DATA SHEET

CISCO MDS 9216I MULTILAYER FABRIC SWITCH

HIGHLIGHTS

The Cisco® MDS 9216i Multilayer Fabric Switch is designed for building mission-critical enterprise storage networks that take advantage of the cost-effectiveness and ubiquity of IP for more robust business-continuance services. Leveraging both Fibre Channel and IP in a single module, the Cisco MDS 9216i offers the following key features:

- **Integrated Fibre Channel and IP Storage Services in an optimized form factor**—Supports fourteen 2-Gbps Fibre Channel interfaces for high performance storage area network (SAN) connectivity and two Gigabit Ethernet ports for Fibre Channel over IP (FCIP) and Small Computer System Interface over IP (iSCSI) storage services.
- **Industry's highest-performance Inter-Switch Links (ISLs)**—Supports up to sixteen 2-Gbps Fibre Channel links in a single PortChannel. Links may span any port on any module within a chassis for added scalability and resilience. Up to 3,500 buffer-to-buffer credits can be assigned to a single Fibre Channel port to extend storage networks over unprecedented distances.
- **Intelligent network services**—Uses virtual SAN (VSAN) technology for hardware-enforced, isolated environments within a single physical fabric; access control lists (ACLs) for hardware-based intelligent frame processing; and advanced traffic-management features such as Fibre Channel Congestion Control (FCC) and fabric-wide quality of service (QoS) to facilitate migration from SAN islands to enterprise-wide storage networks.
- **Comprehensive network security framework**—Supports RADIUS and TACACS+, Fibre Channel Security Protocol (FC-SP), Secure File Transfer Protocol (SFTP), Secure Shell (SSH), and Simple Network Management Protocol Version 3 (SNMPv3) implementing Advanced Encryption Standard (AES), VSANs, hardware-enforced zoning, ACLs, and per-VSAN role-based access control. Additionally, the Gigabit Ethernet ports offer IP security (IPsec) authentication, data integrity, and hardware-assisted data encryption for FCIP and iSCSI.
- **Sophisticated diagnostics**—Provides intelligent diagnostics, protocol decoding, and network-analysis tools as well as integrated Call Home capability for added reliability, faster problem resolution, and reduced service costs.
- **Open platform for network-hosted storage applications**—The Cisco MDS 9216i provides an open platform for hosting intelligent storage services such as network-based virtualization and replication. Storage services modules can be installed in any Cisco MDS 9500 Series or Cisco MDS 9200 Series chassis to provide scalable, distributed application intelligence in the fabric.
- **FCIP for remote SAN extension:**
  - Simplifies data-protection and business-continuance strategies by enabling backup, remote replication, and other disaster recovery services over WAN distances using open-standard FCIP tunneling.
  - Optimizes utilization of WAN resources for backup and replication by tunneling up to three virtual ISLs on a single Gigabit Ethernet port, and enabling hardware-based compression, FCIP Write Acceleration, and FCIP Tape Acceleration.
  - Preserves Cisco MDS 9000 Family enhanced capabilities including VSANs, advanced traffic management, and network security across remote connections.
- **iSCSI for extension of SAN to Ethernet-attached servers:**
  - Extends the benefits of Fibre Channel SAN-based storage to Ethernet-attached servers at a lower cost than possible using Fibre Channel interconnect alone.
  - Increases storage utilization and availability through consolidation of IP and Fibre Channel block storage.
  - Transparent operation preserves the capability of existing management storage applications.

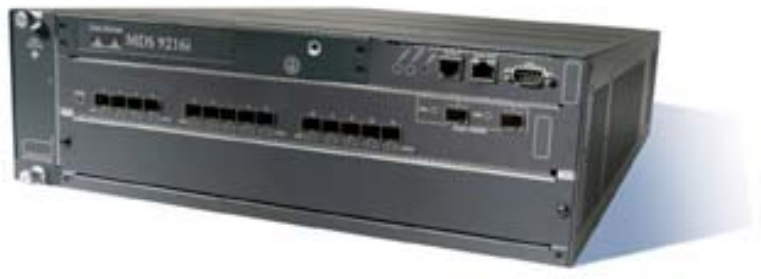
PRODUCT OVERVIEW

Scalable Multilayer Fabric Switch

The Cisco MDS 9216i (Figure 1) brings new capability to the fabric switch market. Sharing a consistent architecture with the Cisco MDS 9500 Series, the Cisco MDS 9216i integrates both Fibre Channel and IP Storage Services in a single system to allow maximum flexibility in user configurations. With fourteen 2-Gbps Fibre Channel ports, two Gigabit Ethernet IP Storage Services ports, and a modular expansion slot, the Cisco MDS 9216i is ideally suited for enterprise storage networks that require high-performance SAN extension or cost-effective IP Storage connectivity.

This unprecedented level of integration gives Cisco MDS 9216i users the benefits of a multiprotocol system without sacrificing Fibre Channel port density. The expansion slot on the Cisco MDS 9216i allows for the addition of any Cisco MDS 9000 Family module, so users can add additional Fibre Channel ports and additional IP ports. Alternatively, the expansion slot may be used for a variety of Cisco MDS 9000 Family Services Modules, thereby providing an unparalleled level of storage services in a single, highly available three-rack unit (RU) system. As the storage network expands further, Cisco MDS 9000 Family modules can be removed from Cisco MDS 9216i switches and migrated into Cisco MDS 9500 Series Multilayer Directors, providing smooth migration, common sparing, and outstanding investment protection.

Figure 1. Cisco MDS 9216i Multilayer Fabric Switch



KEY FEATURES AND BENEFITS

FCIP for Remote SAN Extension

Data distribution, data protection, and business-continuance services are significant components of today's information-centric businesses. The ability to efficiently replicate critical data on a global scale not only ensures a higher level of data protection for valuable corporate information, but also increases utilization of backup resources and lowers total cost of storage ownership. The Cisco MDS 9216i 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.

Advanced FCIP Features to Facilitate Business Continuance and Disaster Recovery

The Cisco MDS 9216i is designed to support robust business-continuance services using FCIP for remote connectivity in conjunction with a suite of advanced features, such as VSANs and Inter-VSAN Routing (IVR), hardware-assisted FCIP compression and encryption, FCIP Write Acceleration, and FCIP Tape Acceleration.

VSANs and IVR Enhance SAN Security and Stability

VSANs allow more efficient storage network utilization by creating hardware-based isolated environments within a single physical SAN fabric or switch. Each VSAN can be zoned as a typical SAN and maintains its own fabric services for added scalability and resilience. VSANs allow the

cost of SAN infrastructure to be shared among more users, while ensuring absolute segregation of traffic and retaining independent control of configuration on a VSAN-by-VSAN basis. With its integrated FCIP capability, the Cisco MDS 9216i enables the extension of VSANs over dedicated or existing IP infrastructure.

The Cisco MDS 9216i supports Inter-VSAN Routing (IVR), the industry's first routing functionality for Fibre Channel. IVR allows selective transfer of data traffic between specific initiators and targets on different VSANs while maintaining isolation of control traffic within each VSAN. With IVR, data can transit VSAN boundaries while maintaining control plane isolation, thereby maintaining fabric stability and availability.

In addition, the Cisco MDS 9216i secures and protects sensitive traffic through IPsec authentication, data integrity, and hardware-assisted encryption.

High-Performance SAN Extension with Compression and FCIP Write Acceleration

The Cisco MDS 9216i supports FCIP compression to maximize the effective WAN bandwidth of SAN extension solutions. The Cisco MDS 9216i achieves up to a 30:1 compression ratio, with typical ratios of 2:1 over a wide variety of data sources. With the addition of hardware-based compression, the MDS 9216i is able to provide optimal levels of compressed throughput for implementations across both low- and high-bandwidth links.

The Cisco MDS 9216i also supports FCIP Write Acceleration, a feature that can significantly improve application performance when storage traffic is extended across distance. When FCIP Write Acceleration is enabled, WAN throughput is optimized by reducing the latency of command acknowledgements. Similarly, the Cisco MDS 9216i supports FCIP Tape Acceleration, which significantly improves throughput over WAN links for remote tape backup operations.

Together, FCIP compression, FCIP Write Acceleration, and FCIP Tape Acceleration enable optimal performance of business-continuance services.

ADVANCED TRAFFIC MANAGEMENT FOR HIGH-PERFORMANCE, RESILIENT FABRICS

The following advanced traffic management capabilities integrated into the Cisco MDS 9216i simplify deployment and optimization of large-scale fabrics.

- Virtual Output Queuing ensures line rate performance on each port, independent of traffic pattern, by eliminating head-of-line blocking.
- 255 buffer-to-buffer credits are assigned to each port for optimal bandwidth utilization across distance. When extended distances are required, up to 3,500 credits can be allocated to a single port within a group of four Fibre Channel ports.
- PortChannels allow users to aggregate up to 16 physical ISLs into a single logical bundle, providing optimized bandwidth utilization across all links. The bundle can consist of any port from any module in the chassis, ensuring that the bundle remains active even in the event of a module failure.
- Fabric Shortest Path First (FSPF)-based multipathing provides the intelligence to load balance across up to 16 equal cost paths and, in the event of a switch failure, dynamically reroute traffic.
- Quality of service can be used to manage bandwidth and control latency in order to prioritize critical traffic.
- Fibre Channel Congestion Control (FCC), an end-to-end, feedback-based congestion control mechanism, augments the Fibre Channel buffer-to-buffer credit mechanism to provide enhanced traffic management.

INDUSTRY'S MOST ADVANCED DIAGNOSTICS AND TROUBLESHOOTING TOOLS

Management of large-scale storage networks requires proactive diagnostics, tools to verify connectivity and route latency, and mechanisms for capturing and analyzing traffic. The Cisco MDS 9000 Family integrates the industry's most advanced analysis and diagnostic tools. Power-on self test (POST) and online diagnostics provide proactive health monitoring. The Cisco MDS 9216i implements diagnostic capabilities

such as Fibre Channel Traceroute for detailing the exact path and timing of flows and Switched Port Analyzer (SPAN) to intelligently capture network traffic. Once traffic has been captured, it can then be analyzed with the Cisco Fabric Analyzer, an embedded Fibre Channel analyzer. Comprehensive port- and flow-based statistics facilitate sophisticated performance analysis and service-level agreement (SLA) accounting. With the Cisco MDS 9000 Family, Cisco Systems® delivers the most comprehensive tool set for troubleshooting and analysis of storage networks.

COMPREHENSIVE SOLUTION FOR ROBUST NETWORK SECURITY

Addressing the need for airtight security in storage networks, the Cisco MDS 9216i offers an extensive security framework to protect highly sensitive data crossing today's enterprise networks. The Cisco MDS 9216i employs intelligent packet inspection at the port level, including the application of ACLs for hardware enforcement of zones, VSANs, and advanced Port Security features.

Extended zoning capabilities are enabled to ensure that LUNs are accessible only by specific hosts (LUN zoning), to limit SCSI read command for a certain zone (read-only zoning), and to restrict broadcasts to only the selected zones (broadcast zones). VSANs are used to achieve higher security and greater stability by providing complete isolation among devices that are connected to the same physical SAN. In addition, Fibre Channel Security Protocol (FC-SP) provides switch-switch and host-switch Diffie-Hellman Challenge Handshake Authentication Protocol (DH-CHAP) authentication supporting RADIUS or TACACS+, to ensure that only authorized devices access protected storage networks. Finally, for both FCIP and iSCSI deployments, the comprehensive IPsec protocol suite delivers secure authentication, data integrity, and hardware-based encryption.

This functionality, in conjunction with management access and control plane security, makes the Cisco MDS 9000 Family the most secure platform of its kind.

EASE OF MANAGEMENT

Delivering SAN capabilities means delivering management capabilities. To meet the needs of all users, the Cisco MDS 9216i 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 MDS9216i presents a consistent, logical CLI. Adhering to the syntax of widely known Cisco IOS® Software CLI, the Cisco MDS 9000 Family CLI is easy to learn and delivers broad management capability. 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, enabling 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.

iSCSI FOR COST-EFFECTIVE EXTENSION OF SAN STORAGE TO ETHERNET-ATTACHED SERVERS

Many IT managers have been hesitant to extend SAN access beyond their mission-critical applications to midrange data center applications because of the complexity and cost involved in upgrading large numbers of midrange servers to Fibre Channel. The Cisco MDS 9216i addresses these limitations by enabling IT organizations to extend their storage networks using cost-effective Ethernet infrastructure. All the benefits of SANs, including increased storage utilization, centralized backups, easier addition of incremental storage capacity, management simplification, and reduced overall total cost of ownership (TCO), can be extended to a new range of applications. Because the Cisco MDS 9216i is an integral component of the Cisco MDS 9000 Family, Ethernet-attached servers will enjoy the same SAN scalability, availability,

manageability, and intelligent services as those servers connected using Fibre Channel, while maintaining the cost and ease-of-use benefits of Ethernet and IP.

ADVANCED SOFTWARE PACKAGES

The Cisco MDS 9216i can be further enhanced through additional software packages that offer advanced intelligence and functionality. Currently available software packages include the following:

- **Cisco Enterprise Package**—The Cisco Enterprise Package includes a set of traffic engineering and advanced security features like Inter-VSAN Routing, QoS, Switch-Switch and Host-Switch Authentication, LUN Zoning, and Read-Only Zones that are recommended for all enterprise SANs.
- **SAN Extension over IP Package**—The Cisco SAN Extension over IP Package provides an integrated, cost-effective, and reliable business-continuance solution that leverages IP infrastructure by offering FCIP for remote SAN extension, along with a variety of advanced features to optimize the performance, and manageability of FCIP links.
- **Cisco Mainframe Package**—The Cisco Mainframe Package is a comprehensive collection of features required for using the Cisco MDS 9500 Series and MDS 9200 Series switches in mainframe storage networks, including FICON protocol, CUP management, switch cascading, fabric binding, and intermixing.
- **Cisco Fabric Manager Server Package**—The Cisco Fabric Manager Server (FMS) Package extends Cisco Fabric Manager by providing historical performance monitoring for network traffic hot-spot analysis, centralized management services, and advanced application integration.

VERSATILE EXPANSION

The modular design of the Cisco MDS 9216i gives it the ability to support current and future Cisco MDS 9000 Family switching or services module. Currently available modules include the following:

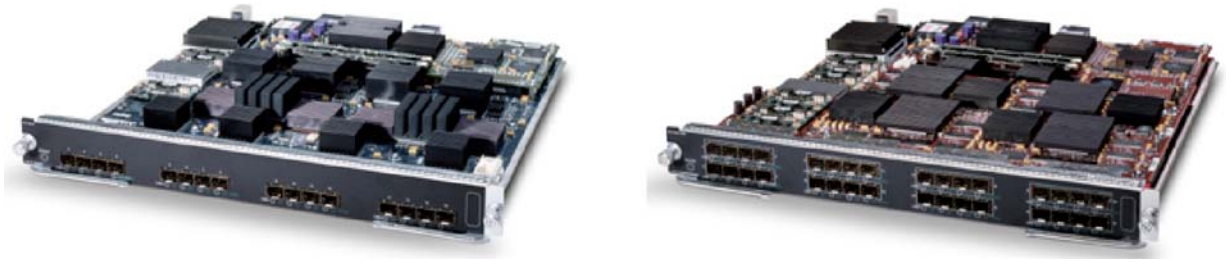
- 16-port and 32-port 2-Gbps Fibre Channel switching modules.
- The IP Services Module supporting iSCSI and FCIP over both four and eight ports of Gigabit Ethernet.
- The Multiprotocol Services Module supporting 14 ports of 2-Gbps Fibre Channel and two ports of Gigabit Ethernet which provide iSCSI and FCIP storage services.
- The Advanced Services Module and Caching Services Module supporting integrated network-hosted application services.

Optionally configurable, these modules give the Cisco MDS 9216i unparalleled functionality and versatility.

Fibre Channel Switching Modules

The Cisco MDS 9216i supports 16-port and 32-port Fibre Channel switching modules (Figure 2), for maximum configuration flexibility. Each module also supports hot-swappable, Small Form-Factor Pluggable (SFP), LC interfaces. Modules can be configured with either short- or long-wavelength SFPs for connectivity up to 500 meters and 10 kilometers, respectively. All interfaces are 2-Gbps compatible. Up to 255 buffer credits per port are supported for maximum extensibility without the requirement for additional licensing. Additionally each port can be configured to operate in the following modes: E_Port, F_Port, FL_Port, SD_Port, TE_Port, and TL_Port.

Figure 2. Cisco MDS 9000 Family 16-Port and 32-Port Fibre Channel Switching Modules



IP Storage Services Modules

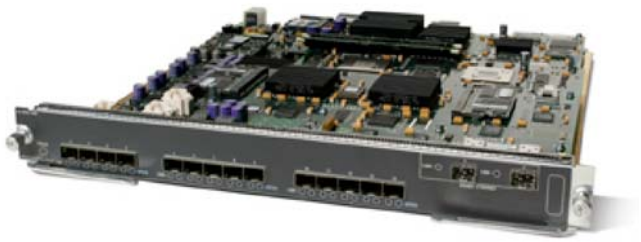
The Cisco MDS 9216i supports the 4-port and 8-port IP Services Modules (Figure 3), allowing increased IP port density. In addition to the two integrated IP interfaces on the Cisco MDS 9216i, the Cisco MDS 9000 Family IP services modules provide either four or eight ports of iSCSI and FCIP. Each port connection is via a 1-Gbps Ethernet SFP interface. Individual ports are user-configurable for iSCSI and FCIP for cost-effective data center and wide area connectivity.

Figure 3. Cisco MDS 9000 Family 4-Port and 8-Port IP Storage Services Modules

Multiprotocol Services Module

The Cisco MDS 9000 Family 14/2-port Multiprotocol Services Module (Figure 4) delivers the intelligence and advanced features required to make multilayer SANs a reality, by integrating in a single module the functions offered by the Cisco 16-Port Fibre Channel Switching Module and the Cisco IP Storage Services Module. The Cisco MDS 9000 Family 14/2-port Multiprotocol Services Module doubles both the Fibre Channel and IP port density of the Cisco MDS 9216i when used in the switch's expansion slot.

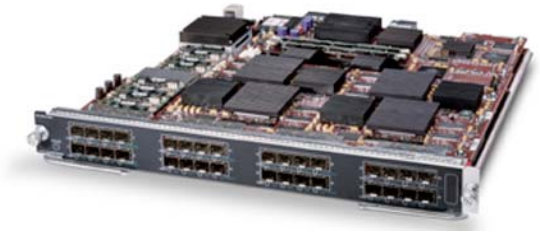
Figure 4. Cisco MDS 9000 Family Multiprotocol Storage Services Module



Advanced Services Module

The Cisco MDS 9000 Family 32-port Fibre Channel Advanced Services Module (Figure 5) facilitates pooling of heterogeneous storage for increased storage usage, simplified storage management, and reduced TCO. The Cisco Advanced Services Module incorporates all the capability of the Cisco MDS 9000 Family Fibre Channel Switching Module and also provides scalable, in-band storage virtualization services. Using highly integrated VERITAS Storage Foundation for Networks software available from VERITAS and a highly distributed processing architecture, the Cisco Advanced Services Module delivers best-in-class virtualization performance, which can be scaled by simply adding modules anywhere in the fabric to meet the performance needs of even the largest enterprises.

Figure 5. Cisco MDS 9000 Family Advanced Services Module



Caching Services Module

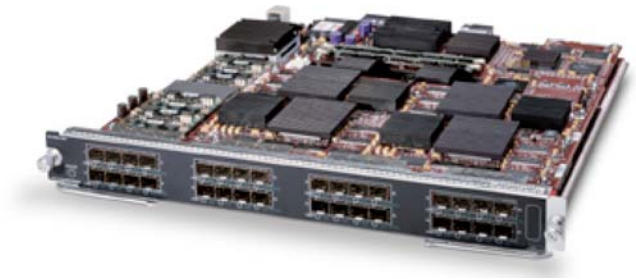
Cisco has teamed with IBM to offer a network-based storage-management solution, which provides customers the ability to securely virtualize their storage from within the network. The Cisco MDS 9000 Family Caching Services Module (Figure 6) integrates two high-performance processing nodes that, when combined with IBM TotalStorage SAN Volume Controller Storage Software for the Cisco MDS 9000 Family, deliver network-hosted virtualization and replication services. Each Caching Services Module includes 8 GB of local cache. Multiple caching services modules can be clustered within the fabric to provide additional scalability and availability.

Figure 6. Cisco MDS 9000 Family Caching Services Module

Storage Services Module

The Cisco MDS 9000 Family Storage Services Module (Figure 7) incorporates all the capabilities of the Cisco MDS 9000 Family 32-Port Fibre Channel Switching Module, introducing, in addition, a variety of innovative storage services. Taking advantage of the high-speed inline SCSI processing performed by dedicated application-specific integrated circuits (ASICs), the Cisco Storage Services Module allows users to dramatically enhance the performance of synchronous data replication deployments through Fibre Channel Write Acceleration or to enable more efficient and reliable serverless backup solutions, lowering the overall TCO and ensuring investment protection for the existing backup infrastructure. Introducing the Cisco MDS 9000 Family SAN Tap protocol, the Cisco Storage Services Module enables to seamlessly integrate a variety of appliance-based storage services in the existing SAN without compromising its integrity and availability. Based on the standard Fabric Application Interface Standard (FAIS) and empowered by a unique distributed processing architecture, network-hosted storage applications reside on the Cisco Storage Services Module to provide high-performing, ready-to-scale, virtualization solutions.

Figure 7. Cisco MDS 9000 Family Storage Services Module



PRODUCT SPECIFICATIONS

Table 1 lists the product specifications for the Cisco MDS 9216i.

Table 1. Product Specifications

Feature	Description
Product Compatibility	• Cisco MDS 9000 Family
Software Compatibility	• Cisco MDS SAN-OS Release 2.0(1) or later
Protocols	• Fibre Channel standards – FC-PH, Revision 4.3 (ANSI/INCITS 230-1994) – FC-PH, Amendment 1 (ANSI/INCITS 230-1994/AM1-1996) – FC-PH, Amendment 2 (ANSI/INCITS 230-1994/AM2-1999) – FC-PH-2, Revision 7.4 (ANSI/INCITS 297-1997) – FC-PH-3, Revision 9.4 (ANSI/INCITS 303-1998) – FC-PI, Revision 13 (ANSI/INCITS 352-2002) – FC-FS, Revision 1.9 (ANSI/INCITS 373-2003) – FC-AL, Revision 4.5 (ANSI/INCITS 272-1996) – FC-AL-2, Revision 7.0 (ANSI/INCITS 332-1999) – FC-AL-2, Amendment 1 (ANSI/INCITS 332-1999/AM1-2003) – FC-SW-2, Revision 5.3 (ANSI/INCITS 355-2001) – FC-SW-3, Revision 6.6 (ANSI/INCITS 384-2004) – FC-GS-3, Revision 7.01 (ANSI/INCITS 348-2001) – FC-GS-4, Revision 7.91 (ANSI/INCITS 387-2004) – FC-BB, Revision 4.7 (ANSI/INCITS 342-2001) – FC-BB-2, Rev. 6.0 (ANSI/INCITS 372-2003) – FCP, Revision 12 (ANSI/INCITS 269-1996) – FCP-2, Revision 8 (ANSI/INCITS 350-2003) – FC-SB-2, Revision 2.1 (ANSI/INCITS 349-2001) – FC-SB-3, Revision 1.6 (ANSI/INCITS 374-2003) – FC-VI, Revision 1.84 (ANSI/INCITS 357-2002) – FC-FLA, Revision 2.7 (INCITS TR-20-1998) – FC-PLDA, Revision 2.1 (INCITS TR-19-1998) – FC-Tape, Revision 1.17 (INCITS TR-24-1999) – FC-MI, Revision 1.92 (INCITS TR-30-2002) – FC-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 • Fibre Channel standard port types: E, F, FL, B • Fibre Channel enhanced port types: SD, ST, TE, TL

Feature	Description
	• 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 (IKE) – RFC 2409 IKEv1 – IKEv2, draft
Cards, Ports, Slots	• Base: 14 fixed auto-sensing 1 / 2-Gbps Fibre Channel ports and 2 fixed 1-Gbps Ethernet ports; • Expansion: 1 empty expansion slot
Features and Functions	• 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 Multipath Load Balancing – QoS—flow-based, zone-based

Feature	Description
	– Fibre Channel Congestion Control – Extended Buffer-To-Buffer Credits – FC Write Acceleration – Network-accelerated serverless backups – Network-assisted applications through SANTap – Network-hosted applications through FAIS-based Intelligent Storage Application Programmatic Interface (ISAPI) • Diagnostics and troubleshooting tools – Power-on-self-test (POST) diagnostics – Online diagnostics – Internal port loopbacks – SPAN and Remote SPAN – Fibre Channel Traceroute – Fibre Channel Ping – Fibre Channel Debug – Cisco Fabric Analyzer – Syslog – Online system health – Port-level statistics – Real Time Protocol Debug • Network security – VSANs – Access Control Lists – Per-VSAN role-based access control – Fibre Channel Zoning N_Port WWN 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 – Fibre Channel Security Protocol (FC-SP) DH-CHAP switch-switch authentication DH-CHAP host-switch authentication

<table>
<tr><th>Feature</th><th>Description</th></tr>
<tr><td></td><td>
– Port Security and Fabric Binding
– IPSec for FCIP and iSCSI
– IKEv1 and IKEv2
– Management access
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
</td></tr>
<tr><td>Performance</td><td>
• Port speed: 1 / 2-Gbps auto-sensing, optionally configurable
• Buffer credits: Up to 3,500 per port
• Ports per chassis: 14 to 46 1 / 2-Gbps Fibre Channel ports, up to 10 1-Gbps Ethernet ports
• Ports per rack: Up to 672
• PortChannel: Up to sixteen 2-Gbps ports
• Supported optics, media, and transmission distances:
<table>
<tr><th>Optics</th><th>Media</th><th>Distance</th></tr>
<tr><td>1-Gbps—SW, LC SFP</td><td>50/125 micron multimode</td><td>500 m</td></tr>
<tr><td>1-Gbps—SX, LC SFP</td><td>50/125 micron multimode</td><td>550 m</td></tr>
<tr><td>1-Gbps—SW, LC SFP</td><td>62.5/125 micron multimode</td><td>300 m</td></tr>
<tr><td>1-Gbps—SX, LC SFP</td><td>62.5/125 micron multimode</td><td>275 m</td></tr>
<tr><td>1-Gbps—LW, LC SFP</td><td>9/125 micron single-mode</td><td>10 km</td></tr>
<tr><td>1-Gbps—LX/LH, LC SFP</td><td>9/125 or 10/125 micron single-mode</td><td>10 km</td></tr>
<tr><td>1-Gbps—CWDM, LC SFP</td><td>9/125 micron single-mode</td><td>Up to 100 km</td></tr>
<tr><td>2-Gbps—SW, LC SFP</td><td>50/125 micron multimode</td><td>300 m</td></tr>
<tr><td>2-Gbps—SW, LC SFP</td><td>62.5/125 micron multimode</td><td>150 m</td></tr>
<tr><td>2-Gbps—LW, LC SFP</td><td>9/125 micron single-mode</td><td>10 km</td></tr>
<tr><td>2-Gbps—CWDM, LC SFP</td><td>9/125 micron single-mode</td><td>Up to 100 km</td></tr>
</table>
</td></tr>
<tr><td>Reliability and Availability</td><td>
• 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
• Passive backplane
</td></tr>
</table>

Feature	Description
	• Stateful process restart • Any module, any port configuration for PortChannels • Fabric-based multipathing • Per-VSAN fabric services • Port tracking • Virtual Routing Redundancy Protocol (VRRP) for management and FCIP or iSCSI connections • Online diagnostics
Network Management	• Access methods – 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 – Storage Networking Industry Association (SNIA) Storage Management Initiative Specification (SMI-S) • 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 Resource Manager Essentials (RME) and Device Fault Manager (DFM)
Programming Interfaces	• Scriptable CLI • Fabric Manager GUI • Device Manager GUI
Environmental	• Temperature, ambient operating – 32° to 104°F (0° to 40°C) • Temperature, ambient non-operating and storage – 40°F to 158°F (-40°C to 75°C) • Relative humidity, ambient (non-condensing) operating – 10 to 90 percent • Relative humidity, ambient (non-condensing) non-operating and storage – 10 to 95 percent • Altitude, operating

Feature	Description
	– -197 to 6,500 feet (-60 to 2,000 meter)
Physical Dimensions	• Dimensions in inches (H x W x D) – 5.25 x 17.32 x 22.66 inches (13.34 x 43.99 x 57.56 cm), three Rack Units (RU) – All units rack mountable in standard 19-inch EIA rack • Weight – Fully configured chassis with optional Switching Module: 70 lbs (32 kg)
Power and Cooling	• 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 2.5 inches (6.4 cm) between walls and the chassis air vents and a minimum horizontal separation of 6 inches (15.2 cm) between two chassis to prevent overheating.
Approvals and Compliance	• **Safety Compliance** – CE Marking – UL 60950 – CAN/CSA-C22.2 No. 60950 – EN 60950 – IEC 60950 – TS 001 – AS/NZS 3260 – IEC60825 – EN60825 – 21 CFR 1040 • **EMC Compliance** – FCC Part 15 (CFR 47) Class A – ICES-003 Class A – EN 55022 Class A – CISPR 22 Class A – AS/NZS 3548 Class A – VCCI Class A – EN 55024 – EN 50082-1 – EN 61000-6-1 – EN 61000-3-2 – EN 61000-3-3

ORDERING INFORMATION

Table 2 lists ordering information for the Cisco MDS 9216i.

Table 2. Ordering Information

Part Number	Product Name
DS-C9216i-K9	Cisco MDS 9216i Multilayer Fabric Switch
Optional Switching Modules, SFPs	
DS-X9016	Cisco MDS 9000 Family 16-port 1 / 2-Gbps Fibre Channel Module, SFP/LC
DS-X9032	Cisco MDS 9000 Family 32-port 1 / 2-Gbps Fibre Channel Module, SFP/LC
DS-X9308-SMIP	Cisco MDS 9000 Family 8-port 1-GE IP Storage Services Module
DS-X9304-SMIP	Cisco MDS 9000 Family 4-port 1-GE IP Storage Services Module
DS-X9302-14K9	Cisco MDS 9000 Family 14/2-port Multiprotocol Services Module
DS-X9032-SMV	Cisco MDS 9000 Family 32-port Advanced Services Module
DS-X9560-SMC	Cisco MDS 9000 Family Caching Services Module
DS-X9032-SSM	Cisco MDS 9000 Family 32-port Storage Services Module
DS-SFP-FC-2G-SW	Cisco MDS 9000 Family 1 / 2-Gbps Fibre Channel-SW, SFP, LC
DS-SFP-FC-2G-LW	Cisco MDS 9000 Family 1 / 2-Gbps Fibre Channel-LW, SFP, LC
DS-SFP-FCGE-SW	Cisco MDS 9000 Family Gigabit Ethernet, 1 / 2-Gbps Fibre Channel-SW, SFP, LC
DS-SFP-FCGE-LW	Cisco MDS 9000 Family Gigabit Ethernet, 1 / 2-Gbps Fibre Channel-LW, SFP, LC
Advanced Software Packages	
M9200EXT12K9	Cisco MDS 9200 SAN Extension over IP Package for Cisco MDS 9000 Family 14/2 port Multiprotocol Services Module
M9200EXT1K9	Cisco MDS 9200 SAN Extension over IP Package for Cisco MDS 9000 Family 8-port 1-GE IP Storage Services Module
M9200EXT14K9	Cisco MDS 9200 SAN Extension over IP Package for Cisco MDS 9000 Family 4-port 1-GE IP Storage Services Module
M9200ENT1K9	Cisco MDS 9200 Series Enterprise Package
M9200FMS1K9	Cisco MDS 9200 Series Fabric Manager Server Package
M9200FIC1K9	Cisco MDS 9200 Series Mainframe Package
M9200SSE1K9	Cisco MDS 9200 Storage Services Enabler Package for the Cisco MDS 9000 Family Advanced Services Module or the Cisco MDS 9000 Family Storage Services Module
Spare Components	
DS-2SLOT-FAN=	Cisco MDS 9200 Fan Module, Spare
DS-CAC-845W=	Cisco MDS 9200 AC power supply— 845 W, spare

Part Number	Product Name
DS-X9016=	Cisco MDS 9000 Family 16-port 1 / 2 -Gbps Fibre Channel Module, SFP/LC, Spare
DS-X9032=	Cisco MDS 9000 Family 32-port 1 / 2-Gbps Fibre Channel Module, SFP/LC
DS-X9308-SMIP=	Cisco MDS 9000 Family 8-port 1GE IP Storage Services Module, Spare
DS-X9304-SMIP=	Cisco MDS 9000 Family 4-port 1GE IP Storage Services Module, Spare
DS-X9302-14K9=	Cisco MDS 9000 Family 14/2-port Multiprotocol Services Module, Spare
DS-X9032-SMV=	Cisco MDS 9000 Family 32-port Advanced Services Module, Spare
DS-X9560-SMC=	Cisco MDS 9000 Family Caching Services Module, Spare
DS-X9032-SSM=	Cisco MDS 9000 Family 32-port Storage Services Module, Spare
DS-SFP-FC-2G-SW=	Cisco MDS 9000 Family 1 / 2-Gbps Fibre Channel-SW, SFP, LC, Spare
DS-SFP-FC-2G-LW=	Cisco MDS 9000 Family 1 / 2-Gbps Fibre Channel-LW, SFP, LC, Spare
DS-SFP-FCGE-SW=	Cisco MDS 9000 Family 1-Gbps Ethernet, 1 / 2-Gbps Fibre Channel-SW, SFP, LC, Spare
DS-SFP-FCGE-LW=	Cisco MDS 9000 Family 1-Gbps Ethernet, 1 / 2-Gbps Fibre Channel-LW, SFP, LC, Spare
M9200EXT12K9=	Cisco MDS 9200 SAN Extension over IP Package for Cisco MDS 9000 Family 14/2-port Multiprotocol Services Module, Spare
M9200EXT1K9 =	Cisco MDS 9200 SAN Extension over IP Package for Cisco MDS 9000 Family 8-port 1-GE IP Storage Services Module, Spare
M9200EXT14K9=	Cisco MDS 9200 SAN Extension over IP Package for Cisco MDS 9000 Family four-port 1-GE IP Storage Services Module, Spare
M9200ENT1K9=	Cisco MDS 9200 Series Enterprise Package, Spare
M9200FMS1K9=	Cisco MDS 9200 Series Fabric Manager Server Package, Spare
M9200FIC1K9=	Cisco MDS 9200 Series Mainframe Package, Spare
M9200SSE1K9=	Cisco MDS 9200 Storage Services Enabler Package for the Cisco MDS 9000 Family Advanced Services Module or the Cisco MDS 9000 Family Storage Services Module, Spare
DS-CWDM-1470=	Cisco 1470 NM CWDM Gigabit Ethernet and 1 / 2-Gbps Fibre Channel SFP, Spare
DS-CWDM-1490=	Cisco 1490 NM CWDM Gigabit Ethernet and 1 / 2-Gbps Fibre Channel SFP, Spare
DS-CWDM-1510=	Cisco 1510 NM CWDM Gigabit Ethernet and 1 / 2-Gbps Fibre Channel SFP, Spare
DS-CWDM-1530=	Cisco 1530 NM CWDM Gigabit Ethernet and 1 / 2-Gbps Fibre Channel SFP, Spare
DS-CWDM-1550=	Cisco 1550 NM CWDM Gigabit Ethernet and 1 / 2-Gbps Fibre Channel SFP, Spare
DS-CWDM-1570=	Cisco 1570 NM CWDM Gigabit Ethernet and 1 / 2-Gbps Fibre Channel SFP, Spare
DS-CWDM-1590=	Cisco 1590 NM CWDM Gigabit Ethernet and 1 / 2-Gbps Fibre Channel SFP, Spare
DS-CWDM-1610=	Cisco 1610 NM CWDM Gigabit Ethernet and 1 / 2-Gbps Fibre Channel SFP, Spare

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FOR MORE INFORMATION

For more information about the Cisco MDS 9216i, visit http://www.cisco.com/en/US/products/hw/ps4159/ps4358/index.html or contact your local account representative.

World Headquarters
Storage Technology Corporation
One StorageTek Drive
Louisville, Colorado 80028 USA
1.800.877.9220 or 01.303.673.5151

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NC0007A 05/05