security. Through an embedded Cisco Fabric Manager and integration with HP OpenView Storage Area Manager software, the Cisco MDS Family delivers unified SAN management, providing ease of administration and improving productivity.

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Cisco MDS 9120—20-port Intelligent Fabric Switch

Cisco MDS 9140—40-port Intelligent Fabric Switch

Cisco MDS 9100 Series Multilayer Fabric Switches

The Cisco MDS 9100 Series, which includes the Cisco MDS 9120 and 9140 Multilayer Fabric Switches, elevates the standard for Fibre Channel (FC) fabric switches, bringing Cisco Multilayer Intelligent Networking to small- and medium-scale SANs and data center edge applications. The Cisco MDS 9100 Series provides the ideal balance of cost-performance and enterprise-class features in a compact 1 RU form factor. Available in 20-port and 40-port maximum configurations, the Cisco MDS 9100 Series offers the port densities required for a wide variety of storage environments. Providing leading-class availability, scalability, security and management, the Cisco MDS 9100 Series allows you to deploy high-performance storage area networks (SANs) with low total cost of ownership (TCO). Layering a rich set of intelligent features onto a cost-effective small profile switching platform, the Cisco MDS 9100 Series addresses the cost-performance, ease of management and connectivity requirements of small- and medium-scale storage environments and provides full feature compatibility with other Cisco MDS 9000 Family products for seamless end-to-end service delivery in large data center core-edge deployments. Each switch is packaged in a 1 RU rack-mountable chassis with redundant hot-swappable power supplies and fans. Shortwave and longwave, small form factor pluggable transceivers (SFPs) are available separately and can be purchased in any quantity, allowing customers scalability to increase the SFPs as their requirements grow. Both chassis utilize front-to-rear airflow. Management access is provided through 10/100 Ethernet and serial console interfaces. The Cisco MDS 9100 Series is a cost-effective solution for enterprise departments, workgroups, small- and medium-scale SAN deployments and edge connectivity in core-edge environments not requiring modularity and support for non-FC data transports.

Key features and benefits—Cisco MDS 9120 and 9140

• Flexible: Offers industry's highest 1 RU and lower TOC

• *Resilient:* Provides redundant power supplies and fans for high availability

• *Serviceable:* Utilizes hot-swappable SFP optical interface modules, fan and power modules

• *Versatile:* Delivers front-to-back airflow configuration

• *Interoperable:* Compatible with existing computing environments

• *Capable:* Introduces VSAN technology, access control lists (ACLs) for hardware-based intelligent frame processing, advanced traffic management features (FC Congestion Control) and fabric-wide QoS for migration from SANs to multilayer storage networks

• *Manageable:* Offers Cisco MDS 9000 Family Fabric and Device Manager and provides built-in storage network management with all features available via CLI or Cisco Fabric Manager, a centralized management tool, simplifying management of multiple switches and fabrics

• *Economical:* Delivers an ideal solution for cost-effectively expanding host connectivity in a SAN, or when building small- to medium-scale SAN environments; lowers cost of SAN deployment

• *Secure:* Provides a comprehensive framework that allows the Cisco MDS 9100 Series to support RADIUS authentication, SNMPv3, role-based access control, SSH, SFTP, FC-SP, VSANs, hardware-enforced zoning and ACLs, minimizing the risk of unauthorized SAN access

• *Reliable:* Supports sophisticated diagnostics providing industry-first intelligent diagnostics, protocol decoding, network analysis tools and integrated Call Home capability for added assurance, faster problem resolution and reduced service costs

Cisco MDS 9216A—16 to 48-port Intelligent Fabric Switch

Cisco MDS 9216i—16 to 48-port Intelligent Fabric Switch

The Cisco MDS 9200 and 9500 Series Fabric Switches feature integrated management, including an embedded Cisco Fabric Manager and integration with HP OpenView Storage Area Manager software and CiscoWorks RME, to provide ease of administration to improve customer productivity.

Cisco MDS 9200 Series Multilayer Fabric Switches

The Cisco MDS 9200 Series switches share a consistent architecture with the Cisco MDS 9500 Series Director and offer the same multilayer intelligence in a modular fabric switch. Intelligent features include multi-protocol support (Fibre Channel, iSCSI, FCIP), Virtual SANs (VSANs), embedded diagnostics and role-based security. With these innovations, companies can build highly scalable, available storage networks with comprehensive security and unified management.

The Cisco MDS 9216A is fully populated out-of-the-box with 16 1- and 2-Gbps autosensing FC ports, and the Cisco MDS 9216i has 14 FC ports and two Ethernet ports built into the chassis and includes a 2-port FCIP software license. An expansion slot allows for the addition of a Cisco MDS 9000 port card available in 16 or 32 ports, for up to 48 FC ports or a Cisco MDS 9000 IP Storage Service Module for FC/iSCSI connectivity. Cisco MDS 9000 port cards and IP Storage Service Modules are interchangeable between the Cisco MDS 9200 Series switches and Cisco MDS 9500 Series directors, providing smooth migration, common sparing and investment protection.

Key features and benefits—Cisco MDS 9216A

- *Interoperable:* Uses the open-standard FCIP protocol to break the distance barrier of current Fibre Channel solutions and enable interconnection of SAN islands over extended distances.

- *Cost-effective:* VSANs allow more efficient storage network utilization by creating hardware-based isolated environments within a single physical SAN fabric or switch. VSANs allow the cost of SAN infrastructure to be shared among more users, while ensuring absolute segregation of traffic.

- *Scalable:* The expansion slot on the Cisco MDS 9216A allows for the addition of any Cisco MDS 9000 Storage Networking Modules, so users can add additional Fibre Channel ports and additional IP ports.

- *Investment protection:* Allows IT organizations to extend their storage networks into the Ethernet infrastructure; has all the benefits of SANs, including increased storage utilization, centralized backups, easier addition of storage capacity and reduced cost of ownership

- *Performance:* Supports hardware-based FCIP compression to maximize the effective WAN bandwidth of SAN extension solutions; achieves up to a 30:1 compression ratio, with typical ratios of 2:1 over a wide variety of data sources

Key features and benefits—Cisco MDS 9216i

- *Manageable:* Provides embedded Cisco Fabric Manager and integration with HP OpenView Storage Area Manager software and CiscoWorks RME

- *Serviceable:* Delivers embedded diagnostics (FC ping, trace route and protocol analyzer) and Call Home capability

- *Upgradeable:* Offers investment protection with multiple module options, all interchangeable across Cisco MDS 9000 line

- *High availability:* Provides non-disruptive software upgrades, redundancy and hot-swappable components

- *Secure:* Supports VSANs, hardware-enforced zoning, role-based access control, FC-SP and ACLs

- *Multi-protocol:* Integrates FC, iSCSI and FCIP in one system

- *Flexible:* Introduces VSANs for consolidation of isolated SAN islands on a single physical fabric

- *Scalable:* Offers 14 FC ports and two Ethernet ports and supports throughput up to 32 Gb in a single PortChannel ISL

- *Open:* Provides open platform for hosting third-party storage applications, such as virtualization

- *Interoperable:* Offers compatibility with a broad range of HP servers and disk and tape storage devices

Cisco MDS 9506—16 to 128-port Multilayer Director

Cisco MDS 9500 Series Multilayer Directors

The Cisco MDS 9506 and 9509 Multilayer Directors deliver multiple layers of intelligence, including multi-protocol support (Fibre Channel, iSCSI, FCIP), VSANs, embedded diagnostics and role-based security. With these innovations, companies can build highly scalable, available storage networks with comprehensive security and unified management.

The Cisco MDS 9506 and 9509 deliver industry-leading performance (1.44 Terabits of internal system throughput), port density (up to 128 ports in the Cisco MDS 9506 and up to 224 ports in the Cisco MDS 9509) and high availability to lower TCO and enable integrated SAN infrastructures. MDS 9000 Family Modules, including 16- and 32-port 1 or 2 Gb FC port cards, IP Storage Services and Multi-protocol Modules, are interchangeable across MDS 9000 Family directors and fabric switches, providing a smooth migration path, common sparing and investment protection.

Key features and benefits—Cisco MDS 9506

- *Available:* Ensures non-disruptive operation and continuous access to business-critical data

- *Flexible:* Enables multiple SANs to share a single physical fabric while maintaining a secure environment for critical applications and lower TCO

- *Secure:* Provides a comprehensive security framework ensuring data is secure, including RADIUS authentication, SNMPv3, role-based access control, SSH, SFTP, FC-SP, VSANs, hardware-enforced zoning and ACLs

- *Reliable:* Delivers sophisticated diagnostics to provide industry-first intelligent diagnostics, protocol decoding, network analysis tools and integrated Call Home capability for added assurance, faster problem solving and reduced service costs

- *Simple:* Offers unified storage management, with built-in storage network management features to simplify and centralize multiple switch and fabric management; integrates with HP OpenView Storage Area Manager software, substantially reducing TCO

- *Interoperable:* Delivers flexibility and investment protection with Cisco MDS 9506 sharing common switching modules across all Cisco MDS 9500 Series products and the Cisco MDS 9216; offers migration, common sparing and outstanding investment protection

- *Performance:* Provides inter-switch networking for PortChannel capability to allow users to aggregate up to 16 physical links (16 Gb) into one logical bundle for high reliability and maximum throughput for large-scale SANs

- *Scalable:* Delivers optimal use of data center floor space at 12.25 inches tall (seven-rack units), and with up to 6 units in a standard 42U rack provides up to 768 FC ports; each 7U chassis accommodates up to 128 ports

- *Manageable:* Utilizes multi-protocol intelligence with FC, iSCSI and FCIP support, its multi-protocol platform is designed for deployment of cost-optimized storage; this protocol agnostic switch addresses the requirements of large data center storage environments, delivering agility to integrate future technologies

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Cisco MDS 9509—16 to 224-port Multilayer Director

Key features and benefits—Cisco MDS 9509

- *Manageable:* Provides embedded Cisco Fabric Manager and integration with HP OpenView Storage Area Manager software and CiscoWorks RME

- *Serviceable:* Delivers embedded diagnostics (FC ping, trace route and protocol analyzer) and Call Home capabilities

- *Upgradeable:* Offers investment protection with multiple module options, all interchangeable across Cisco MDS 9000 line

- *High availability:* Provides non-disruptive software upgrades, stateful process failover and hot-swappable components

- *Secure:* Supports VSANs, hardware-enforced zoning, role-based access control, FC-SP and ACLs

- *Multi-protocol:* Integrates FC, iSCSI and FCIP in one system

- *Flexible:* Introduces VSANs for consolidation of isolated SAN islands on a single physical fabric

- *Scalable:* Offers 16 to 224 FC ports supporting a throughput of up to 32 Gb in a single PortChannel ISL

- *High performance:* Supplies 1.44 Terabits of internal throughput ensuring readiness for future 10 Gb integration

- *Open:* Provides open platform for hosting third-party storage applications, such as virtualization

- *Interoperable:* Offers compatibility with a broad range of HP servers, as well as disk and tape storage devices

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Cisco MDS 9000—Multi-protocol
Services Module

Cisco MDS 9000—8-port IP Storage
Services Module

Cisco MDS 9000—4-port IP Storage
Services Module

Cisco MDS 9000 Storage Networking Modules

Cisco MDS 9000 Storage Networking Modules,
commonly referred to as 14+2, provide flexible
and scalable solutions for Cisco MDS 9200 and
MDS 9500 Series switches. Using open-standard
IP-based technology, the Cisco Storage Networking
Modules eliminate barriers to SAN expansion, enabling
businesses to extend the reach of their Fibre Channel
SANs throughout the data center and between data
centers. Multiple functionality supports interconnection
of remote SAN islands and extends SAN connectivity
to IP-enabled servers using FCIP and iSCSI protocols.
The modules integrate seamlessly into the Cisco MDS
9000 Family of multilayer directors and fabric switches.
Traffic can be routed between any IP storage port and
any other port on a Cisco MDS 9000 Family switch.
HP offers the following Cisco Networking Modules:

Cisco MDS 9000 16-port 1/2 Gb FC port card
Cisco MDS 9000 32-port 1/2 Gb FC port card
Cisco MDS 9000 4-port IP Storage Services Module
Cisco MDS 9000 8-port IP Storage Services Module
Cisco MDS 9000 Multi-protocol Storage Services Module

Key features and benefits

• *Versatile expansion:* Offers 16 to 32 FC ports,
  FCIP and iSCSI

• *Multiple storage network connection possibilities:*
  Provides the ability to add FC ports or connect remote
  SANs through FCIP or iSCSI protocols; configure with
  shortwave, longwave or extended-reach SFPs for
  connectivity up to 100 kilometers

• *Seamless integration:* Offers compatibility with Cisco
  MDS 9000 Family of multilayer directors and switches;
  supports the full range of Cisco services available
  including VSANs, security and traffic management

• *LAN to SAN connectivity:* Delivers increased storage
  utilization and availability through consolidation of IP
  and Fibre Channel block storage

• *Scalability:* Provides scalability options for customers
  where future SAN growth is apparent; additional
  network nodes can be connected through a Fibre
  Channel expansion module once all ports have been
  filled within a switch chassis

• *Security and continuity:* Data protection and business
  continuity is established through the use of bridging
  between a Fibre Channel SAN and an IP network.
  Remote replication is enabled through the FCIP
  operation within a Cisco Storage Networking Module.

• *Interoperability:* Through FCIP and iSCSI bridging,
  remote fabrics and servers can be connected to
  established Fibre Channel SANs where all the benefits
  of SANs can be leveraged.

Cisco MDS 9000 Enterprise Package
The standard software package that is bundled at
no charge with the Cisco MDS 9000 Series switches
includes the base set of features that Cisco Systems
believes are required by most customers for building a
storage area network (SAN). The Cisco MDS switch also
has a set of advanced traffic engineering and advanced
security features that are recommended for all enterprise
SANs. These features are bundled together in the Cisco
MDS 9000 Enterprise Package.

Key features and benefits
* *Inter-VSAN Routing:* Inter-VSAN Routing enables
selective transfer of data traffic between specific
initiators and targets on different virtual SANs (VSANs)
without merging VSANs into a single logical fabric.
Fibre Channel control traffic does not flow between
VSANs, nor can initiators access resources except for
the ones designated with Inter-VSAN Routing.

* *Quality of service (QoS):* The QoS feature in Cisco
SAN-OS allows for data traffic to be classified into
distinct levels for service differentiation.

* *Switch-switch and host-switch authentication:* Fibre
Channel Security Protocol (FC-SP) capabilities
in Cisco SAN-OS provide switch-switch and
host-switch authentication.

* *LUN zoning:* Cisco SAN-OS hardware enforced LUN
zoning ensures LUNs (Logical Unit Numbers) are
accessible only by specific hosts.

* *Read-only zones:* Cisco MDS switches support a type
of Small Computer System Interface (SCSI) command
as a zoning attribute. In conjunction with other zoning
attributes, when a SCSI command type attribute is
restricted to SCSI read commands, read-only zones
can be created.

* *Port security:* This feature locks down the mapping of
an entity to a switch port. The entity can be a host,
target or switch and is identified by its Worldwide
Number (WWN).

* *VSAN-based access control:* This feature enables
customers to define roles where the scope of the
roles is limited to certain VSANs. For example,
a network administrator role can be set up to allow
configuration of all platform-specific capabilities, while
VSAN-administrator roles can be set to only allow
configuration and management of specific VSANs.

* *Available:* Enables Inter-VSAN Routing, which shares
resources across VSANs without compromising VSAN
scalability, reliability, availability and security benefits

* *Secure:* Offers Inter-VSAN Routing, which can be
used in conjunction with FCIP to create more efficient
business continuity and disaster recovery solutions

* *Flexible:* Enables the QoS feature in Cisco SAN-OS
allowing data traffic to be classified into distinct levels
for service differentiation

* *Reliable:* Offers FC-SP capabilities to help eliminate
disruptions that may occur due to unauthorized devices
connecting to a large enterprise fabric

* *Manageable:* Delivers LUN zoning to provide a single
point of control for managing secure access to LUNs
across heterogeneous storage subsystems

* *Interoperable:* Utilizes read-only zones for useful
sharing of volumes across servers, providing read-only
operations for backup, data-warehousing, etc.

* *Secure:* Features port security which ensures SAN
security is not compromised due to unauthorized
devices connecting to a switch port

* *Resilient:* Provides VSAN-based access control to reduce
SAN disruptions by localizing user error effects to the
VSANs, when the user has administrative privileges

* *Controllable:* Offers VSAN-based access control adding
a layer of security where only administrators can
configure switches within specified VSANs

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Cisco MDS 9000 Fabric Manager Server
The standard software package that is bundled at no charge with the Cisco MDS 9000 Series switches includes the base set of features that Cisco Systems believes are required by most customers for building a storage area network (SAN). The Cisco MDS switch also has a set of advanced traffic engineering and advanced security features that are recommended for all enterprise SANs. These features are bundled together in the Cisco MDS 9000 Enterprise Package.

Key features and benefits
- *FC statistics monitoring:* Performance statistics for inter-switch links (ISLs), host and storage device connections, and traffic between specific Fibre Channel sources and destinations (Route Flows) are monitored continuously with Cisco FMS.

- *Reporting and graphing:* Historical performance reports and graphs over daily, weekly, monthly and yearly intervals are available for network hot-spot analysis. Top 10 and daily summary reports for all ISLs, hosts and storage connections, and Route Flows present fabric-wide statistics.

- *Intelligent setup:* Wizards are provided to quickly select information to monitor, set up Route Flows and estimate performance database storage requirements. After initial configuration, host and storage device selections automatically adapt to switch port changes to maintain performance history continuity.

- *Monitoring:* Provides FC statistics monitoring to identify hot spots that may limit bandwidth performance within a Fibre Channel interconnect

- *Manageable:* Delivers reporting and graphing track performance capabilities to monitor data over time and make adjustments, achieving best use of network bandwidth

- *Simple:* Utilizes Intelligent Setup to minimize the amount of application configuration

Technical specifications

Cisco MDS 9100 Series*

Cisco MDS 9120   Cisco MDS 9140

Performance	Cisco MDS 9120: (4) 2.125 Gbps line speed, full duplex ports, (16) 2.125 Gbps, full duplex ports in 4-port groups, each group sharing 2.5 Gbps of switch bandwidth Cisco MDS 9140: (8) 2.125 Gbps line speed, full duplex ports, (32) 2.125 Gbps, full duplex ports in 4-port groups, each group sharing 2.5 Gbps of switch bandwidth
Switch bandwidth	Cisco MDS 9120: 18 Gbps end-to-end, full duplex Cisco MDS 9140: 36 Gbps end-to-end, full duplex
Maximum frame size	2112-byte payload
Port types	F, FL, TL, E, TE, SD, ST
Supported optics, media and transmission distances (optics, media, distance)	1 Gbps—Shortwave, LC SFP 50/125 micron multi-mode 500 m 1 Gbps—Shortwave, LC SFP 62.5/125 micron multi-mode 300 m 1 Gbps—Longwave, LC SFP 9/125 micron single-mode 10 km 2 Gbps—Shortwave, LC SFP 50/125 micron multi-mode 300 m 2 Gbps—Shortwave, LC SFP 62.5/125 micron multi-mode 150 m 2 Gbps—Longwave, LC SFP 9/125 micron single-mode 10 km 1 Gbps—CWDM (Coarse Wavelength Division Multiplexing), LC SFP Dispersion penalty at 100 km 2 dB @ 1.25 Gbps 2 Gbps—CWDM, LC SFP Dispersion penalty at 100 km 3 dB @ 2.12 Gbps
Management access	Console port, 10/100 Ethernet port (RJ-45)
Management included	Cisco SAN-OS command line interface (CLI), Cisco Fabric Manager, Cisco Device Manager, SNMP
Availability	Hot-swappable redundant fans and power supplies, hot-swappable SFP optical modules, automatic process restart; PortChannels allows users to aggregate up to four physical links (Cisco MDS 9120 and MDS 9140) into one logical bundle; the bundle can sustain the failure of any physical link without causing a reset.
Security	SSH, RADIUS, SNMPv3 and role-based access control; port lockdown; VSANs; hardware-based ACLs
Diagnostics	Power-On-Self-Test (POST), online system health monitoring, network analysis and debug tools, FC trace route, FC ping, Switched Port Analyzer (SPAN), Remote Switched Port Analyzer (RSPAN), Cisco Fabric Analyzer, integrated Call Home
Power consumption	300W
Temperature range	Temperature, ambient operating: -32°F (-35°C) to 104°F (40°C) Temperature, ambient non-operating and storage: -40°F (-40°C) to 158°F (70°C)
Humidity range	Humidity (RH), ambient (non-condensing) operating: 10% to 90% Humidity (RH), ambient (non-condensing) non-operating and storage: 5% to 95%
Nominal voltage	100–240 VAC nominal (±10% for full range) 50-60 Hz nominal (±3 Hz for full range)
Voltage tolerance range (VAC)	100–240 VAC nominal (±10% for full range) 50-60 Hz nominal (±3 Hz for full range)
Operating current (Amps)	12A maximum
Dimensions	Height 1.75 (inches) 4.45 (metric) Width 17.2 43.7 Depth 23.1 58.7
What's included	Cisco MDS 9120: Cisco MDS 9120 base unit with 20 ports; dual 300W power supplies; two power cords (configurable); dual fan trays; rack-mount kit; documentation CDs; ESD wrist strap (disposable); console cable kit; packaged documents Cisco MDS 9140: Cisco MDS 9140 base unit with 40 ports; dual 300W power supplies; two power cords (configurable); dual fan trays rack-mount kit; documentation CDs; ESD wrist strap (disposable); console cable kit; packaged documents

*Specifications are the same for the 9120 and the 9140, except where noted.

Cisco MDS 9200 Series*

Cisco MDS 9216A

Cisco MDS 9216i

Availability	Hot-swappable, 1+1 redundant power supplies; hot-swappable fan tray with integrated temperature and power management; hot-swappable SFP optics; hot-swappable switching module; stateful process restart; any module, any port configuration for PortChannels; fabric-based multi-pathing; per VSAN fabric services; passive backplane; online diagnostics
Port speed	1/2 Gb auto-sensing, optionally configurable
Buffer credits	Up to 255 per port
Ports per chassis	Cisco MDS 9216A: 16 to 48 Gb FC ports, up to eight 1-Gb Ethernet ports Cisco MDS 9216i: 14 FC ports and two Ethernet ports
Ports per rack	Up to 672
PortChannel	Up to 16 2-Gb ports
Supported optics, media and transmission distances (optics, media, distance)	1 Gb—Shortwave, LC SFP 50/125 micron multi-mode 500 m 1 Gb—Shortwave, LC SFP 62.5/125 micron multi-mode 300 m 1 Gb—Longwave, LC SFP 9/125 micron single-mode 10 km 2 Gb—Shortwave, LC SFP 50/125 micron multi-mode 300 m 2 Gb—Shortwave, LC SFP 62.5/125 micron multi-mode 150 m 2 Gb—Longwave, LC SFP 9/125 micron single-mode 10 km
Security	VSANs
Zoning	N_Port WWN, N_Port FC-ID, Fx_Port WWN
FC security protocol	FC Security Protocol (FC-SP)
Management access	SSHv2, SNMPv3
Compatibility	FC 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 FC (RFC 2625); Extensive IETF-standards-based TCP/IP, SNMPv3, and RMON MIBs
Class of service	Class 2, Class 3, Class F
FC standard port types	E, F, FL
FC 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	Power-On-Self-Test (POST) diagnostics; online diagnostics; internal loopbacks; SPAN; FC trace route; 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
Serviceability	Configuration file management; non-disruptive software upgrades for switching module; Call Home; power management LEDs; port beaconing; system LED; SNMP traps for alerts; network boot
Temperature range	Temperature, ambient operating: 32°F (-35°C) to 104°F (40°C) Temperature, ambient non-operating and storage: -40°F (-40°C) to 158°F (70°C)
Humidity range	Humidity (RH), ambient (non-condensing) operating: 10% to 90% Humidity (RH), ambient (non-condensing) non-operating and storage: 5% to 95%
Power and cooling	Power supplies: Power supply (845W AC); AC input characteristics; 100 to 240 VAC (10% range); 50-60 Hz (nominal) Airflow: 200 linear feet per minute (lfm) 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
Dimensions		(inches)	(metric) | Height 5.25 / 13.34 Width 17.32 / 43.99 Depth 22.655 / 57.54
What's included	Cisco MDS 9216A: Cisco MDS 9216A base unit with one modular expansion slot; includes 16 FC ports populated with shortwave SFPs; RJ-45 10/100 Ethernet management port; RJ-45 console port; DB-9 COM port; software image; dual AC power supplies; power cords; fan modules; 19-inch rack-mount kit; software; Cisco MDS OS, Cisco Fabric Manager Cisco MDS 9216i: Cisco MDS 9216i base unit with one modular expansion slot; includes 14 FC ports and 2 Ethernet ports populated with shortwave SFPs; RJ-45 10/100 Ethernet management port; RJ-45 console port; DB-9 COM port; software image; dual AC power supplies; power cords; fan modules; 19-inch rack-mount kit; software; Cisco MDS OS, Cisco Fabric Manager and 2-port FCIP software license

*Specifications are the same for the 9216A and the 9216i, except where noted.

Technical specifications

Cisco MDS 9506

Availability	Online, non-disruptive software upgrades; stateful 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 switching modules; stateful process restart; any module, any port configuration for PortChannels; fabric-based multi-pathing; per VSAN fabric services; passive backplane; online diagnostics
Performance	2.125 Gbps line speed, full duplex ports
Switch bandwidth	1.44 Tbps of internal bandwidth
Maximum frame size	2112-byte payload
Port types	E, F, FL, SD, TE, TL, ST
Supported optics, media and transmission distances (optics, media, distance)	1 Gbps—Shortwave, LC SFP 50/125 micron multi-mode 500 m 1 Gbps—Shortwave, LC SFP 62.5/125 micron multi-mode 300 m 1 Gbps—Longwave, LC SFP 9/125 micron single-mode 10 km 2 Gbps—Shortwave, LC SFP 50/125 micron multi-mode 300 m 2 Gbps—Shortwave, LC SFP 62.5/125 micron multi-mode 150 m 2 Gbps—Longwave, LC SFP 9/125 micron single-mode 10 km 1 Gbps—CWDM, LC SFP Dispersion penalty at 100 km 2 dB @ 1.25 Gbps 2 Gbps—CWDM, LC SFP Dispersion penalty at 100 km 3 dB @ 2.12 Gbps
Management access	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
Management included	Cisco SAN-OS command line interface (CLI), Cisco Fabric Manager, Cisco Device Manager, SNMP
Security	Virtual SANs (VSANs) Zoning: N_Port WWN, N_Port FC-ID, Fx_Port WWN, FC-SP Management access: SSH v2, SNMP v3, RADIUS, role-based access control
Diagnostics	Power-On-Self-Test (POST); online system health monitoring; network analysis and debug tools; internal loopback; port-level statistics; FC trace route; FC Ping; Switched Port Analyzer (SPAN); Remote Switched Port Analyzer (RSPAN); Cisco Fabric Analyzer; integrated Call Home
Power consumption	1050W @ 110 VAC 1900W @ 220 VAC These numbers represent the maximum output power provided by the power supply; the total actual power consumption is configuration dependent.
Nominal voltage	5A max at 220 VAC at 1900W output 15A max at 110 VAC at 1050W output
Voltage tolerance range (VAC)	100-240 VAC (±10% for full range)
Operating current (Amps)	15A max at 220 VAC at 1900W output 15A max at 110 VAC at 1050W output
Heat dissipation (Btu/hr or kcal/hr)	DS-C9506 with fans: 573 BTU/hr; DS-X9530-SF1: 1000 BTU/hr; DS-X9016: 1000 BTU/hr; DSX9032: 911 BTU/hr; DS-X9038-SMIP: 1000 BTU/hr. Note: these numbers assume worst-case conditions. Typical numbers are approximately 30 percent below the numbers listed here.
Temperature range	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 range	Humidity (RH), ambient (non-condensing) operating – 10% to 90% Humidity (RH), ambient (non-condensing) non-operating and storage – 10% to 95%
Dimensions	Height 12.25 (inches) 31.11 (metric) Width 17.37 44.12 Depth 21.75 55.25
What's included	Cisco MDS 9506: Cisco MDS 9506 base unit with a 7U, 6-slot chassis; fans; dual supervisor modules; dual 1900W AC power supplies; firmware; rack-mount kit; documentation CDs; ESD wrist strap (disposable); console cable kit; packaged documents; supports up to four optional expansion port modules

Technical specifications

Cisco MDS 9509

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 multi-pathing; per VSAN fabric services; passive backplane; online diagnostics
Port speed	1/2 Gb auto-sensing, optionally configurable
Buffer credits	Up to 255 per port
Ports per chassis	16 to 224 1/2 Gb FC ports, up to 48 1 Gb Ethernet ports
Ports per rack	672 1/2 Gb FC ports
Supported optics, media and transmission distances (optics, media, distance)	1 Gb —Shortwave, LC SFP 50/125 micron multi-mode 500 m 1 Gb —Shortwave, LC SFP 62.5/125 micron multi-mode 300 m 1 Gb —Longwave, LC SFP 9/125 micron single-mode 10 km 2 Gb —Shortwave, LC SFP 50/125 micron multi-mode 300 m 2 Gb —Shortwave, LC SFP 62.5/125 micron multi-mode 150 m 2 Gb —Longwave, LC SFP 9/125 micron single-mode 10 km
Security	Virtual SANs (VSANs)
Zoning	N_Port WWN, N_Port FC-ID, Fx_Port WWN
FC security protocol	FC-SP
Management access	SSH v2, SNMP v3
Compatibility	FC 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 7°; 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 FC (RFC 2625) Extensive IETF standards-based TCP/IP, SNMP v.3 and RMON MIBs
Class of service	Class 2, Class 3, Class F
FC standard port types	E, F, FL
FC 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	Power-On-Self-Test (POST) diagnostics; online diagnostics; internal loopbacks; SPAN; FC trace route; 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
Temperature range	Temperature, ambient operating: 32°F (-35°C) to 104°F (40°C) Temperature, ambient non-operating and storage: -40°F (-40°C) to 158°F (70°C)
Humidity range	Humidity (RH), ambient (non-condensing) operating: 10% to 90% Humidity (RH), ambient (non-condensing) non-operating and storage: 5% to 95%

Power and Cooling	Power supplies (2500W AC):
	  Input: 100-240 VAC nominal (±10% for full range); 16A maximum; 50-60 Hz nominal (±3 Hz for full range)
	  Output: 1300W (100 VAC @ 16A); 2500W (200 VAC @ 16A)
	
	Power supplies (2500W DC):
	  Input: 48 to -60 VDC continuous @ 80A
	  Output: 2500W (-48 to -60 VDC)
	
	Airflow: 300 lfm 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.

Dimensions	Height 24.5 (inches) 62.3 (metric) Width 17.25 43.9 Depth 18.4 46.8
What's included	Cisco MDS 9509: Cisco MDS 9509 base unit with a 9-slot chassis; dual supervisor modules; dual 2500W power supplies (AC version only); power cord; software, Cisco MDS SAN-OS, Cisco Fabric Manager; documentation

Cisco MDS 9000 Storage Networking Modules*

Reliability and availability	Hot-swappable module, hot-swappable SFP optics, online diagnostics, stateful process restart, non-disruptive, supervisor failover, fabric-based multi-pathing, per-VSAN fabric services , Virtual Routing Redundancy Protocol (VRRP) for management and FCIP or iSCSI connections
Port speed	1-Gbps Ethernet
Ports per chassis	4 to 48 ports per chassis
Ports per rack	Up to 144 ports per 42U rack
FCIP tunnels	Up to 3 per port
EtherChannel	Up to 2 1-Gbps ports
IP standards	RFC 791 IPv4 RFC 793, 1323 TCP RFC 894 IP/Ethernet RFC 1041 IP/802 RFC 792, 950, 1256 ICMP RFC 1323 TCP performance enhancements RFC 2338 VRRP
Ethernet standards	IEEE 802.3z Gigabit Ethernet; IEEE 802.1Q VLAN
IP storage services	FCIP; iSCSI; Internet Storage Name Server (iSNS); iSCSI Network Boot Protocol (iNBP)
Advanced functionality	VSAN; Inter-VSAN Routing; EtherChannel with Multi-path Load Balancing; FCIP compression; FCIP Write Acceleration; FCIP Tape Acceleration
Diagnostics and troubleshooting tools	Power-on-self-test (POST) diagnostics, online diagnostics, internal port loopbacks, SPAN and Remote SPAN, Cisco Fabric Analyzer, Syslog, online system health, port-level statistics, Real Time Protocol Debug
Security	VSANs; Access Control Lists; per-VSAN role-based access control iSCSI zoning: iSCSI name; IP address Management access: SSH v2 implementing AES; SNMPv3 implementing AES; SFTP
Network management	Access methods through Cisco MDS 9500 Series Supervisor module: Out-of-band 10/100 Ethernet port; RS-232 serial console port; in-band IP-over-Fibre Channel; DB-9 COM port Access protocols: CLI-via console and Ethernet ports; SNMPv3-via Ethernet port and in-band IP-over-Fibre Channel access; Distributed Device Alias service Network security: per-VSAN 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 2000 Resource Manager Essentials
Serviceability	Configuration file management; Call Home; power-management LEDs; port beaconing; system LED; SNMP traps for alerts; network boot
OS support	Cisco MDS SAN-OS Release 2.0(1) or later
Dimensions (HxWxD)	Height 1.75 (inches) 3.0 (metric) Width 14.4 35.6 Depth 16 40.6
Weight	4 oz
Shipping weight	14 oz
Maximum transfer rate	1 GB Ethernet to 1/2 Gb FC
Temperature range	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 range	Humidity (RH), ambient (non-condensing) operating: 10% to 90% Humidity (RH), ambient (non-condensing) non-operating and storage: 5% to 95%
Altitude operation	197 to 6,500 feet (60 to 2,000 meter)

*Technical specifications are for all modules except the Multi-protocol Services Module, which is listed on page 14.

Cisco MDS 9000 Multi-protocol Services Module

Reliability and availability	Hot-swappable module, hot-swappable SFP optics, online diagnostics, stateful process restart, non-disruptive supervisor failover, any module, any port configuration for PortChannels, fabric-based multi-pathing, per-VSAN fabric services , port tracking, Virtual Routing Redundancy Protocol (VRRP) for management and FCIP or iSCSI connections
Port speed	2/1-Gbps auto-sensing, optionally configurable
Buffer credits	Up to 3,500 per port
PortChannel	Up to 16 2-Gbps ports
Compatibility	FC protocols: FC-PH, Revision 4.3; FC-PH, Amendment 1; FC-PH, Amendment 2; FC-PH-2, Revision 7.4; FC-PH-3, Revision 9.4; FC-PI, Revision 13; FC-FS, Revision 1.9; FC-AL, Revision 4.5; FC-AL-2, Revision 7.0; FC-AL-2, Amendement 1; FC-SW-2, Revision 5.3; FC-SW-3, Rev. 6.6; FC-GS-3, Revision 7.01; FC-GS-4, Rev. 7.91; FC-BB, Revision 4.7; FC-BB-2, Rev. 6.0; FCP, Revision 12; FCP-2, Revision 8; FC-SB-2, Revision 2.1; FC-SB-3, Revision 1.6; FC-VI, Revision 1.84; FC-FLA, Revision 2.7; FC-PLDA, Revision 2.1; FC-Tape, Revision 1.17; FC-MI, Revision 1.92; FC-SP, Revision 1.6; FC-DA, Revision 3.1 IP over Fibre Channel (RFC 2625) Extensive IETF-standards based TCP/IP, SNMPv3, and Remote Monitoring (RMON) MIBs
Class of service	Class 2, Class 3, Class F
FC standard port types	E, F, FL, B
FC enhanced port types	SD, ST, TE, TL
IP standards	RFC 791 IPv4; RFC 793, 1323 TCP; RFC 894 IP/Ethernet; RFC 1041 IP/802; RFC 792, 950, 1256 ICMP; RFC 1323 TCP performance enhancements; RFC 2338 VRRP
Ethernet standards	IEEE 802.3z Gigabit Ethernet IEEE 802.1Q VLAN
IPsec	RFC 2401 Security Architecture for IP RFC 2403, 2404 HMAC RFC 2405, 2406, 2451 IP ESP RFC 2407, 2408 ISAKMP RFC 2412 OAKLEY Key Determination Protocol RFC 3566, 3602, 3686 AES
Internet Key Exchange (KE)	RFC 2409 IKEv1 IKEv2, draft
Fabric services	Name server; Internet Storage Name Server (iSNS); Registered State Change Notification (RSCN); login services; Fabric Configuration Server (FCS); Private loop; Public loop; Translative loop; Broadcast; In-order delivery
Advanced functionality	VSAN; Inter-VSAN Routing; PortChannel with Multi-path Load Balancing; QoS-flow-based, zone-based; Fibre Channel Congestion Control; Extended Buffer-to-Buffer Credits
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
Security	VSANs; Access Control Lists; per-VSAN role-based access control FC 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 iSCSI zoning: iSCSI name; IP address Management access: DH-CHAP switch-switch authentication; DH-CHAP host-switch authentication; Port Security and Fabric Binding; IPsec for FCIP and iSCSI; IKEv1 and IKEv2; SSH v2 implementing AES; SNMPv3 implementing AES; SFTP
Serviceability	Configuration file management; Non-disruptive software upgrades for Fibre Channel interfaces; Call Home; Power-management LEDs; port beaconing; system LED; SNMP traps for alerts; Network boot
Management	Access methods through Cisco MDS 9500 Series Supervisor module: Out-of-band 10/100 Ethernet port; RS-232 serial console port; in-band IP-over-Fibre Channel; DB-9 COM port Access protocols: CLI-via console and Ethernet ports; SNMPv3-via Ethernet port and in-band IP-over-Fibre Channel access Distributed Device Alias service Security: Per-VSAN 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 2000 Resource Manager Essentials
OS support	Cisco MDS SAN-OS Release 2.0(1) or later
Dimensions (HxWxD)	Height 1.75(inches) 3.0 (metric) Width 14.4 35.6 Depth 16 40.6
Weight	10 lbs (4.5 kg)
Temperature range	Temperature, ambient operating: 32°F (0°C) to 104°F (40°C) Temperature, ambient non-operating and storage: −40°F (−40°C) to 167°F (75°C)
Humidity range	Humidity (RH), ambient (non-condensing) operating: 10% to 90% Humidity (RH), ambient (non-condensing) non-operating and storage: 10% to 95%

Cisco MDS 9000 Enterprise Package

Software prerequisites	Cisco SAN OS v1.3 or later firmware Java Virtual Machine v1.4 or later Microsoft® Windows® 2000/XP Solaris v2.8 Red Hat Linux
Hardware prerequisites	1 Cisco MDS 9100, 9200 or 9500 Series switch with v1.3 or later firmware PC, workstation or server – Intel® Pentium® III Processor, 500 MHz minimum, 128 MB system memory minimum
Distribution media	Cisco MDS 9000 Enterprise Package is a firmware-resident, Java-based application within a Cisco MDS 9000 Series switch.
Software licensing	Cisco MDS 9000 Enterprise Package is licensed per Cisco MDS 9000 Series switch.

Cisco MDS 9000 Fabric Manager Server

Software prerequisites	Cisco SAN OS v1.3 or later firmware Java Virtual Machine v1.4 or later Microsoft Windows 2000/XP Solaris v2.8
Hardware prerequisites	1 Cisco MDS 9100, 9200, or 9500 Series switch with v1.3 or later firmware PC, workstation, or server – Intel Pentium III Processor, 500 MHz minimum, 128 MB system memory minimum
Distribution media	Cisco Fabric Manager Server is a firmware-resident, Java-based application within a Cisco MDS 9000 Series switch. The server portion of the application is installed from the switch to PC.
Software licensing	Cisco MDS 9000 Fabric Manager Server is licensed per Cisco MDS 9000 Series switch.

Ordering information

Cisco MDS 9120 and 9140

Part number	Description
A7426A	Cisco MDS 9120 Multilayer Fabric Switch—20-port, 1/2 Gb FC Fabric Switch, requires SFPs (sold separately see below)
A7427A	Cisco MDS 9140 Multilayer Fabric Switch—40-port, unpopulated 1/2 Gb FC Fabric Switch, requires SFPs (sold separately see below)
Options	
A7428A	Transceiver, small form factor pluggable, shortwave—1 or 2 Gb FC
A7429A	Transceiver, small form factor pluggable, longwave—1 or 2 Gb FC
Accessories	
A7430A	Cisco MDS 9000 Port Analyzer Adapter

Cisco MDS 9216A

Part number	Description
A7558A	Cisco MDS 9216A base unit—16-port, 16 shortwave SFPs (A7428A) included, 1 expansion slot
Options	
A7464A	Cisco MDS 9000—16-port, 1/2 Gb FC port card, shortwave SFPs (A7428A) included
A7465A	Cisco MDS 9000—32-port 1/2 Gb FC port card, longwave SFPs (A7428A) included
A7428A	Transceiver, small form factor pluggable, shortwave—1 or 2 Gb FC
A7429A	Transceiver, small form factor pluggable, longwave—1 or 2 Gb FC
A7430A	Cisco MDS 9000 Port Analyzer Adapter
A7470A	Cisco MDS 9000 8-port IP Storage Services Module—8-port, 1 Gbps Ethernet plug-in module for Cisco MDS 9200 and 9500 Series expansion slots, requires A7487A or A7488A SFPs and FCIP software license (A7474A) for FCIP operation
A7562A	Cisco MDS 9000 4-port IP Storage Serivcees Module—4 port, 1 Gbps Ethernet plug-in module for cisco MDS 9200 and 9500 Series expansion slots, requires A7487A or A7488A SFPs and FCIP software license (T3695A) for FCIP operation
A7559A	Cisco MDS 9000 Multi-propocol Storage Services Module—14 Fibre Channel ports and two 1 GB Ethernet port expansion module for Cisco MDS 9200 and 9500 switches, includes 14 shortwave SFPs (A7428A) and two 1 GB Ethernet SFP (A7487A), requires 2-port FCIP software license (T3678A)
A7474A	Cisco MDS 9200 8-port FCIP Services software license—required for FCIP operation of Cisco MDS 9000 8-port IP Storage Services Module within a Cisco MDS 9200 Series switch
T3695A	Cisco MDS 9200 4-port FCIP Services software license—required for FCIP operation of Cisco MDS 9000 4-port IP Storage Services Module within a Cisco MDS 9200 Series Switch
T3678A	Cisco MDS 9200 2-port FCIP Services software license—required for FCIP operation of the two IP ports on the Cisco MDS 9000 Multi-propocol Services Module (A7559A) within a Cisco MDS 9200 Series switch
A7487A	1 Gb Ethernet and 1/2 Gb FC shortwave SFP, LC
A7488A	1 Gb Ethernet and 1/2 Gb FC longwave SFP, LC

Ordering information

Cisco MDS 9216i

Part number	Description
A7558A	Cisco MDS 9216i base unit—14-port, two Ethernet ports built into the chassis
Options	
A7464A	Cisco MDS 9000—16-port, 1/2 Gb FC port card, 16 shortwave SFPs (A7428A) included
A7465A	Cisco MDS 9000—32-port, 1/2 Gb FC port card, 32 shortwave SFPs (A7428A) included
A7428A	Transceiver, small form factor pluggable, shortwave—1 or 2 Gb FC
A7429A	Transceiver, small form factor pluggable, longwave—1 or 2 Gb FC
A7430A	Cisco MDS 9000 Port Analyzer Adapter
A7470A	Cisco MDS 9000 8-port IP Storage Services Module—1 Gbps Ethernet plug-in module for Cisco MDS 9200 and 9500 Series expansion slots, requires A7487A or A7488A SFPs and FCIP software license (A7474A) for FCIP operation
A7562A	Cisco MDS 9000 4-port IP Storage Services Module— 1 Gbps Ethernet plug-in module for Cisco MDS 9200 and 9500 Series expansion slots, requires A7487A or A7488A SFPs and FCIP software license (T3695A) for FCIP operation
A7559A	Cisco MDS 9000 Multi-protocol Storage Services Module—14 Fibre Channel ports and two 1 GB Ethernet port expansion module for Cisco MDS 9200 and 9500 switches, includes 14 shortwave SFPs (A7428A) and two 1 GB Ethernet SFP (A7487A), requires 2-port FCIP license (T3678A)
A7474A	Cisco MDS 9200 8-port FCIP Services software license—required for FCIP operation of Cisco MDS 9000 8-port IP Storage Services Module within a Cisco MDS 9200 Series switch
T3695A	Cisco MDS 9200 4-port FCIP Services software license—required for FCIP operation of Cisco MDS 9000 4-port IP Storage Services Module within a Cisco MDS 9200 Series switch
T3678A	Cisco MDS 9200 2-port FCIP Service software license—required for FCIP operation of Cisco MDS 9000 Multi-protocol Service Module within a Cisco MDS 9216A switch
A7487A	1 Gb Ethernet and 1/2 Gb FC shortwave SFP, LC
A7488A	1 Gb Ethernet and 1/2 Gb FC longwave SFP, LC

Cisco MDS 9506

Part number	Description
A7471A	Cisco MDS 9506 with 0 ports—base unit includes a 7U, 6-slot chassis, fans, dual supervisor modules, dual 1900W AC power supplies, firmware and documentation; supports up to four optional expansion port modules
Options	
A7464A	Cisco MDS 9000 Series 16-port card—16-port 1/2 Gb FC module, fully populated with shortwave SFPs (A7428A)
A7465A	Cisco MDS 9000 Series 32-port card—32-port 1/2 Gb FC module, fully populated with shortwave SFPs (A7428A)
A7428A	Transceiver, small form factor pluggable, shortwave—1 or 2 Gb FC, supports distances up to 500 m at 1 Gb or 300 m at 2Gb
A7429A	Transceiver, small form factor pluggable, longwave—1 or 2 Gb FC, supports distances up to 10 km
A7468A	Cisco MDS 9500 Sup Compact Flash Disk, 512 MB—flash memory for Supervisor modules, used to store and configuration information
A7430A	Cisco MDS 9000 Port Analyzer Adapter
FCIP and iSCSI solutions	
A7470A	Cisco MDS 9000 8-port IP Storage Services Module—1 Gbps Ethernet plug-in module for Cisco MDS 9200 and 9500 Series expansion slots, requires A7487A or A7488A SFPs and FCIP software license (A7469A) for FCIP operation within a Cisco MDS 9500 Series switch
A7469A	Cisco MDS 9500 FCIP Services software license—required for FCIP operation of Cisco MDS 9000 8-port IP Storage Services Module within a Cisco MDS 9500 Series switch
A7562A	Cisco MDS 9000 4-port IP Storage Services Module—1 Gbps Ethernet plug-in module for Cisco MDS 9200 and 9500 series expansion slots, requires A7487A or A7488A SFPs and FCIP software license (T3695A) for FCIP operation within a Cisco MDS 9500 Series switch
T3694A	Cisco MDS 9500 4-port FCIP Services software license—required for FCIP operation of Cisco MDS 9000 4-port IP Storage Services Module within a Cisco MDS 9500 Series switch
A7559A	Cisco MDS 9000 Multi-protocol Storage Services Module—14 Fibre Channel ports and two 1 GB Ethernet port expansion modules for Cisco MDS 9200 and 9500 switches, includes 14 shortwave SFPs (A7428A) and two 1 GB Ethernet SFPs (A7487A), requires optional 2-port FCIP software license (T3679A) for FCIP operation within a Cisco MDS 9500 Series switch
T3679A	Cisco MDS 9200 2-port FCIP Services software license—required for FCIP operation of the two IP ports on the Cisco MDS 9000 Multi-protocol Services Module (A7559A) within a Cisco MDS 9500 Series switch
A7487A	1 Gb Ethernet and 1/2 Gb FC shortwave SFP, LC
A7488A	1 Gb Ethernet and 1/2 Gb FC longwave SFP, LC
Power options*	
346702-B21	Cisco MDS 9506 base unit without power supplies—purchase this base unit for a DC-powered Cisco MDS 9506
346705-B21	1900W DC power supply for Cisco MDS 9506—Purchase two for DC-powered MDS 9506
346704-B21	1900W AC Power Supply for Cisco MDS 9506—Two included with AC-powered MDS 9506

* Cisco MDS 9506 (A7471A) is shipped from factory with dual 1900W AC power supplies. For DC version of Cisco MDS 9506, order a base unit (346702-B21) and two 1900W DC power supplies (346705-B21).

Ordering information

Cisco MDS 9509

Part number	Description
A7462A	Cisco MDS 9509 base unit—includes a 14U, 9-slot chassis, fans, dual supervisor modules, dual 2500W AC power supplies, firmware and documentation; supports up to seven optional expansion port modules
Options	
A7464A	Cisco MDS 9000 Series 16-port card**—includes shortwave SFPs (A7428A)
A7465A	Cisco MDS 9000 Series 32-port card**—includes shortwave SFPs (A7428A)
A7428A	Transceiver, small form factor pluggable, shortwave—1 or 2 Gb FC
A7429A	Transceiver, small form factor pluggable, longwave—1 or 2 Gb FC
A7430A	Cisco MDS 9000 Port Analyzer Adapter
A7468A	Cisco MDS 9500 Sup Compact Flash Disk, 512MB
FCIP and iSCSI solutions	
A7470A	Cisco MDS 9000 8-port IP Storage Services Module—1 Gbps Ethernet plug-in module for Cisco MDS 9200 and 9500 Series expansion slots, requires A7487A or A7488A SFPs and FCIP software license (A7469A) for FCIP operation
A7469A	Cisco MDS 9500 FCIP Services software license—required for FCIP operation of Cisco MDS 9000 8-port IP Storage Services Module within a Cisco MDS 9500 Series switch
A7562A	Cisco MDS 9000 4-port IP Storage Services Module—1 Gbps Ethernet plug-in module for Cisco MDS 9200 and 9500 series expansion slots, requires A7487A or A7488A SFPs and FCIP software license (T3694A) for FCIP operation within a Cisco MDS 9500 Series switch
T3694A	Cisco MDS 9500 4-port FCIP Services software license—required for FCIP operation of Cisco MDS 9000 4-port IP Storage Services Module within a Cisco MDS 9500 Series switch
A7559A	Cisco MDS 9000 Multi-protocol Storage Services Module—14 Fibre Channel ports and two 1 GB Ethernet port expansion module for Cisco MDS 9200 and 9500 switches, includes 14 shortwave SFPs (A7428A) and two 1 GB Ethernet SFP (A7487A), requires optional 2-port FCIP software license (T3679A) for FCIP operation within a Cisco MDS 9500 Series switch
T3679A	Cisco MDS 9500 2-port FCIP Services software license—required for FCIP operation of the two IP ports on the Cisco MDS 9000 Mult-iprotocol Services Module (A7559A) within a Cisco MDS 9500 Series switch
A7487A	1 Gb Ethernet and 1/2 Gb shortwave SFP, LC
A7488A	1 Gb Ethernet and 1/2 Gb longwave SFP, LC
Power options*	
333739-B21	2500W AC Power Supply for Cisco MDS 9509 with power cord—two each included with Cisco MDS 9509 base unit (AC version A7462A)
332309-B21	2500W DC Power Supply for Cisco MDS 9509—or DC-powered Cisco MDS 9509, order two each of 332309-B21 and one 332306-B21
332310-B21	4000W AC Power Supply for Cisco MDS 9000 Series, U.S.
332311-B21	4000W AC Power Supply for Cisco MDS 9000 Series, International
332306-B21	Cisco MDS 9509 base unit includes a 14U, 9-slot chassis, fans, dual supervisor modules, no power supplies, firmware and documentation; base unit without power supplies

**Cisco MDS 9000 port cards are shipped with shortwave SFP.
***For DC-powered or 4000W AC-powered versions of Cisco MDS 9509, order base unit with no power supplies (332306-B21) and two
  DC (332309-B21) or AC (332310-B21, 332311-B21) power supplies.

Cisco MDS 9216A, 9216i, 9506 and 9509 CWDM (Course Wavelength Division Multiplexing)

Course Wavelength Division Multiplexing (CWDM) Solution

The Cisco CWDM Extended Distance Solution is designed to transmit multiple 1/2 Gb FC and/or Gigabit Ethernet traffic streams over a single, shared fiber-optic cable. The CWDM solution consists of a 2-slot (1RU) CWDM Chassis, which accommodates up to two passive optic CWDM Mux plug-in modules. Two types of modules are available: an 8-wavelength multiplexer/demultiplexer module and a 4-wavelength multiplexer/demultiplexer module with add/drop capabilities. The color-coded active CWDM wavelength-specific SFPs are installed into available FC and IP ports within one or more Cisco MDS directors. Up to eight CWDM wavelength-specific SFPs may be connected to the passive optic CWDM Mux plug-in module, using the 1 meter or 5 meter single-mode Lucent Connector (LC)/Standard Connector (SC) fiber-optic jumper cables. Each wavelength-specific SFP represents a color or channel, and up to eight channels are transmitted simultaneously between sites over a single, shared fiber-optic cable, helping reduce the costs for Extended Distance Solutions.

Part number	Description
A7483A	4-wavelength Add/Drop Mux, with Chassis—consists of a 2-slot (1RU) CWDM Chassis, which accommodates up to two passive optic CWDM Mux plug-in modules and a 4-wavelength multiplexer/demultiplexer module with add/drop capabilities
A7484A	8-wavelength Mux/Demux, with Chassis—consists of a 2-slot (1RU) CWDM Chassis, which accommodates up to two passive optic CWDM Mux plug-in modules and an 8-wavelength multiplexer/demultiplexer module
A7475A	1470 NM CWDM FC SFP—color-coded active CWDM wavelength-specific 1470 nanometer SFP
A7476A	1490 NM CWDM FC SFP—color-coded active CWDM wavelength-specific 1490 nanometer SFP
A7477A	1510 NM CWDM FC SFP—color-coded active CWDM wavelength-specific 1510 nanometer SFP
A7478A	1530 NM CWDM FC SFP—color-coded active CWDM wavelength-specific 1530 nanometer SFP
A7479A	1550 NM CWDM FC SFP—color-coded active CWDM wavelength-specific 1550 nanometer SFP
A7480A	1570 NM CWDM FC SFP—color-coded active CWDM wavelength-specific 1570 nanometer SFP
A7481A	1590 NM CWDM FC SFP—color-coded active CWDM wavelength-specific 1490 nanometer SFP
A7482A	1610 NM CWDM FC SFP—color-coded active CWDM wavelength-specific 1610 nanometer SFP
A7485A	Fibre Cable LC/SC 1 Meter—1 meter single-mode Lucent Connector (LC)/Standard Connector (SC) fiber-optic jumper cable
A7486A	Fibre Cable LC/SC 5 Meter—5 meter single-mode Lucent Connector (LC)/Standard Connector (SC) fiber-optic jumper cable

Ordering information

Cisco MDS 9120, 9140, 9216A, 9216i, 9506 and 9509 cables

Part number	Description
LC-LC for between 2 Gb devices	
221692-B21	2 m LC-LC Multi-mode Fibre Channel Cable
221692-B22	5 m LC-LC Multi-mode Fibre Channel Cable
221692-B23	15 m LC-LC Multi-mode Fibre Channel Cable
221692-B26	30 m LC-LC Multi-mode Fibre Channel Cable
221692-B27	50 m LC-LC Multi-mode Fibre Channel Cable
LC-SC for between a 1 Gb and a 2 Gb device	
221691-B21	2 m LC-SC Multi-mode Fibre Channel Cable
221691-B22	5 m LC-SC Multi-mode Fibre Channel Cable
221691-B23	15 m LC-SC Multi-mode Fibre Channel Cable
221691-B26	30 m LC-SC Multi-mode Fibre Channel Cable
221691-B27	50 m LC-SC Multi-mode Fibre Channel Cable

Cisco MDS 9000 Storage Networking Modules

Part number	Description
A7464A	Cisco MDS 9000—16-port, 1/2 Gb FC port card, 16 shortwave SFPs (A7428A) included
A7465A	Cisco MDS 9000—32-port, 1/2 Gb FC port card, 32 shortwave SFPs (A7428A) included
A7562A	Cisco MDS 9000 4-port IP Storage Services Module—4-port, 1 Gbps Ethernet plug-in module for Cisco MDS 9200 and 9500 Series expansion slots, requires A7487A or A7488A SFPs and FCIP software license (T3695A) for FCIP operation
A7470A	Cisco MDS 9000 8-port IP Storage Services Module—8-port, 1 Gbps Ethernet plug-in module for Cisco MDS 9200 and 9500 Series expansion slots, requires A7487A or A7488A SFPs and FCIP software license (A7474A or A7469A) for FCIP operation
A7559A	Cisco MDS 9000 Multi-protocol Storage Services Module—14 Fibre Channel ports and two 1 GB Ethernet port expansion module for Cisco MDS 9200 and 9500 switches, includes 14 shortwave SFPs (A7428A) and two 1 GB Ethernet SFP (A7487A), requires 2-port FCIP software license (T3678A)
Options	
T3695A	Cisco MDS 9200 4-port FCIP software license—required for FCIP operation of Cisco MDS 9000 4-port IP Storage Services Module within a Cisco MDS 9200 Series switch
T3694A	Cisco MDS 9500 4-port FCIP software license—required for FCIP operation of Cisco MDS 9000 4-port IP Storage Services Module within a Cisco MDS 9500 Series switch
A7474A	Cisco MDS 9200 FCIP Services software license—required for FCIP operation of Cisco MDS 9000 8-port IP Storage Services Module within a Cisco MDS 9200 Series switch
A7469A	Cisco MDS 9500 8-port FCIP software license—required for FCIP operation of Cisco MDS 9000 8-port IP Storage Services Module within a Cisco MDS 9500 Series switch
T3678A	Cisco MDS 9200 2-port FCIP service license—required for Cisco MDS 9000 Multi-protocol Service Module within a Cisco MDS 9200 Series switch
T3679A	Cisco MDS 9500 2-port FCIP service license—required for Cisco MDS 9000 Multi-protocol Service Module within a Cisco MDS 9500 Series switch (included with 9216i)
A7428A	Transceiver, small form factor pluggable, shortwave—1 or 2 Gb FC
A7429A	Transceiver, small form factor pluggable, longwave—1 or 2 Gb FC
A7487A	1 Gb Ethernet and 1/2 Gb FC shortwave SFP, LC
A7488A	1 Gb Ethernet and 1/2 Gb FC longwave SFP, LC

Cisco MDS 9000 Enterprise Package

Part number	Description
A7515A	Cisco MDS 9100 Enterprise Package license for one Cisco MDS 9100 Series switch
A7516A	Cisco MDS 9200 Enterprise Package license for one Cisco MDS 9200 Series switch
A7517A	Cisco MDS 9500 Enterprise Package license for one Cisco MDS 9500 Series switch

Cisco MDS 9000 Fabric Manager Server

Part number	Description
A7512A	Cisco MDS 9100 Fabric Manager Server license for one Cisco MDS 9100 Series switch
A7513A	Cisco MDS 9200 Fabric Manager Server license for one Cisco MDS 9200 Series switch
A7514A	Cisco MDS 9500 Fabric Manager Server license for one Cisco MDS 9500 Series switch

Cisco MDS Series Fabric Switches and Directors

Software warranty	HP warrants that the software media will be free of physical defects for a period of 90 days from delivery.
	Software product services: Product Support gives the customer access to HP's experienced technical support resources as well as access to the HP Information Services database for support on a variety of multi-vendor/multi-platform software products. Product support includes escalation and problem coordination with the appropriate engineering group. HP Services offer a variety of options to allow you to tailor your product service to meet the needs of your organization. Basic warranty on products can be uplifted from day one to ensure you receive the service you need when you need it.
	Software product services: Standard 1-year, 8x5 phone support, service packs, right to new versions included with the product
	Additional service offered as HP Care Pack Services: HP Care Pack Services are available to upgrade the one year of Software Support included with the product to 3 full years.
	• HP Care Pack Services are available to upgrade the one year of Software Support included with the product to either 1 or 3 years of Support Plus 24, which provides 24x7 coverage (24 hours per day, 7 days per week, including holidays).
	• HP Care Pack Services are available to upgrade the one year of Software Support included with the product to either 1 or 3 years of Support Plus, which provides 13x5 coverage.
	• Basic installation service is available.
	• Contractual software support services
	• For tailored support contracts based on personalized statement of work, contact your local support center at: www.hp.com/support/.
Hardware warranty and support	(1-1-1) Hardware Warranty; 1-year parts, 1-year on-site (9x5, next-business-day response) and 1-year labor. NOTE: The hardware warranty covers firmware and embedded non-saleable software. Saleable software carries its own warranty. Increased warranty options are available as HP Care Pack services, including: 1- and 3-year on-site, next-day, same-day 4-hour response, 13x5 and 24x7, hardware and software phone support. For more information on warranty and support options, please visit our web site at: www.hp.com/hps/tech/storage/supp/.
	Hardware product installation is not included in the warranty, but is available and highly recommended next to the SAN solution service. Upgrades to the 90 days software conformance to warranty are available as Care Pack Services. HP also offers a wide range of specialized SAN services such as SAN Solution Service, SAN Environmental Support, SAN Architecture Service as well as proactive maintenance and availability services such as Critical Services, Proactive Essentials and Proactive 24. For more information on these and other service options, please contact your HP representative or visit our website at: www.hp.com/hps/support.
Financial services	HP Financial Services provides innovative financing and financial asset management programs to help you cost-effectively acquire, manage and ultimately retire your HP solutions. For more information on these services, please contact your HP sales representative, or visit: www.hp.com/go/hpfinancialservices.
For more information	For more information on the HP offering of Cisco products, please visit: www.hp.com/go/san.

www.hp.com/go/san

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