Cisco MDS 9200 for IBM System Storage switches, models 9216i and 9216A, offer enhanced performance, scalability, multiprotocol capabilities, and IBM warranty

At a glance

The Cisco MDS 9216i for IBM System Storage switch (2054-D1H) and Cisco MDS 9216A for IBM System Storage switch (2054-D1A):

- Replace the 2062 Models D1A and D1H Cisco MDS 9216 switches, being withdrawn today.
- Now come with one year IBM warranty.

Cisco Systems MDS 9216i offers integrated Fibre Channel and IP storage services capability designed to provide:

- Support for simplified data protection and business continuance through FCIP for remote SAN extension.
- The benefits of Fibre Channel SAN-based storage to Ethernet-attached servers through iSCSI.

Cisco Systems MDS 9216A is designed to:

- Support future growth, scalability and provide performance capabilities
- Provide expandability with a variety of optional switching modules up to a total of 64 Fibre Channel ports
- Provide an internal backplane to accommodate 4 Gb optional modules and advanced function

Overview

Two fabric switch models, the Cisco MDS 9216i for IBM System Storage™ (2054-D1H) multilayer fabric switch and the Cisco MDS 9216A for IBM System Storage (2054-D1A) multilayer fabric switch, enhance Storage Area Network (SAN) director and fabric switch offerings available from IBM. These offerings are available with one year IBM warranty.

They replace the Cisco MDS 9216i (2062-D1H) and Cisco MDS 9216A (2062-D1A) switches being withdrawn today. Refer to Hardware Withdrawal WG07-0030, dated February 13, 2007.

Cisco MDS 9216i for IBM System Storage switch: The Cisco MDS 9216i for IBM System Storage switch is designed to bring enhanced functions to fabric switch products. 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 greater flexibility in user configurations. With 14 2Gbps Fibre Channel ports, two Gigabit Ethernet IP storage services ports, and a modular expansion slot, the Cisco MDS 9216i is well suited for enterprise storage networks that require high-performance SAN extension or cost-effective IP storage connectivity.

This high level of integration affords 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 a Cisco MDS 9000 Family switching module, so users can add additional Fibre Channel ports and additional IP ports. Alternatively, the expansion slot can be used for a variety of Cisco MDS 9000 Family services modules, thereby, providing a high level of storage services in a single, 3-rack unit (RU) system.

Cisco MDS 9216A for IBM System Storage switch: The Cisco MDS 9216A for IBM System Storage brings advanced capability and investment protection to fabric switch products. Sharing a consistent architecture with the Cisco MDS 9500 Series, the Cisco MDS 9216A combines multilayer intelligence with a modular chassis, making it an extremely capable and flexible fabric switch. Starting with 16 2 Gbps Fibre Channel ports, the expansion slot on the Cisco MDS 9216A allows for the addition of current or future Cisco MDS 9000 Family modules for up to 64 total ports.

Key prerequisites

Cisco MDS SAN OS 3.0, or later for feature #2404, #2412, #2424, or #2448

Product number

For details, refer to the Product number section in this announcement.

Planned availability date

February 23, 2007

AP distribution

Country/Region	Announced
ASEAN*	Yes
Australia	Yes
People's Republic of China	Yes
Hong Kong S.A.R. of the PRC	Yes
Macao S.A.R. of the PRC	Yes
Taiwan	Yes
Korea	Yes
Japan	Yes
New Zealand	Yes

*Brunei Darussalam, Indonesia, Cambodia, Lao People's Democratic Republic, Malaysia, Philippines, Singapore, Thailand, Viet Nam

Description

The Cisco MDS 9216i and 9216A for IBM System Storage (2054-D1H and 2054-D1A) are both three-rack-unit Multilayer Fabric switches featuring non-disruptive software upgrade support for a single switching module, and hot-swap capabilities for module components: dual redundant power supplies, fan assemblies, single switching module, and optic transceivers.

Standard features

- Fabric Manager — to help provide switch configuration and troubleshooting capabilities
- VSAN technology — to help provide hardware-enforced, isolated environments within a single physical fabric
- Access control lists (ACLs) — enabling hardware-based intelligent frame processing
- Fabric zoning — which provides a security framework through logical unit number (LUN) zoning, read-only zoning, and broadcast zones

Optional features

12-Port 4 Gb Fibre Channel Switching Module (#2412)

For the most demanding storage networking environments, the Cisco MDS 9000 Family 12-Port 4 Gbps Fibre Channel Switching Module is designed to deliver attractive performance. 4 Gbps ports, which auto negotiate to 4, 2, and 1 Gbps, deliver up to 96 Gbps of full-duplex bandwidth making the Cisco 12-Port Fibre Channel Switching Module ideal for attachment of the highest performance 4 Gbps-enabled storage subsystems and for ISL connections between switches. With its multiprotocol capability, the Cisco 12-port Fibre Channel Switching Module seamlessly integrates FICON™ protocol, FICON Control Unit Port (CUP) management, and switch cascading to enable mainframe connectivity. VSANs allow hardware-based separation of Fibre Channel and FICON traffic switched on a single physical SAN, supporting decreased cost without compromising scalability, availability, manageability, and network security.

24-Port 4 Gb Fibre Channel Switching Module (#2424)

For high performance storage networking environments, the Cisco MDS 9000 Family 24-Port 4 Gbps Fibre Channel Switching Module is designed to deliver a balance of performance and scalability. Twenty four ports, auto-sensing to 4, 2, or 1 Gbps, deliver the sustained bandwidth required to address the performance demands of today's enterprise-class storage arrays and servers. Bandwidth is allocated across four 6-port port groups, providing 24 Gbps of full-duplex bandwidth per port group. Port Bandwidth Reservation, a Cisco-unique feature available on the Cisco 24-Port 4 Gbps Fibre Channel Switching Module, enables 1 Gbps, 2 Gbps, or 4 Gbps of switching bandwidth to be dedicated to a port, enabling improved bandwidth allocation for any application, including high performance inter-switch links. By combining Cisco 12-Port, 24-Port, and 48-Port 4 Gbps Fibre Channel Switching Modules in a single, modular chassis, you can design cost/performance optimized storage networks in a wide range of application environments. This application-oriented approach to port deployment can help reduce the number of switches and inter-switch links required in a storage network, in many cases helping to reduce or eliminate the need for less efficient core-edge network topologies. Fewer switches can help simplify management and reduce deployment and operational costs, resulting in lower costs.

48-Port 4 Gb Fibre Channel Switching Module (#2448)

Storage network consolidation moves to a new level with the transport improvements provided by the Cisco MDS 9000 Family 48-Port 4 Gbps Fibre Channel Switching Module. The Cisco 48-Port 4 Gbps Fibre Channel Switching Module can help deliver 96 Gbps of total bandwidth enabling up to 528 ports per chassis in the MDS 9513. Bandwidth is allocated across four 12-port port groups, providing 24 Gbps of full-duplex bandwidth per port group. Port Bandwidth Reservation, a feature available on the Cisco 48-Port 4 Gbps Fibre Channel Switching Module, enables 1 Gbps, 2 Gbps or, 4 Gbps of switching bandwidth to be dedicated to a port, enabling the flexible bandwidth allocation needed to address a wide range of application requirements. By combining Cisco 12-Port, 24-Port, and 48-Port 4 Gbps Fibre Channel Switching Modules in a single, modular chassis, you can better design storage networks to balance cost and performance in a wide range of application environments.

4-Port 10 Gb Fibre Channel Switching Module (#2404)

The Cisco MDS 9000 Family 4-Port 10 Gbps Fibre Channel Switching Module is designed to deliver attractive performance with 10 gigabit per second link bandwidth, 96 Gbps of aggregate bandwidth per module, and the intelligence and advanced features required to make multilayer storage area networks a reality. Delivering up to five times the effective link bandwidth of 2 Gbps Fibre Channel products, the Cisco 4-Port 10 Gbps Fibre Channel Switching Module includes hardware-enabled innovations designed to help improve performance, scalability, availability, security, and manageability of storage networks.

The Cisco 4-Port 10 Gbps Fibre Channel Switching Module is designed to be hot swappable and must be ordered with at least one hot-swappable, X2 form-factor pluggable, SC-type interfaces. Individual ports can be configured with longwave X2 optical transceivers for connectivity up to 10 kilometers. Up to 250 buffer credits per port are supported for increased extensibility without requiring additional licensing. With the optional Cisco Enterprise Package, up to 5,000 buffer credits can be allocated to an individual port, enabling full link bandwidth over thousands of kilometers without degradation in link utilization. Ports can be configured to operate in the following modes: E port, F port, FL port, TE port, SD port, ST port, and B port.

Ultra-high per port bandwidth makes the Cisco 4-Port 10 Gbps Fibre Channel Switching Module well suited for ISL attachment, both within the data center and between data centers across metro optical networks. When compared with ISL connections utilizing 2 Gbps Fibre Channel links, ISLs using Cisco 10 Gbps links can reduce ISL cabling cost by up to 80%.

With its multiprotocol capability, the 4-port 10 Gbps Fibre Channel Switching Module integrates FICON protocol, FICON Control Unit Port (CUP) management, and switch cascading to enable mainframe connectivity. VSANs allow hardware-based separation of Fibre Channel and FICON traffic switched on a single physical SAN, offering cost savings while supporting scalability,

availability, manageability, and network security.

The following table outlines maximum subscription ratios for each switching module, when fully populated with SFPs, and active.

Maximum subscription ratio with all ports active

Module	1 Gbps	2 Gbps	4 Gbps	10 Gbps
12-Port 4 Gbps	1:1	1:1	1:1	NA
24-Port 4 Gbps	1:1	1:1	2:1	NA
48-Port 4 Gbps	1:1	2:1	4:1	NA
4-Port 10 Gbps	NA	NA	NA	1:1

NA = Not applicable

FC Port 10 Gb 10km LW X2 SC (#5040)

This feature provides an additional 10 Gb longwave 10 kilometer X2 transceiver, designed to provide Fibre Channel connections at distances up to 10 kilometers (6.2 miles), while using the appropriate 9.0/125 micrometer single mode fiber optic cable with SC connectors.

Tri-Rate SW SFP Transceiver (#5210)

This feature provides a Tri-Rate (1 and 2 Gbps FC and Gigabit Ethernet) shortwave SFP transceiver for the IBM 2054.

Tri-Rate LW SFP Transceiver (#5220)

This feature provides a Tri-Rate (1 and 2 Gbps FC and Gigabit Ethernet) longwave SFP transceiver for the IBM 2054.

FC SW SFP Transceiver ((#5230)

This feature provides a FC shortwave SFP transceiver for the IBM 2054.

FC LW SFP Transceiver (#5240)

This feature provides a FC longwave SFP transceiver for the IBM 2054.

Gigabit Ethernet Copper SFP (#5250)

This feature provides a Gigabit Ethernet Copper SFP appropriate for IP modules #2208 and #2214.

FC 4 Gb SW SFP Transceiver — 4 Pack (#5434)

This feature provides four shortwave SFP transceivers, designed to provide Fibre Channel connections at distances up to 150 meters, while using the appropriate 50.0/125 micrometer fiber optic cable, and distances up to 70 meters, while using the appropriate 62.5/125 micrometer fiber optic cable.

FC 4 Gb LW 4 Km SFP Transceiver — 4 Pack (#5444)

This feature provides four additional 4 Gb longwave 4 kilometer SFP transceivers, designed to provide Fibre Channel connections at distances up to 4 Km (2.48 miles), while using the appropriate 9.0/125 micrometer single mode fiber optic cable with LC connectors.

FC 4 Gb LW 10 Km SFP Transceiver — 4 Pack (#5454)

This feature provides four additional 4 Gb longwave 10 kilometer SFP transceivers, designed to provide Fibre Channel connections at distances up to 10 kilometers (6.2 miles), while using the appropriate 9.0/125 micron single mode fiber optic cable with LC connectors.

Maximum supported distance for SFP transceivers

SFP Feature number	Fibre type	Core size (microns)	Speed (Gbps)	Cable distance
5210/5230/ 5434	Multimode	62.5	1	300m
		62.5	2	150m
		62.5	4	70m
		50.0	1	500m
		50.0	2	300m
		50.0	4	150m
5444	Single mode	9.0	1	4km

		9.0	2	4km
		9.0	4	4km
5220/5240/	Single mode	9.0	1	10km
5454		9.0	2	10km
		9.0	4	10km

The following 2 Gbps Switching Modules and options are also available for the Cisco MDS 9200 switches.

Cisco MDS 9000 Storage Services Module (#2400)

This feature provides a Storage Services Module providing a 32-port Fibre Channel Switching Module and intelligent storage services in addition to 1 and 2 Gbps Fibre Channel switching. The Storage Services Module Fibre Channel ports are compatible with the Fibre Channel SFP's (#5230 and #5240).

8-Port IP Line Card (#2208)

This feature provides an 8-Port IP Line Card (excluding optics) for connection to Gigabit Ethernet networks and support for iSCSI and FCIP capabilities. FCIP Activation requires ordering the FCIP Activation Services Line Card #2209.

9200 FCIP Activation for 8-Port IP Line Card (#2209)

This feature provides FCIP Activation for the Cisco 8-Port IP Services Line Card (#2208) to enable extended distance fabric capabilities over LAN and WAN connections for the MDS 9200.

Multiprotocol Services Module (#2214)

This feature provides a Multiprotocol Services Module (excluding optics) for connection to 14 2 Gbps Fibre Channel and 2 1 Gigabit Ethernet ports, and support for iSCSI and FCIP capabilities. FCIP Activation requires ordering the 9200 FCIP Activation for Multiprotocol Services Module, #2215 for each Multiprotocol Services Module.

The Multiprotocol Services Module IP ports are compatible with the Tri-Rate SFP Transceivers (#5210 and #5220) and the Gigabit Ethernet Copper SFP (#5250).

The Multiprotocol Services Module Fibre Channel ports are compatible with the Fibre Channel SFP (#5230 and #5240), Tri-Rate SFP Transceivers (#5210 and #5220), and the Gigabit Ethernet Copper SFP (#5250).

9200 FCIP Activation MDS Multiprotocol Services Module (MSM) (#2215)

This feature provides FCIP Activation for the Cisco Multiprotocol Services Module (#2214) to enable extended distance fabric capabilities over LAN and WAN connections for the MDS 9200.

The following firmware activation features are available for the Cisco MDS 9200 Multilayer Switches.

MDS 9200 Enterprise Package (#7011)

The Cisco MDS 9200 Enterprise Package is designed to provide enhanced security and management features, bundled for convenience and added flexibility. The Cisco MDS 9200 Enterprise Package includes the following capabilities: LUN zoning, Read-only zones, Port lockdown.

MDS 9200 Fabric Manager Server Package (#7016)

The Cisco MDS 9200 Fabric Manager Server Package extends Cisco Fabric Manager by helping provide historical performance data collection for network traffic hot-spot analysis, centralized management services, and support for advanced application integration.

MDS 9200 Mainframe Package (#7031)

The Cisco MDS 9200 Mainframe Package provides a collection of advanced features to enable MDS 9200 operation in mainframe storage network applications.

Features include:

- FICON Control Unit Port (CUP) — Implementation of a special control device called the FICON Control Device, also known as CUP, in the Cisco MDS 9000 Family allows in-band management of the switch from FICON hosts.
- Fabric Binding — The Fabric Binding feature helps ensure that Inter-Switch Links (ISLs) are only enabled between switches that have been authorized in the fabric binding configuration.
- Switch Cascading — The Switch Cascading feature supports a topology for FICON devices

wherein ISLs can be used between a host and an I/O device. Thus, Switch Cascading facilitates creation of mainframe storage networks consisting of multiple switches.

- Additional features — Additional FICON-related features included in the Mainframe package are:
  - FICON Native Mode and Native Mode Channel-to-Channel operation
  - Persistent FICON FCID assignment
  - Port swapping for host-channel cable connections

MDS 9200 Storage Services Enabler Package (#7041)

This feature provides three different interfaces for Independent Software Vendors (ISVs) to develop intelligent fabric applications including:

- Compatible network-accelerated serverless backup applications that can use the Serverless Backup Engine Interface to enable disk systems to write directly to tape systems without requiring backup server reads and writes.
- Compatible network-assisted appliance-based storage applications that can use the SANTap Service Interface to directly replicate data to remote sites without requiring application server agents.
- Compatible network-hosted storage applications that can use the Intelligent Storage Service Application Programmatic Interface for "out-of-band" storage management.

For the most current IBM TotalStorage® Proven™ application information, visit

http://www.ibm.com/storage/proven

Product number

Description	Machine type	Model	Feature number
Cisco MDS 9216A Fabric Switch	2054	D1A	
8-Port IP Services Line Card			2208
9200 FCIP Act/8-Port IP Serv LC			2209
Multiprotocol Services Module (MSM)			2214
9200 FCIP Activation for MSM			2215
Storage Services Module			2400
4-port 10 Gb FC Switching Module			2404
12-port 4 Gb FC Switching Module			2412
24-port 4 Gb FC Switching Module			2424
48-port 4 Gb FC Switching Module			2448
FC 10 Gb 10 km LW X2 Transceiver			5040
Tri-Rate SW SFP			5210
Tri-Rate LW SFP			5220
FC 2 Gb SW SFP			5230
FC 2 Gb LW SFP			5240
Gigabit Ethernet Copper SFP			5250
FC 4 Gb SW SFP -- 4 Pack			5434
FC 4 Gb 4 km LW SFP -- 4 Pack			5444
FC 4 Gb 10 km LW SFP -- 4 Pack			5454
1 m 50u LC/LC Fiber Cable			5601
5 m 50u LC/LC Fiber Cable			5605
25 m 50u LC/LC Fiber Cable			5625
MDS 9200 Enterprise Pkg			7011
MDS 9200 Fabric Mgr Server Pkg			7016
MDS 9200 Mainframe Server Pkg			7031
MDS 9200 Storage Services Enabler			7041
Power Cord, North America			9110
Power Cord, Australia			9111
Power Cord, Europe			9112
Power Cord, CD12 (Italy)			9113
Power Cord, U.K.			9114
Power Cord, Argentina			9115
Power Cord, South Africa			9116

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 Power Cord, Switzerland                              9117
 Cab Jumper Power Cord, 250 V ac 20A, C14-C15         9120

Cisco MDS 9216i Fabric Switch        2054     D1H

 8-Port IP Services Line Card                         2208
 9200 FCIP Act/8-Port IP Serv LC                      2209
 Multiprotocol Services Module (MSM)                  2214
 9200 FCIP Activation for MSM                         2215
 Storage Services Module                              2400
 4-port 10 Gb FC Switching Module                     2404
 12-port 4 Gb FC Switching Module                     2412
 24-port 4 Gb FC Switching Module                     2424
 48-port 4 Gb FC Switching Module                     2448
 FC 10 Gb 10 km LW X2 Transceiver                     5040
 Tri-Rate SW SFP                                      5210
 Tri-Rate LW SFP                                      5220
 FC 2 Gb SW SFP                                       5230
 FC 2 Gb LW SFP                                       5240
 Gigabit Ethernet Copper SFP                          5250
 FC 4 Gb SW SFP -- 4 Pack                             5434
 FC 4 Gb 4 km LW SFP -- 4 Pack                        5444
 FC 4 Gb 10 km LW SFP - 4 Pack                        5454
 1 m 50u LC/LC Fiber Cable                            5601
 5 m 50u  LC/LC Fiber Cable                           5605
 25 m 50u  LC/LC Fiber Cable                          5625
 MDS 9200 Enterprise Pkg                              7011
 MDS 9200 Fabric Mgr Server Pkg                       7016
 MDS 9200 Storage Servics Enabler                     7041
 MDS 9200 Fabric Mgr Server Pkg                       7016
 MDS 9200 Mainframe Server Pkg                        7031
 MDS 9200 Storage Services Enabler                    7041
 Power Cord, North America                            9110
 Power Cord, Australia                                9111
 Power Cord, Europe                                   9112
 Power Cord, CD12 (Italy)                             9113
 Power Cord, U.K.                                     9114
 Power Cord, Argentina                                9115
 Power Cord, South Africa                             9116
 Power Cord, Switzerland                              9117
 Cab Jumper Power Cord, 250 V ac 20A, C14-C15         9120
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Model conversions: Not applicable

Feature conversions: Not applicable

Trademarks

Publications

Technical documentation for Cisco products is provided by Cisco Systems. For a list of available documentation and instructions for ordering a set of manuals on CD-ROM, visit

http://www.cisco.com/go/ibm/storage

Documentation for Cisco products is available only in English.

Services

Global Technology Services

IBM services include business consulting, outsourcing, hosting services, applications, and other technology management.

These services help you learn about, plan, install, manage, or optimize your IT infrastructure to be an On Demand Business. They can help you integrate your high-speed networks, storage systems, application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or visit

http://www.ibm.com/services/

For details on available IBM Business Continuity and Recovery Services, contact your IBM representative or visit

http://www.ibm.com/services/continuity

For details on education offerings related to specific products, visit

http://www.ibm.com/services/learning/index.html

Select your country, and then select the product as the category.

Technical information

Specified operating environment

Physical specifications: Cisco MDS 9216i Fabric Switch (2054-D1H) and Cisco MDS 9216A Fabric Switch (2054-D1A)

3 rack units (RUs)

All units rack mountable in standard 19-inch EIA rack.

- Width: 43.99 cm (17.32 in)
- Depth: 57.56 cm (22.66 in)
- Height: 13.34 cm (5.25 in)
- Weight: 32 kg (70 lb), fully configured chassis with optional switching module

To assure installability and serviceability in non-IBM industry-standard racks, review the installation planning information for any product-specific installation requirements.

For information on **technical specifications** of Cisco products, including operating environment and physical specifications, visit

http://www.cisco.com/go/ibm/storage

Operating environment:

Cisco MDS 9216i Fabric Switch (2054-D1H) and Cisco MDS 9216A Fabric Switch (2054-D1A):

Environmental

- Temperature, ambient operating: 32° to 104°F (0° to 40°C)
- Temperature, ambient nonoperating and storage: 40° to 158°F (40° to 75°C)
- Relative humidity, ambient (noncondensing) operating: 10% to 90%
- Relative humidity, ambient (noncondensing) nonoperating and storage: 10% to 95%
- Altitude, operating: -197 to 6,500 ft (-60 to 2,000 m)

Power and cooling

Power supply (845WAC)

- AC input characteristics
  - 100 to 240 V ac (10% range)
  - 50 to 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 in. (6.4 cm) between walls and chassis air vents, and a minimum horizontal separation of 6 in. (15.2 cm) between two chassis to prevent overheating.

Safety compliance

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

EMC compliance

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

For information on **technical specifications** of Cisco products, including operating environment, recommended installation procedures, and physical specifications, visit

http://www.cisco.com/go/ibm/storage

Hardware requirements

Supported servers and storage systems: Cisco Systems Multilayer Switches and Directors are designed to support:

Servers

- IBM System z™ and S/390® servers
- IBM System p™ and selected RS/6000® servers
- IBM System i™ and selected AS/400® servers
- IBM System x™ and selected Netfinity® servers
- Other Intel®-based servers with Linux™, Microsoft™ Windows™ 2000, and Windows 2003
- Selected Sun and HP servers

Storage software

- IBM TotalStorage® SAN Volume Controller (SVC)
- IBM TotalStorage SAN File System (SFS)

Storage systems

- IBM TotalStorage DS8000 series
- IBM TotalStorage DS6000 series
- IBM TotalStorage DS4000 series
- IBM TotalStorage Enterprise Storage Server™
- IBM TotalStorage FAStT Family of Storage Servers
- IBM TotalStorage 358x and 359x Tape Drives
- IBM TotalStorage 3494, 357x, and 358x Tape Libraries
- Other selected storage systems

Achievable throughput (1, 2, or 4 Gbps) depends on the maximum speed supported by the attached system.

For a complete list of hardware requirements, cross-product requirements, prerequisites, and product dependencies, refer to

http://www.cisco.com/go/ibm/storage

Software requirements:

Cisco MDS 9216i Fabric Switch (2054-D1H) Cisco MDS 9216A Fabric Switch (2054-D1A)

Software compatibility:

- Cisco MDS 9000 SAN-OS Software Release 3.1(1) or later

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

Diagnostics and troubleshooting tools

- 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 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
  - In-band FICON™ CUP over Fibre Channel
- Access protocols
  - CLI via console and Ethernet ports
  - SNMPv3 via Ethernet port and in-band IP over Fibre Channel access
  - Storage Networking Industry Association (SNIA) Storage Management Initiative Specification (SMI-S)
  - FICON CUP
- Distributed Device Alias service
- Network security
  - Per-VSAN role-based access control using RADIUS and TACACS+-based authentication, authorization, and accounting (AAA) functions
  - SFTP
  - SSHv2 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

For a complete list of software requirements, cross product requirements, prerequisites, and

product dependencies, visit

http://www.cisco.com/go/ibm/storage

Compatibility: Cisco MDS 9216i Fabric Switch (2054-D1H)

Network security

- VSANs
- ACLs
- 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
- FC-SP™
  - DH-CHAP switch-switch authentication
  - DH-CHAP host-switch authentication
- Port Security and Fabric Binding
- IPSec for FCIP and iSCSI
- IKEv1 and IKEv2
- Management access
  - SSHv2 implementing AES
  - SNMPv3 implementing AES
  - IP ACLs

Protocols

- Fibre Channel standards
  - FC-PH, Revision 4.3 (ANSI/INCITS 230-1994)
  - FC-PH, Amendment 1 (ANSI/INCITS 230-1994/AM1 1996)
  - FC-PH, Amendment 2 (ANSI/INCITS 230-1994/AM2-1999)
  - FC-PH-2, Revision 7.4 (ANSI/INCITS 297-1997)
  - FC-PH-3, Revision 9.4 (ANSI/INCITS 303-1998)
  - FC-PI, Revision 13 (ANSI/INCITS 352-2002)
  - FC-PI-2, Revision 10 (ANSI/INCITS 404-2006)
  - 10GFC, Revision 4.0 (ANSI/INCITS 364-2003)
  - FC-FS, Revision 1.9 (ANSI/INCITS 373-2003)

  - FC-FS-2, Revision 0.92
  - FC-LS, Revision 1.2
  - FC-AL, Revision 4.5 (ANSI/INCITS 272-1996)
  - FC-AL-2, Revision 7.0 (ANSI/INCITS 332-1999)
  - FC-AL-2, Amendment 1 (ANSI/INCITS 332-1999/AM1-2003)
  - FC-AL-2, Amendment 2 (ANSI/INCITS 332-1999/AM2-2006)
  - FC-SW-2, Revision 5.3 (ANSI/INCITS 355-2001)
  - FC-SW-3, Revision 6.6 (ANSI/INCITS 384-2004)
  - FC-SW-4, Revision 7.5 (ANSI/INCITS 418-2006)
  - FC-GS-3, Revision 7.01 (ANSI/INCITS 348-2001)
  - FC-GS-4, Revision 7.91 (ANSI/INCITS 387-2004)
  - FC-GS-5, Revision 8.2
  - FC-BB, Revision 4.7 (ANSI/INCITS 342-2001)
  - FC-BB-2, Revision 6.0 (ANSI/INCITS 372-2003)
  - FC-BB-3, Revision 6.8 (ANSI/INCITS 414-2006)
  - FCP, Revision 12 (ANSI/INCITS 269-1996)
  - FCP-2, Revision 8 (ANSI/INCITS 350-2003)
  - FCP-3, Revision 4 (ANSI/INCITS 416-2006)
  - FC-SB-2, Revision 2.1 (ANSI/INCITS 349-2001)
  - FC-SB-3, Revision 1.6 (ANSI/INCITS 374-2003)
  - FC-VI, Revision 1.84 (ANSI/INCITS 357-2002)
  - FC-FLA, Revision 2.7 (INCITS TR-20-1998)
  - FC-PLDA, Revision 2.1 (INCITS TR-19-1998)
  - FC-Tape, Revision 1.17 (INCITS TR-24-1999)
  - FC-MI, Revision 1.92 (INCITS TR-30-2002)
  - FC-MI-2, Revision 2.6 (INCITS TR-39-2005)
  - FC-SP, Revision 1.74
  - FC-DA, Revision 3.1 (INCITS TR-36-2004)
  - FAIS, Revision 0.7
- IP over Fibre Channel (RFC 2625)
- IPv6, IPv4 and ARP over FC (RFC 4338)
- Extensive IETF standards-based TCP/IP, SNMPv3, and remote monitoring (RMON) MIBs
- Class of service: Class 2, Class 3, Class F
- Fibre Channel standard port types: E, F, FL, B
- Fibre Channel enhanced port types: SD, ST, TE
- 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

  - RFC 2460, 4291 IPv6
  - RFC 2463 ICMPv6
  - RFC 2461, 2462 IPv6 neighbor discovery and stateless auto-configuration
  - RFC 2464 IPv6/Ethernet
  - RFC 3270 iSCSI
  - RFC 3643, 3821 FCIP
- 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

Cisco MDS 9216A Fabric Switch (2054-D1A)

Network security

- VSANs
- ACLs
- 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
- FC-SP
  - DH-CHAP switch-switch authentication
  - DH-CHAP host-switch authentication
- Port Security and Fabric Binding
- Management access
  - SSHv2 implementing AES
  - SNMPv3 implementing AES
  - IP ACLs

Protocols

- Fibre Channel standards
  - FC-PH, Revision 4.3 (ANSI/INCITS 230-1994)
  - FC-PH, Amendment 1 (ANSI/INCITS 230-1994/AM1-1996)
  - FC-PH, Amendment 2 (ANSI/INCITS 230-1994/AM2-1999)
  - FC-PH-2, Revision 7.4 (ANSI/INCITS 297-1997)
  - FC-PH-3, Revision 9.4 (ANSI/INCITS 303-1998)
  - FC-PI, Revision 13 (ANSI/INCITS 352-2002)
  - FC-PI-2, Revision 10 (ANSI/INCITS 404-2006)
  - FC-FS, Revision 1.9 (ANSI/INCITS 373-2003)
  - FC-FS-2, Revision 0.91
  - FC-LS, Revision 1.2
  - FC-AL, Revision 4.5 (ANSI/INCITS 272-1996)
  - FC-AL-2, Revision 7.0 (ANSI/INCITS 332-1999)
  - FC-AL-2, Amendment 1 (ANSI/INCITS 332-1999/AM1-2003)
  - FC-AL-2, Amendment 2 (ANSI/INCITS 332-1999/AM2-2006)
  - FC-SW-2, Revision 5.3 (ANSI/INCITS 355-2001)
  - FC-SW-3, Revision 6.6 (ANSI/INCITS 384-2004)
  - FC-SW-4, Revision 7.5 (ANSI/INCITS 418-2006)
  - FC-GS-3, Revision 7.01 (ANSI/INCITS 348-2001)
  - FC-GS-4, Revision 7.91 (ANSI/INCITS 387-2004)
  - FC-GS-5, Revision 8.2
  - FC-BB, Revision 4.7 (ANSI/INCITS 342-2001)
  - FC-BB-2, Revision 6.0 (ANSI/INCITS 372-2003)
  - FC-BB-3, Revision 6.8 (ANSI/INCITS 414-2006)
  - FCP, Revision 12 (ANSI/INCITS 269-1996)
  - FCP-2, Revision 8 (ANSI/INCITS 350-2003)
  - FCP-3, Revision 4 (ANSI/INCITS 416-2006)
  - FC-SB-2, Revision 2.1 (ANSI/INCITS 349-2001)
  - FC-SB-3, Revision 1.6 (ANSI/INCITS 374-2003)
  - FC-VI, Revision 1.84 (ANSI/INCITS 357-2002)
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- Class of Service: Class 2, Class 3, Class F
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For the most current and complete description of the Cisco Systems MDS 9000 Family of storage networking products, visit

http://www.cisco.com/go/ibm/storage

For specific configuration support dates and other details on availability, server models, operating system levels, storage attachment capabilities, and throughput connectivity speeds, visit

http://www.ibm.com/storage/cisco

Support for some configurations may not be available on the initial planned availability date.

Limitations: Requires SAN-OS 3.0, or later.

Planning information

Customer responsibilities: Planning information, including customer responsibilities, physical planning, and installability is available in the specific product planning manuals on the following Web site

http://www.cisco.com/go/ibm/storage

Cable orders: A fiber optic cable is required for attaching the Cisco MDS 9200 Multilayer Fabric Switches to host computer system adapters, or other Fibre Channel storage area components. The fiber optic cable must be customer supplied, and must meet specifications defined by Cisco Systems.

While operating at 4 Gbps Fibre Channel standard tolerances, 50.0/125 micrometer fiber optic cable is designed for use up to 150 meter distances, and 62.5/125 micrometer fiber optic cable is designed for use up to 70 meter distances. The fiber optic cable connection is a Lucent Connector (LC) type.

In many situations, the required lengths and installation of fiber optic cables will be unique to each customer's configuration and facility specifications. Product support services, offered by IBM Global Services' Site and Connectivity Solutions, can provide assistance for these unique cabling and installation requirements.

Security, auditability, and control

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

Terms and conditions

Volume orders: Contact your IBM representative.

Warranty period: One year

Warranty service: If required, IBM provides repair or exchange service depending on the types of warranty service specified for the machine. IBM will attempt to resolve your problem over the telephone, or electronically via an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. If applicable to your product, parts considered customer replaceable units (CRUs) will be provided as part of the machine's standard warranty service.

Service levels are response time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for

country-specific and location-specific information. This product is covered by the following types of service.

On-site Service: IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well-lit, and suitable for the purpose.

- 24 hours per day, 7 days a week, same-day response

If your problem can be resolved with a CRU (for example, keyboard, mouse, speaker, memory, or HDD), IBM may ship the CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM at any time on your request.

Based upon availability, CRUs will be shipped for next-business-day delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective CRU must be returned to IBM. When return is required, return instructions and a container are shipped with the replacement CRU, and you may be charged for the replacement CRU if IBM does not receive the defective CRU within 15 days of your receipt of the replacement.

Non-IBM parts support

Warranty service: This product contains non-IBM parts. Normal IBM warranty service will apply using manufacturer provided field replaceable unit (FRU) parts.

Warranty service upgrades and maintenance service options

Warranty service upgrades: None.

Maintenance services:

Post warranty support and pricing is available from your local IBM office at the time of this announcement. Please contact your IBM representative for further information.

Usage plan machine: No

IBM hourly service rate classification: None

When a type of service involves the exchange of a machine part, the replacement may not be new, but will be in good working order.

Field-installable features: Yes

Model conversions: No

Machine installation: Installation is performed by IBM. IBM will install the machine in accordance with the IBM installation procedures for the machine. In the United States, contact IBM at 800-IBM-SERV (426-7378). In other Countries, contact the local IBM office.

Graduated program license charges apply: No. This product does not contain licensed internal code or licensed machine code.

Educational allowance: A reduced charge is available to qualified education customers. The educational allowance may not be added to any other discount or allowance.

The educational allowance is 15% for the products in this announcement.

Prices

For all local charges contact your IBM representative.

Alternative service charges:

Post warranty support and pricing is available from your local IBM office at the time of this announcement. Contact your IBM representative for further information.

Annual minimum maintenance charges:

Post warranty support and pricing is available from your local IBM office at the time of this announcement. Please contact your IBM representative for further information.

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Financing solutions from IBM Global Financing can help you stretch your budget and affordably acquire the new product. But beyond the initial acquisition, our end-to-end approach to IT management can also help keep your technologies current, reduce costs, minimize risk, and preserve your ability to make flexible equipment decisions throughout the entire technology lifecycle.

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