Overview

The MDS 9222i MultiService Fabric Switch brings the most flexible storage networking capability available in the fabric switch market today. Sharing a consistent architecture with the MDS 9500 Directors, the MDS 9222i integrates both Fibre Channel and IP Storage Services in a single system to allow maximum flexibility in user configurations. With eighteen 4-Gbps Fibre Channel ports, four Gigabit Ethernet IP Storage Services ports, a four port FCIP software license and an open modular expansion slot that can be used to connect an additional forty-eight ports of 8-Gbps or 4-Gbps Fibre Channel or even four 10-Gb Fibre Channel ports for Inter-Switch Links, the MDS 9222i is a comprehensive package, ideally suited for enterprise storage networks that require high performance SAN extension or cost-effective IP Storage connectivity for applications such as Business Continuity using Fibre Channel over IP or iSCSI host attachment to Fibre Channel storage devices. The 9222i encrypts data in transit over IP LANs and WANs or while at rest on storage tape media using optional Storage Media Encryption for added security to your SAN environment adding built-in SAN/LAN/WAN connectivity, advanced security, management and modular design make it the most adaptive and powerful storage fabric switch available.

Cisco MDS 9222i MultiService Fabric Switch

Key Features and Benefits

- Integrated Fibre Channel and IP Storage Services in a single optimized form factor:
  - Supports eighteen 4-Gbps Fibre Channel interfaces for high performance storage area network (SAN) connectivity plus four Gigabit Ethernet ports for Fibre Channel over IP (FCIP) and Small Computer System Interface over IP (iSCSI) storage services plus an on-board crypto processing engine to encrypt data transported over IP networks or to be stored on tape.
- Industry's highest-performance Inter-Switch Links (ISLs):
  - Supports up to sixteen 4 or 8-Gbps or 4, 10-Gbps Fibre Channel links in a single PortChannel.
  - Links may span any like speed ports on any module within a chassis for added scalability and resilience.
  - Up to 4095 buffer-to-buffer credits can be assigned to a single Fibre Channel port to extend storage networks over unprecedented distances.
- Hardware Assisted Encryption Security:
  - On-board crypto processing engine supports secure IEEE standard Advanced Encryption Standard (AES) 256-bit algorithms
  - IPsec for Data in Transit over IP networks
  - Storage Media Encryption of Data at Rest on tape - FIPS 140-2, level 2 certifications.
- 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.
  - 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) protocol, Simple Network Management Protocol Version 3 (SNMPv3) implementing Advanced Encryption

Overview

Standard (AES), VSANs, hardware-enforced zoning, ACLs, and per-VSAN Role-Based Access Control (RBAC). Additionally Gigabit Ethernet ports support IPsec authentication, data integrity, and hardware-assisted data encryption and key management.

- 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 9222i provides an open platform for hosting intelligent storage services such as network-based virtualization and replication.
  - Storage services modules can be installed in the Cisco MDS 9222i 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, hardware-based encryption, FCIP Write Acceleration, and FCIP Tape Acceleration.
  - Enhanced hardware-based FCIP compression performance for both high-bandwidth and low-bandwidth links. The MDS 9222i achieves a compression ratio of up to 43:1, with typical ratios of 4:1.
  - FCIP Services Software License is included for the 4 Gigabit Ethernet ports included with the MDS 9222i base unit.
- 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.
  - Through transparent operation, preserves the capability of existing storage management applications.

Product Highlights

FCIP for remote SAN Extensions

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 9222i 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 9222i 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. The Cisco MDS 9222i 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.

High Performance SAN Extension with Compression and FCIP Write Acceleration

The Cisco MDS 9222i supports hardware-based FCIP compression to maximize the effective WAN bandwidth of SAN extension solutions. The Cisco MDS 9222i achieves up to a 43:1 compression ratio, with typical ratios of 4:1 over a wide variety of data sources. The Cisco MDS 9222i 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 9222i supports FCIP Tape Acceleration, which significantly improves throughput over WAN links for remote tape backup operations.

Advanced Traffic Management for High-Performance, Resilient Fabrics

- Virtual Output Queuing ensures line rate performance on each port, independent of traffic pattern, by eliminating head-of-line blocking.
- Up to 4095 buffer-to-buffer credits can be assigned to an individual port for optimal bandwidth utilization across long distances.
- Port Channels 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.

Product Highlights

Industry's Most Advanced Diagnostics and Troubleshooting Tools

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 9222i 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.

Comprehensive Solution for Robust Network Security

The Cisco MDS 9222i offers an extensive security framework to protect highly sensitive data crossing today's enterprise networks. The Cisco MDS 9222i 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 deployment, the comprehensive IPsec protocol suite delivers secure authentication, data integrity, and hardware-based encryption.

Ease of Management

To meet the needs of administrators the 9222i has thee principle methods of administration; Command Line Interface, Cisco Fabric Manager, as well as HP Openview and HP Storage Essentials.
The Cisco MDS 9222i 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 the optional Cisco Fabric Manager Server and other HP management applications such as HP OpenView and HP Storage Essentials. Cisco MDS SAN-OS also provides an extensive API for integration with third-party and user developed management tools.

Product Highlights

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 9222i 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 9222i 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 directly to a Fibre Channel SAN, while maintaining the cost and ease-of-use benefits of Ethernet and IP.

Product Family Models

- Cisco MDS 9513 Multilayer Director w/Dual Supervisor 2
  - Intelligent, multi-protocol 13-slot Director with up to 528 Auto-Sensing 4/2/1 Gb Fibre Channel ports
- Cisco MDS 9506 Multilayer Director w/Dual Supervisor 2
  - Intelligent, multi-protocol 6-slot Director with up to 192 Auto-Sensing 1/2/4/10 Gb Fibre Channel ports or 1Gb Ethernet ports
- Cisco MDS 9509 Multilayer Director w/Dual Supervisor 2
  - Intelligent, multi-protocol 9-slot Director with up to 336 Auto-Sensing 1/2/4/10 Gb Fibre Channel ports or 1Gb Ethernet ports.
- Cisco MDS 9134 Fabric Switch
  - Intelligent, Fibre Channel Fabric Switch with 32 Auto-Sensing 4/2/1 Gb Fibre Channel ports and two 10Gb Fibre Channel ports
- Cisco MDS 9124 Fabric Switch
  - Intelligent, Fibre Channel Fabric Switch with 24 Auto-Sensing 4/2/1 Gb Fibre Channel ports
- Cisco MDS 9124e Fabric Switch for HP c-Class BladeSystem
  - Intelligent, Fibre Channel Fabric Switch with 24 Auto-Sensing 4/2/1 Gb Fibre Channel port

Software Components, Standard

SAN-OS/NX-OS

Cisco MDS 9000 SAN-OS/NX-OS delivers numerous advanced storage networking capabilities for the Cisco MDS 9000 Family of Multilayer Intelligent Directors and Fabric Switches.

Cisco Fabric Manager

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, LUN security, monitoring, and fault resolution. All functions are available through a secure interface, which enables remote management from any location. Cisco Fabric Manager may be used independently or in conjunction with third-party management applications. Cisco provides an extensive API for integration with third-party and user developed management tools.

Product Highlights

Software Components, Optional

Cisco Fabric Manager Server Package	The "Standard" Cisco Fabric Manager software that is included at no charge with the MDS family switches provides basic switch configuration and troubleshooting capabilities. The Cisco Fabric Manager Server (FMS) Package extends Cisco Fabric Manager by providing historical performance data collection for network traffic hot-spot analysis, centralized management services and advanced application integration.
Cisco Enterprise Package	Cisco MDS switches have a set of advanced traffic engineering and advanced security features that are recommended for all Enterprise SANs. These features are bundled together in a management application called the Cisco MDS 9000 Enterprise Package.
Cisco MDS 9000 Family SME Package	Cisco MDS 9000 Family SME Package allows encryption of storage media (data at rest). Strong, standard IEEE AES-256 encryption for heterogeneous tape devices and VTLs as well as tape data compression are provided as a distributed fabric service.
Cisco MDS 9000 Family Mainframe Package	The Cisco MDS 9000 Family Mainframe Package is a comprehensive collection of features required for using the Cisco MDS 9200 Series switches in mainframe storage networks, including FICON protocol and CUP management, switch cascading, fabric binding, and intermixing.

Warranty	2-2-2) Hardware Warranty - Hardware Warranty - Two-year on-site warranty, 24x7, 4-hour remote response, installation not included. NOTE: The hardware warranty covers firmware and embedded non-saleable software. Saleable software carries its own warranty, see below. Software Warranty - HP warrants only that the software media will be free of physical defects for a period of ninety (90) days from delivery. EXCLUSIVE REMEDY: The entire liability of HP and its suppliers and your exclusive remedy for software that does not conform to this Limited Warranty shall be the repair or replacement of the defective media. This warranty and remedy are subject to your returning the defective media during the warranty period to HP in the country in which you obtained the software. NOTE: The hardware warranty covers firmware and embedded non-saleable software. For extended hardware installation and maintenance information, click the link below: http://h18005.www1.hp.com/services/carepaq/us/install/ http://h18005.www1.hp.com/services/carepaq/us/hardware/. NOTE: Certain restrictions and exclusions apply. Consult the Customer Support Center for details Hardware or Software product installation is not included in the warranty, but is available and highly recommended.

HP Care Pack Services. Scalable, Flexible, Dependable. Like your storage.

Your storage is evolving. Get scalable support that evolves with it. HP Care Pack Services is an easy-to-buy, easy-to-use portfolio of packaged services covering your lifecycle needs. You can rely on our highly skilled, HP certified professionals to offer a breadth of expertise across leading storage technologies, and work side by side with you for optimal results. Partner with HP Technology Services to boost availability and avoid costly downtime by mitigating technology-related business risks. To help take the worry out of deploying, supporting and managing your storage technologies, we've designed a portfolio of service options that are as flexible, scalable and affordable as our storage.

Protect your business beyond the warranty

Standard warranty protects against product defects and some causes of downtime. HP Care Pack Services helps you proactively guard against unplanned downtime which can reduce your productivity and profitability. By using a standard approach to warranty uplifts, such as HP Care Pack Services, customers can be certain of consistency of operations for both mission-critical and standard business computing.

Extending warranties with HP Care Pack Services

The key to normalizing the warranty of combined solutions-is making service uplift simple: HP Care Pack Services. This portfolio of predefined packages, extending across the entire IT lifecycle, offering consulting, education, technical support, optimization, risk assessment, and more. It's entirely flexible allowing customers to extend the cover to the precise level of support required. Customer's standard hardware warranty, for example, can be upgraded to next-business-day response, to same-day coverage, or even to a committed six-hour call-to-repair service available 24 hours every day of the week.

Provide consistent, predictable levels of support across your entire department or business
Give you direct access to proven technical and problem-solving expertise
Offer a choice of response-time and repair-time commitments
Are available whenever and wherever you do business

For many products, post-warranty HP Care Pack Services are available when your original warranty has expired. Choose the support levels that meet your business requirements, from basic to mission-critical. In the new world of business technology, when your technology has to work for your business to work, who can you trust to make your technology work? HP Technology Services, the trusted business technology experts who manage your technology in action, because when technology works, business works.
http://www.hp.com/hps/storage

NOTE: Care Pack Services availability may vary by product and country.

HP Service & Warranty Support

Software Product Services

Software Warranty - HP warrants only that the software media will be free of physical defects for a period of ninety (90) days from delivery.

EXCLUSIVE REMEDY - The entire liability of HP and its suppliers and your exclusive remedy for software that does not conform to this Limited Warranty shall be the repair or replacement of the defective media. This warranty and remedy are subject to your returning the defective media during the warranty period to HP in the country in which you obtained the software.

NOTE: Certain restrictions and exclusions apply. Consult the Customer Support Center for details. Hardware or Software product installation is not included in the warranty, but is available and highly recommended.

Related Services

Services that will enhance the user experience in many product deployments.

3-Year HP Critical Service for SANs

3-Year HP Critical Service for SANs offers a comprehensive, robust suite of proactive and reactive services expressly designed to help you resolve complex interoperability issues and maximize uptime and data availability in your SAN environment

HP Assessment Service for SANs

HP Assessment Service for SANs offers customized technical and operational guidance to customers with a deployed storage area network (SAN) infrastructure, and provides recommendations to help improve availability levels and ongoing management of your SAN environment.

Product Number	Product Name	Service Name	Care Pack Services Product # and Band
		HP Assessment Service for SANs	HE807A1
AG851B	MDS 9222i Multiservice Fabric Switch	3-Year HP Critical Service for SANs	HA112A3-8SQ
AG852B	MDS9000 18/4 w/0 SFP Module	3-Year HP Critical Service for SANs	HA112A3-8SR
AE378B	MDS 9000 32-Port Stor Serv Module	3-Year HP Critical Service for SANs	HA112A3-84A
AE383B	MDS 9000 12-Port 4Gb FC Module	3-Year HP Critical Service for SANs	HA112A3-4CY
AE384B	MDS 9000 24-Port 4Gb FC Module	3-Year HP Critical Service for SANs	HA112A3-4CZ
AE385B	MDS 9000 48-Port 4Gb FC Module	3-Year HP Critical Service for SANs	HA112A3-84B
AE386B	MDS 9000 4-Port 10Gb FC Module	3-Year HP Critical Service for SANs	HA112A3-84C
AJ901B	MDS 9000 48-Port 8Gb Host Optimized Module	3-Year HP Critical Service for SANs	HA112A3-4QL

Service and Support and Warranty Information

eSupport

HP eSupport is a portfolio of technology-based services that assist you with managing your business environment - from the desktop to the data center.

Support Portal
The HP support portal provides one-stop access to the information, tools and services you need to manage the daily operations of your IT environment.

Features include:

- Access to self-solve tools (including search technical knowledge base)
- Efficient logging and tracking of support cases
- Collaboration with other business and IT professionals
- Download of patches and drivers
- Access to diagnostic tools
- Proactive notification of relevant information

Access to certain features of the support portal requires an HP service agreement. To access the support portal, visit: http://www.hp.com/support

Remote Support Technology (RST)-HP Remote Support Pack
Taking a more proactive approach to IT support, the HP Remote Support pack plug-in module easily integrates with HP Systems Insight Manager to provide a powerful, unified "single pane of glass" solution for onsite and remote management.

HP Remote Support Pack enhances HP Systems Insight Manager with intelligent event diagnosis plus the automatic submission of hardware event notifications securely to HP support, including acknowledgment and status returns. It adds remote configuration collections to allow the delivery of assessment and proactive services for your SAN storage and HP-UX environments.

Customer Technical Training

Consider education as an integral part of your strategy to get the best return on investment for your HP storage solution. HP offers a variety of training courses on storage software, networking, archiving and disk storage systems. Our classes are available in many delivery modalities from traditional instructor-led courses at one of our 80 training centers worldwide to on-site training customized to your needs or online. www.hp.com/learn/storage

HP Services Awards

HP Services continues to be recognized for service and support excellence by customers, partners, industry organizations and publications around the world. Recent honors and award reflect our services team's dedications, technical expertise, professionalism and uncompromising commitment to customer satisfaction. For a list of all our awards, please visit: http://h20129.ww2.hp.com/services/cache/77318-0-0-225-121.html.

Additional Services Information

For more information about HP Care Pack Services for Storage, please visit: http://www.hp.com/hps/storage

Service and Support and Warranty Information

Additional HP support services	HP Services provides a broad spectrum of services to commercial and enterprise customers, including performance and availability services such as proactive mission-critical services, as well as support management services for deployment of the entire IT infrastructure, including HP and multivendor environments. For more information on these services, contact your HP sales representative or visit: http://www.hp.com/hps/support
Education services	HP offers a variety of training methods to fit your needs including traditional instructor-led courses at one of our 120 training centers worldwide, onsite training customized to your needs, in your facility, or even Remotely Assisted Instruction Learning that combines the best of traditional classroom training (including its live instructor and labs) with the best of online training (no traveling required). And if you like learning on your own schedule, at your own pace, make use of e-learning opportunities on the award-winning HP IT Resource Center, a "learning community" with extensive on-demand resources that can be accessed 24x7. For more information on these services, contact your HP sales representative or visit: http://www.hp.com/learn and click on "HP StorageWorks".
Financial services	HP Financial Services provides innovative financing and financial asset management programs to help customers cost-effectively acquire, manage, and ultimately retire their HP solutions. For more information on these services, please contact your HP sales representative or visit: http://www.hp.com/go/hpfinancialservices

Software Components, Optional

Cisco Fabric Manager Server Package	The "Standard" Cisco Fabric Manager software that is included at no charge with the MDS family switches provides basic switch configuration and troubleshooting capabilities. The Cisco Fabric Manager Server (FMS) Package extends Cisco Fabric Manager by providing historical performance data collection for network traffic hot-spot analysis, centralized management services and advanced application integration.
Cisco MDS 9200 Storage Services Module Enabler LTU	This license is required when 3rd party applications ared used in conjustion with the Network Services Application Program Interface
HP MDS 9200 MPS 18/4 FCIP Module LTU (Only required when optional AG852A/B module is used for FCIP)	This License is required to us FC over IP with an optional 18/4 module on an MDS 9200 switch. This License is not required to use the embedded IP ports in a 92XXi switch. Those port are already enabled and the License is included with the switch.
Cisco MDS 9200 Enterprise Package	Cisco MDS switches have a set of advanced traffic engineering and advanced security features that are recommended for all Enterprise SANs. These features are bundled together in a management application called the Cisco MDS 9500 Enterprise Package.
MDS 9200 Mainframe Fibre Connection LTU T4409A	This License is required to use FICON services for IBM mainframe connections to an MDS 9200 switch. The FICON option is only supported on HP XP arrays. Other HP arrays do not support FICON.

Service and Support and Warranty Information

Cisco MDS 9222i Storage Media Encryption package License To Use	Cisco MDS 9222i SME Package allows the use of the embedded crypto-engine for the encryption of storage media (data at rest). Strong, standard IEEE AES-256 encryption for heterogeneous tape devices and VTLs as well as tape data compression is provided as a distributed fabric service.
Cisco MDS 9200 Storage Media Encryption package for one MPS 18/4 Module LTU	Cisco MDS 9200 SME Package for one 18/4 MultiServices Module allows addition of encryption of storage media (data at rest). Strong, standard IEEE AES-256 encryption for heterogeneous tape devices and VTLs as well as tape data compression is provided as a distributed fabric service

	Cisco MDS 9509 w/Dual Supervisor 2	Cisco MDS 9506 w/Dual Supervisor 2	Cisco MDS 9513 w/Dual Fabric 2 Module	Cisco MDS 9134 Fabric Switch	Cisco MDS 9124 Fabric Switch	Cisco MDS 9124e Fabric Switch for HP c-Class Blade System
Introduction Date	February 2006	February 2006	January 2009	March 2008	March 2007	February 2007
Switch Type	Multilayer Director	Multilayer Director	Multilayer Director	Multilayer Fabric Switch	Multilayer Fabric Switch	Embedded Fabric Switch
Maximum ports	336 Fibre Channel, 50 IP ports	192 Fibre Channel, 26 IP ports	528 Fibre Channel, 58 IP ports	34 Fibre Channel ports, 64 Fibre Channel ports (requires two stacked switches)	24, 4 Gb Fibre Channel ports	16 Internal, 8 Fibre Channel ports
Number of slots per chassis	Nine	Six	Thirteen	N/A, Fixed FRU	N/A, Fixed FRU	N/A, Fixed FRU

Step 1 – Base Configuration

Select one:

Model	Model Description	Part Number
Cisco MDS 9222i w/0 SFP Fabric Switch	Cisco MDS 9222i	AG851B

Step 2 – Options

Model Description Fibre Channel Port Expansion Modules	Quantity	Part Number
MDS 9000 48-Port 8Gb Host Optimized Module	1 Max	AJ901B
SFPs required, supports 4Gb and 8Gb SFPs		
MDS 9000 8Gb FC SFP+ Short Range Transceiver		AJ906A
MDS 9000 8Gb FC SFP+ Long Range Transceiver		AJ907A
HP MDS 9000 18/4 Multiservice Module	1 Max	AG852B
1-2 Gb Fibre Channel-SW SFP, LC		A7428A
1-2 Gb Fibre Channel-LW SFP, LC		A7429A
Cisco MDS 9000 12-Port 4Gb FC Module	1 Max	AE383B
Cisco MDS 9000 24-Port 4Gb FC Module	1 Max	AE384B
Cisco MDS 9000 48-Port 4Gb FC Module	1 Max	AE385B
Cisco MDS9000 4Gb FC SFP 4pk 500m XCVR		AE379A
Cisco MDS9000 4Gb FC SFP 4KM Transceiver		AE494A
Cisco MDS9000 4Gb FC SFP Long Wave XCVR		AE380A
Cisco MDS 9000 4-Port 10Gb FC Module	1 Max	AE386B
Cisco MDS9000 10Gb FC SFP Short Wave XCVR		AE381A
Cisco MDS9000 10Gb FC SFP Long Wave XCVR		AE456A
Cisco MDS 9000 32-Port Storage Service Module	1 Max	AE378B
1GB Ethernet & 1-2Gb FC short wave SFP, LC		A7487A
1GB Ethernet & 1-2Gb FC long wave SFP, LC		A7488A
Cisco MDS9000 1Gb E-net SFP Copper XCVR		AE382A
MDS 9000 Port Analyzer Adapter	1 Max	A7430A
MDS 9000 10Gb Fibre Channel 2X Extended Range Transceiver		AG861A
MDS 9000 10Gb Fibre Channel 2X Copper Transceiver		AG870A
Cisco MDS 9000 10Gb Ethernet X2 Short Range Transceiver		AG871A
Cisco MDS 9000 Encryption Key Manager Smart Card Reader		AG872A
Cisco MDS 9000 Encryption Key Manager Smart Card		AG873A
Cisco MDS 9000 15 Meter Cable for 10Gb Copper Short Range X2 Transceivers		AG876A
Cisco MDS 9000 1 Meter Cable for 10Gb Copper Short Range X2 Transceivers		AG877A
Optional Software		
Cisco MDS9200 Storage Services Module Enabler LTU		T4318A

Configuration Information

HP MDS 9200 MPS 18/4 FCIP Module LTU (Only required when optional AG852A/B module is used for FCIP)		T5412A
Cisco MDS 9200 Fabric Manager Server Package		A7513A
Cisco MDS 9200 Enterprise Package		A7516A
MDS 9200 Mainframe Fibre Connection LTU T4409A		T4409A
Cisco MDS 9222i Storage Media Encryption package License To Use		T5414A
Cisco MDS 9200 Storage Media Encryption package for one MPS 18/4 Module LTU		T5418A
Course Wave Division Multiplexer Solution		
MDS 9000 1470 NM CWDM 4Gb FC SFP Transceiver		AG853A
MDS 9000 1490 NM CWDM 4Gb FC SFP Transceiver		AG854A
MDS 9000 1510 NM CWDM 4Gb FC SFP Transceiver		AG855A
MDS 9000 1530 NM CWDM 4Gb FC SFP Transceiver		AG856A
MDS 9000 1550 NM CWDM 4Gb FC SFP Transceiver		AG857A
MDS 9000 1570 NM CWDM 4Gb FC SFP Transceiver		AG858A
MDS 9000 1590 NM CWDM 4Gb FC SFP Transceiver		AG859A
MDS 9000 1610 NM CWDM 4Gb FC SFP Transceiver		AG860A
Dense Wave Division Multiplexer solution		
HP StorageWorks CWDM 4-port Multiplexer A		AG878A
HP StorageWorks CWDM 4-port Multiplexer B		AG879A
HP StorageWorks CWDM 8-port Multiplexer		AG880A
HP StorageWorks CWDM Multiplexer Chassis		AG881A
HP 2m Single-Mode LC/LC Fibre Channel Cable Used for CWDM solution	1 Pack	AK345A
HP 5m Single-Mode LC/LC Fibre Channel Cable Used for CWDM solution	1 Pack	AK346A
MDS 9000 3582 NM DWDM 2Gb SFP Transceiver		AG863A
MDS 9000 3504 NM DWDM 2Gb SFP Transceiver		AG864A
MDS 9000 3425 NM DWDM 2Gb SFP Transceiver		AG865A
MDS 9000 3268 NM DWDM 2Gb SFP Transceiver		AG866A
MDS 9000 3190 NM DWDM 2Gb SFP Transceiver		AG867A
MDS 9000 3112 NM DWDM 2Gb SFP Transceiver		AG868A
MDS 9000 3033 NM DWDM 2Gb SFP Transceiver		AG869A
Installation Service		
Cisco MDS 9222i Installation Service		HA113A1#5D2

Accessories

Optical Cables

(LC-LC for between two 2/4 Gb devices)	Part Number
2 m LC-LC Multi-Mode Fibre Channel Cable	221692-B21
5 m LC-LC Multi-Mode Fibre Channel Cable	221692-B22
15 m LC-LC Multi-Mode Fibre Channel Cable	221692-B23
30 m LC-LC Multi-Mode Fibre Channel Cable	221692-B26
50 m LC-LC Multi-Mode Fibre Channel Cable	221692-B27

Configuration Information

(LC-SC for between a 1 Gb and a 2 Gb device)

FC Cable LC/SC 1 Meter	A7485A
FC Cable LC/SC 5 Meter	A7486A
2 m LC-SC Multi-Mode Fibre Channel Cable	221691-B21
5 m LC-SC Multi-Mode Fibre Channel Cable	221691-B22
15 m LC-SC Multi-Mode Fibre Channel Cable	221691-B23
30 m LC-SC Multi-Mode Fibre Channel Cable	221691-B26
50 m LC-SC Multi-Mode Fibre Channel Cable	221691-B27

O/S Support	MDS 9000 SAN-OS Release 3.2(1) or later
Fibre Channel 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)
- 10GFC, Amendment 1 (ANSI INCITS 364-2003/AM1-2007)
- FC-FS, Revision 1.9 (ANSI INCITS 373-2003)
- FC-FS-2, Revision 1.01 (ANSI INCITS 424-2007)
- FC-FS-2, Amendment 1 (ANSI INCITS 424-2007/AM1-2007)
- FC-LS, Revision 1.62 (ANSI INCITS 433-2007)
- 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 8.51 (ANSI INCITS 427-2007)
- 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-SB-3, Amendment 1 (ANSI INCITS 374-2003/AM1-2007)
- FC-VI, Revision 1.84 (ANSI INCITS 357-2002)
- FC-SP, Revision 1.8 (ANSI INCITS 426-2007)
- FAIS, Revision 1.03 (ANSI INCITS 432-2007)
- 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-DA, Revision 3.1 (INCITS TR-36-2004)
- IP over Fibre Channel (RFC 2625)
- IPv6, IPv4 and ARP over Fibre Channel (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
  - TL

Protocols

- 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, 4443 ICMPv6
- RFC 2461, 2462 IPv6 neighbor discovery and stateless auto-configuration
- RFC 2464 IPv6/Ethernet
- RFC 3270, 3980 iSCSI
- RFC 3643, 3821 FCIP
- Ethernet standards
- IEEE Std 802.3-2005 Ethernet
- IEEE Std 802.1Q-2005 VLAN
- IPSec
- RFC 2401, 4301 security architecture for IP
- RFC 2403, 2404 HMAC
- RFC 2405, 2406, 2451, 4303 IP ESP
- RFC 2407, 2408 ISAKMP
- RFC 2412 OAKLEY Key Determination Protocol
- RFC 3566, 3602, 3686 AES
- Internet Key Exchange (IKE)
- RFC 2409 IKEv1
- RFC 4306 IKEv2

Features and functions

- Fabric services
  - Name server
  - Internet Storage Name Server (iSNS)
  - Registered State Change Notification (RSCN)
  - Login services
  - Fabric Configuration Server (FCS)
  - Public loop
  - Broadcast
  - In-order delivery
- Advanced Functionality
  - VSANs
  - Inter-VSAN Routing
  - PortChannel with Multipath 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
- 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
  - 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
  - Nondisruptive software upgrades for Fibre Channel interfaces
  - Call Home
  - Power-management LEDs
  - Port beaconing
  - System LED
  - SNMP traps for alerts
- Network boot

Performance

- Port speed: 4/2/1-Gbps auto-sensing, optionally configurable
- Buffer credits:

- 16 per port (shared-mode ports)
- Up to 250 per port (dedicated-mode ports)
- Up to 4095 on an individual port (dedicated-mode ports with optional MDS 9000 Family Enterprise Package license activated)

- Ports per chassis:
  - 18 to 66 4/ 2/1-Gbps Fibre Channel ports, up to Twelve 1-Gbps Ethernet ports
- Ports per rack:
  - Up to 980
- Port Channel:
  - Up to sixteen physical links
- FCIP tunnels:
  - Up to 3 per port

Cards, ports, slots

Base: 18 fixed auto-sensing 4/2/1-Gbps Fibre Channel ports, 4 1-Gb Ethernet ports

Expansion: 1 empty expansion slot

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
- 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)

Reliability and 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 multipathing
- Per-VSAN fabric services
- Port tracking
- Passive backplane
- Virtual Router Redundancy Protocol (VRRP) for management and FCIP or iSCSI connections
- Online diagnostics

Technical Specifications

Programming Interfaces

- Scriptable CLI
- Fabric Manager GUI
- Device Manager GU

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 (FR 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
- FIPS
  - 140-2 Level 3 (for Multiservice FIPS Module - DS-X9304-18FK

Power and Cooling

- Power supply (845W AC)
  - AC input characteristics
    - 100 to 240 VAC (10% range)
    - 50-60Hz (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 separation of 6 inches (15.2 cm) between two chassis to prevent overheating.

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%
Relative humidity, ambient (non-condensing) non-operating and storage	10% to 95%
Altitude, operating	-197 to 6500 feet (-60 to 2000 meter)

Technical Specifications

Dimensions (HxWxD)	5.25 x 17.32 x 22.66 in (13.34 x 43.99 x 57.56 cm) 3 Rack Units (RU) All units rack mountable in standard 19 inch EIA rack Weight of Fully configured chassis with optional Multiprotocol Service Module: 62 lb (28.2 kg)