Cisco MDS 9216 Multilayer Fabric Switch

Cisco MDS 9216 Highlights

- Compelling economics: A modular design provides a 3U base system consisting of sixteen 1 / 2-Gbps auto-sensing Fibre Channel (FC) ports and can be expanded with a variety of optional switching modules up to 48 total Fibre Channel ports.

- TCO driven design: The Cisco MDS 9216 Multilayer Fabric Switch offers advanced management tools for overall lowest total cost of ownership (TCO). Introduces Virtual SAN (VSAN) technology for hardware-enforced isolated environments within a single physical fabric for secure sharing of physical infrastructure further decreasing TCO.

- Multiprotocol/multitransport: The multilayer architecture of the Cisco MDS 9216 Multilayer Fabric Switch enables a consistent feature set over a protocol agnostic switch fabric; seamlessly integrates Fibre Channel, iSCSI, and FCIP in one system. Flexible architecture allows integration of future storage protocols.

- Intelligent network services: The Cisco MDS 9216 introduces VSAN technology, Access Control Lists (ACLs) for hardware-based intelligent frame processing, and advanced traffic management features such as Forward Congestion Control (FCC) and fabric-wide QoS to enable migration from SAN islands to enterprise-wide storage networks.

- Open platform for intelligent storage services: The Cisco MDS 9216 provides an open platform for hosting intelligent storage services such as network-based virtualization and replication.

- Comprehensive security framework: The Cisco MDS 9216 supports RADIUS authentication, SNMPv3, role-based access control, SSH, SFTP, FC-SP, VSANs, hardware-enforced zoning, LUN zoning, and ACLs.

Figure 1

The Cisco MDS 9216 Multilayer Fabric Switch is Designed for Building Mission-Critical Enterprise Storage Networks where Scalability, Multi-Layer Capability, Resiliency, Robust Security, and Ease-of-Management are Imperative

- Sophisticated diagnostics: Provides industry-first intelligent diagnostics, protocol decoding and network analysis tools, as well as integrated Call Home capability for added reliability, faster problem resolution, and reduced service costs.
- Unified storage management: The Cisco MDS 9216 includes built-in storage network management with all features available via CLI or Cisco Fabric Manager, a centralized management tool that simplifies management of multiple switches and fabrics.
- Industry's highest performance Inter Switch Links (ISLs): The Cisco MDS 9216 supports up to sixteen 2-Gbps links in a single PortChannel—links may span any port on any module within a chassis for added scalability and resilience.
- Flexibility and investment protection: The Cisco MDS 9216 shares common switching modules across all Cisco MDS 9500 Series products.

Cisco MDS 9216—16-Port Multilayer Fabric Switch with Room to Grow

The Cisco MDS 9216 Multilayer Fabric Switch brings new functionality and investment protection to the fabric switch market. Sharing a consistent architecture with the Cisco MDS 9500 Series, the Cisco MDS 9216 combines multilayer intelligence with a modular chassis, making it the industry's most intelligent and flexible fabric switch. Starting with sixteen 1 / 2-Gbps auto-sensing Fibre Channel ports, the MDS 9216's expansion slot allows for the addition of any Cisco MDS 9000 Family module for up to 48 total ports. As the storage network expands further, Cisco MDS 9000 Family modules can be removed from Cisco MDS 9216 Fabric Switches and migrated into Cisco MDS 9500 Series Multilayer Directors, providing smooth migration, common sparing, and outstanding investment protection.

Versatile Expansion

The modular design of the Cisco MDS 9216 gives it the ability to support any Cisco MDS 9000 Family switching module. Available modules include 16-port and 32-port 1 / 2-Gbps auto-sensing Fibre Channel switching modules and the IP Services Module supporting iSCSI and FCIP over eight ports of 1-Gbps Ethernet. Optionally configurable, these modules give the Cisco MDS 9216 Multilayer Fabric Switch unparalleled functionality and versatility.

Cisco MDS 9216 Advanced Features

Introducing the VSAN

Industry first for the Cisco MDS 9216 Multilayer Fabric Switch, VSANs allow more efficient SAN utilization by creating hardware-based isolated environments within a single SAN fabric. Each VSAN can be zoned as a typical SAN and maintains its own fabric services for added scalability and resilience. VSANs allow the cost of SAN infrastructure to be shared among more users, while assuring absolute segregation and security of traffic and retaining independent control of configuration on a VSAN-by-VSAN basis.

Multiprotocol Intelligence for Investment Protection

The Cisco MDS 9216 Multilayer Fabric Switch's unique architecture allows seamless integration of new transport protocols for maximum flexibility. Beginning with Fibre Channel, iSCSI, and FCIP the Cisco MDS 9216 is a robust multi-protocol platform designed for deployment of cost-optimized storage networks. Today, users can implement 2 Gbps Fibre Channel for high performance applications, iSCSI over Ethernet for cost-effective connectivity to

shared storage pools, and FCIP for connectivity between data centers. The Cisco MDS 9216 is designed to support future storage protocols so that users can seamlessly migrate to new technologies while retaining a consistent set of features, services, and management tools.

Comprehensive Security

Recognizing the need for airtight security in storage networks, the Cisco MDS 9216 Multilayer Fabric Switch applies extensive security measures at all possible points of attack. SSH, RADIUS, SNMPv3, and Role Based Access Control are employed against unauthorized management access. To guard against compromising control traffic, Fibre Channel Security Protocol (FC-SP) is employed. FC-SP provides confidentiality, data origin authentication, and connectionless integrity across the fabric. Data plane traffic is secured with VSANs, guaranteeing segregation of traffic across shared fabrics and with hard and soft zoning to satisfy traffic segregation requirements within a VSAN. Hardware-based ACLs can provide further granularity for advanced security options. The Cisco MDS 9216 leverages Cisco's experience securing the world's most sensitive data networks to deliver the industry's most secure storage networking platform.

Advanced Diagnostics and Trouble-shooting Tools

Multilayer intelligence within the Cisco MDS 9216 Multilayer Fabric Switch includes advanced network analysis and debug tools. For fault management in large-scale storage networks, the Cisco MDS 9216 delivers commands such as FC Traceroute for detailing the exact path and timing of flows and uses Switched Port Analyzer (SPAN) to efficiently capture network traffic. Once traffic has been captured, it can then be analyzed with Cisco Fabric Analyzer, an embedded Fibre Channel analyzer. In addition, integrated Call Home capability is provided for added reliability, faster problem resolution, and reduced service costs. With the Cisco MDS 9216 Multilayer Fabric Switch, Cisco delivers the most comprehensive toolset for troubleshooting and analysis of an organization's storage network.

Ease-of-Management

Delivering on the promise of SANs means delivering on management capabilities. To meet the needs of all users, the Cisco MDS 9216 Multilayer Fabric Switch provides three principal modes of management: Cisco MDS 9000 Family Command Line Interface (CLI), Cisco FabricManager, and integration with third-party storage management tools.

The Cisco MDS 9216 presents the user with a consistent, logical CLI. Adhering to the syntax of widely known Cisco IOS® CLI, the MDS 9000 Family CLI is easy to learn and delivers broad management functionality. The Cisco MDS 9000 Family CLI is an extremely efficient and direct interface designed to provide optimal functionality to administrators in enterprise environments.

Cisco Fabric Manager is a responsive, easy-to-use Java application that simplifies management across multiple switches and fabrics. Cisco Fabric Manager enables administrators to perform vital tasks such as topology discovery, fabric configuration and verification, provisioning, monitoring, and fault resolution. All functions are available through a secure interface, 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.
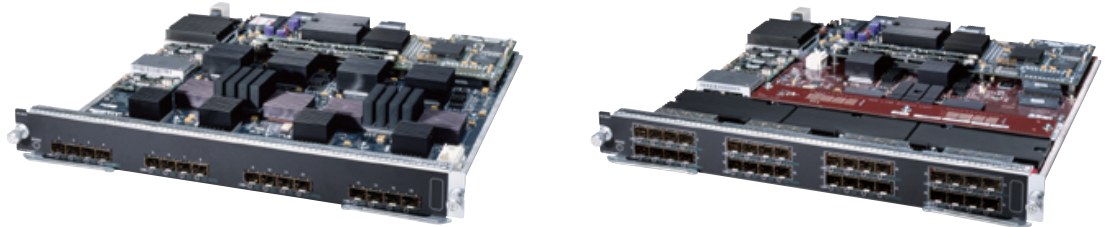
Optional Cisco MDS 9000 Family Modules

Fibre Channel Switching Modules

Figure 2

Cisco MDS 9000 Family 16-Port and 32-Port Fibre Channel Switching Modules for Flexible Storage Network Configuration

The Cisco MDS 9216 Multilayer Fabric Switch supports 16-port and 32-port Fibre Channel Switching Modules, 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 500m and 10km, respectively. All interfaces are auto-sensing 1 / 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, TL_Port.

IP Services Module

Figure 3:

Cisco MDS 9000 Family 8-Port IP Services Module Combines iSCSI and FCIP for Cost-effective Storage Connectivity in the Data Center and Across the WAN.

Support of the IP Services Module allows the Cisco MDS 9216 Multilayer Fabric Switch to seamlessly integrate Fibre Channel and IP storage environments. Multiprotocol storage networks allow for cost optimization, with iSCSI connectivity for mid-range applications and Fibre Channel connectivity for high-end applications. The Cisco MDS 9000 Family IP Services Module provides eight ports of iSCSI and/or FCIP routing. Each port connection is via a 1-Gbps Ethernet SFP interface. Individual ports are user-configurable for iSCSI or FCIP for cost-effective datacenter and wide area connectivity.

Specifications

Availability

- Hot-swappable power supply—upgradable to 1+1 redundant power
- 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
- Passive backplane
- Online diagnostics

Performance/Scalability

- Port speed: 1 / 2-Gbps auto-sensing, optionally configurable
- Buffer credits: Up to 255 per port
- Ports per chassis: 16 to 48 1 / 2 Gbps Fibre Channel ports, up to eight 1-Gbps Ethernet ports
- Ports per rack: Up to 672
- PortChannel: Up to sixteen 2-Gbps ports
- Supported optics, media, and transmission distances:

Optics	Media	Distance
1-Gbps—SW, LC SFP	50/125 micron multimode	500 m
1-Gbps—SW, LC SFP	62.5/125 micron multimode	300 m
1-Gbps—LW, LC SFP	9/125 micron single-mode	10 km
2-Gbps—SW, LC SFP	50/125 micron multimode	300 m
2-Gbps—SW, LC SFP	62.5/125 micron multimode	150 m
2-Gbps—LW, LC SFP	9/125 micron single-mode	10 km

Security

- VSANs
- Zoning
  - N_Port WWN
  - N_Port FC-ID
  - F_Port
  - SCSI LUN(s)

- FC-ESP for securing interswitch fabric control traffic
- Management access
  - SSHv2
  - SNMPv3

Compatibility and Standards Compliance

- Fibre Channel Protocols
  - FC-PH, Revision 4.3
  - FC-PH-2, Revision 7.4
  - FC-PH-3, Revision 9.4
  - FC-GS-2, Revision 5.3
  - FC-GS-3, Revision 7.01
  - FC-FLA, Revision 2.7
  - FC-FG, Revision 3.5
  - FC-SW-2, Revision 5.3
  - FC-AL, Revision 4.5
  - FC-AL-2, Revision 7.0
  - FC-PLDA, Revision 2.1
  - FC-VI, Revision 1.61
  - FCP, Revision 12
  - FCP-2, Revision 7a
  - FC-SB-2, Revision 2.1
  - FC-BB, Revision 4.7
  - FC-FS, Revision 1.7
  - FC-PI, Revision 13
  - FC-MI, Revision 1.99
  - FC-Tape, Revision 1.17
- IP over Fibre Channel (RFC 2625)
- Extensive IETF-standards based TCP/IP, SNMPv3, and RMON MIBs
- Class of Service: Class 2, Class 3, Class F
- Fibre Channel standard port types: E, F, FL
- Fibre Channel enhanced port types: SD, TE, TL

Fabric Services

- Name server
- Registered State Change Notification (RSCN)
- Login services
- Private loop
- Public loop

- Translative loop
- Broadcast
- In-order delivery
- Name server zoning

Diagnostics and Troubleshooting Tools
- Power-on-self-test (POST) diagnostics
- Online diagnostics
- Internal loopbacks
- SPAN
- FC Traceroute
- FC Ping
- FC Debug
- Cisco Fabric Analyzer
- Syslog
- Online system health
- Port-level statistics

Storage 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
- Security
  – Role-based access control using RADIUS based AAA functions
  – SSHv2
  – SNMPv3
- Management Applications
  – Cisco MDS 9000 Family CLI
  – Cisco Fabric Manager
  – CiscoWorks 2000 Resource Manager Essentials

Serviceability

- Configuration file management
- Non-disruptive software upgrades for switching module
- Call home
- Power management LEDs
- Port beaconing
- System LED
- SNMP traps for alerts
- Network boot

Environment

- Temperature, ambient operating
  - 32 F (0 C) to 104 F (40 C)
- Temperature, ambient non-operating and storage
  - –40 F (-40 C) to 158 F (70 C)
- Humidity (RH), ambient (non-condensing) operating
  - 10% to 90%
- Humidity (RH), ambient (non-condensing) non-operating and storage
  - 5% to 95%
- Altitude, operating
  - Sea level to 6500 feet (2000 m)

Physical Characteristics

- Dimensions in inches (H x W x D)
  - 5.25 x 17.32 x 22.655 in—3RU
  - All units rack mountable in standard 19 inch EIA rack.
- Weight
  - Fully configured chassis with optional Switching Module and power supply: 70 lbs (32 kg)

Power and Cooling

- Power Supply (950 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 6 inches (16 cm) between walls and the chassis air vents and a minimum separation of 12 inches (30.5 cm) between two chassis to prevent overheating.

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

Industry EMC, safety, and environmental standards

- GR-63-Core NEBS Level 3
- GR-1089-Core NEBS Level 3
- ETS 300 019 Storage Class 1.1
- ETS 300 019 Transportation Class 2.3
- ETS 300 019 Stationary Use Class 3.1
- ETS 300 386

Ordering Information

Part Number	Description
332315-B21	Cisco MDS 9216 chassis with one modular expansion slot; includes 16 Fibre Channel ports, RJ-45 10/100 Ethernet management port, RJ-45 console port, and DB-9 COM port; also includes software image, dual power supplies, fan module, and 19-inch mounting rack kit.
Optional Switching Modules, Required SFPs	
332307-B21	Cisco MDS 9000 Family 16-port 1/2-Gbps FC Module, SFP/LC
332308-B21	Cisco MDS 9000 Family 32-port 1/2-Gbps FC Module, SFP/LC
332312-B21	1/2-Gbps Fibre Channel-SW, Small Form Factor Pluggable, LC
332313-B21	1/2-Gbps Fibre Channel-LW, Small Form Factor Pluggable, LC
Installation Services	
HA113A1#5D2	Cisco MDS 9216 Installation Service

For more information on the HP offering of Cisco products, please visit:
http://h18006.www1.hp.com/storage/saninfrastructure.html

Corporate Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-4000
800 553-NETS (6387)
Fax: 408 526-4100

European Headquarters
Cisco Systems Europe
11 Rue Camille Desmoulins
92782 Issy-les-Moulineaux
Cedex 9
France
www-europe.cisco.com
Tel: 33 1 58 04 60 00
Fax: 33 1 58 04 61 00

Americas Headquarters
Cisco Systems, Inc.
170 West Tasman Drive
San Jose, CA 95134-1706
USA
www.cisco.com
Tel: 408 526-7660
Fax: 408 527-0883

Asia Pacific Headquarters
Cisco Systems, Inc.
Capital Tower
168 Robinson Road
#22-01 to #29-01
Singapore 068912
www.cisco.com
Tel: +65 317 7777
Fax: +65 317 7799

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