Data Sheet

Cisco MDS 9000 Family IP Storage Services Modules

PRODUCT OVERVIEW

Extending the Benefits of Fibre Channel SANs

Companies investing in Fibre Channel SAN infrastructure have realized significant benefits in increased storage utilization and availability, simplified management, and more effective disaster recovery and business continuance strategies. Until now, however, SAN deployments have been primarily focused on mission-critical application islands within individual data centers. The difficulty and cost associated with migrating the large number of data center midrange servers to Fibre Channel have made it impractical for IT managers to extend the benefits of SAN to midrange applications. Using open-standard IP-based technology, the Cisco MDS 9000 Family IP Storage Services Modules eliminate the barriers to SAN expansion, enabling businesses to extend the reach of their Fibre Channel SANs throughout the data center and between data centers. The dual functionality of the Cisco MDS 9000 Family IP Storage Services Modules support interconnection of remote SAN islands and extends SAN connectivity to Ethernet attached servers using the FCIP and iSCSI protocols, respectively.

Integration with Cisco MDS 9000 Family Switching Services

The Cisco IP Storage Services Modules seamlessly integrate into the Cisco MDS 9500 Series of Multilayer Directors and the MDS 9200 Series of Multilayer Fabric Switches. Traffic can be switched between any IP storage port and any Fibre Channel port on a Cisco MDS 9000 Family switch. The Cisco IP Storage Services Modules support the full range of services available on other Cisco MDS 9000 Family Fibre Channel Switching Modules including VSANs, security, and traffic management.

Flexible Configuration

The Cisco 4-port IP Storage Services Module and the Cisco 8-port IP Storage Services Module support, respectively, four and eight hot-swappable, Small Form-Factor Pluggable (SFP), LC Gigabit Ethernet interfaces. Modules can be configured with short-wave, long-wave, or extended-reach SFPs for connectivity up to 100 kilometers. Additionally, all ports are configurable for both FCIP and iSCSI. Ports configured for FCIP operation can be further configured to support up to three virtual ISL connections.

Figure 1. Cisco MDS 9000 Family IP Storage Services Modules Deliver Four or Eight Ports of Wire-Rate iSCSI or FCIP over Gigabit Ethernet

KEY FEATURES AND BENEFITS

Cisco® MDS 9000 Family IP Storage Services Modules offer the following features:

- **Flexible IP Storage Services**—4-port and 8-port configurations deliver both Fibre Channel over IP (FCIP) and Small Computer System Interface over IP (iSCSI) storage services.
- **Simplified business continuance and storage consolidation**—Use widely known IP to cost-effectively connect to more servers and more locations over greater distances than previously possible.
- **Simplified management**—Provide unified management environment independent of whether servers use Fibre Channel or IP to connect to the storage network.
- **Comprehensive security**—Combine ubiquitous IP security infrastructure with Cisco Virtual SANs (VSANs), hardware-based zoning, and hardware-based access control lists (ACLs) to provide robust security.
- **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 Inter Switch Links (ISLs) on a single Gigabit Ethernet port, and enabling compression, FCIP Write Acceleration and FCIP Tape Acceleration.
  - Reduces SAN complexity by eliminating the need to deploy and manage a separate remote connectivity platform.
  - Preserves Cisco MDS 9000 Family enhanced capabilities including VSANs, advanced traffic management, and security across remote connections.
- **iSCSI for extension of SAN to Ethernet attached servers**:
  - Extends the benefits of Fibre Channel SAN-based storage to Ethernet attached servers at a lower cost than possible using Fibre Channel interconnect alone.
  - Increases storage utilization and availability through consolidation of IP and Fibre Channel block storage.
  - Transparent operation preserves the functionality of existing management storage applications.

FCIP for Remote SAN Extension

Data distribution, data protection, and business continuance services are significant components of today's information-centric businesses. The ability to efficiently replicate critical data on a global scale not only ensures a higher level of data protection for valuable corporate information, but also increases utilization of backup resources and lowers total cost of storage ownership. The Cisco MDS 9000 Family IP Storage Services Modules use 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 SAN Extension Features

The Cisco MDS 9000 Family IP Storage Services Modules support FCIP compression to maximize the effective WAN bandwidth of SAN Extension solutions. The Cisco IP Storage Services Modules achieve up to a 30:1 compression ratio, with typical ratios of 2:1 over a wide variety of data sources. The Cisco IP Storage Services Modules are able to provide optimal levels of compressed throughput for implementations across low to intermediate-bandwidth links.

The Cisco IP Storage Services Modules also support 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 IP Storage Services Modules support FCIP Tape Acceleration, which significantly improves throughput over WAN links for remote tape backup operations.

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

VSANs and IVR Enhance SAN Security and Stability

VSANs allow more efficient storage network utilization by creating hardware-based isolated environments within a single physical SAN fabric or switch. Each VSAN can be zoned as a typical SAN and maintains its own fabric services for added scalability and resilience. VSANs allow the cost of SAN infrastructure to be shared among more users, while ensuring absolute segregation of traffic and retaining independent control of configuration on a VSAN-by-VSAN basis. With their integrated FCIP capability, the Cisco MDS 9000 Family IP Storage Services Modules enable the extension of VSANs over IP infrastructure.

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 9000 Family IP Storage Services Modules address these limitations by enabling IT organizations to extend their storage networks using cost-effective Ethernet infrastructure. All the benefits of SAN, 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 servers and applications. Because the Cisco IP Storage Services Modules are an integral component of the Cisco MDS 9000 Family, Ethernet attached servers will enjoy the same SAN scalability, availability, manageability, and intelligent services as those servers connected using Fibre Channel, while maintaining the cost and ease-of-use benefits of Ethernet and IP.

Transparent and Proxy Initiator Operation

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Integrated Mainframe Support

The Cisco MDS 9000 Family IP Storage Services Modules are mainframe-ready with full support for IBM zSeries FICON and Linux environments. Qualified by IBM for attachment to all FICON-enabled devices in an IBM zSeries operating environment, the modules support transport of the FICON protocol in both cascaded and non-cascaded fabrics, as well as an intermix of FICON and open systems Fibre Channel Protocol traffic on the same switch. Virtual SANs simplify intermix of SAN resources between z/OS, mainframe Linux, and open systems environments, allowing for increased SAN utilization and simplified SAN management. VSAN-based intermix mode eliminates the uncertainty and instability often associated with zoning-based intermix techniques. VSANs also eliminate the possibility of a misconfiguration or a component failure in one VSAN affecting operation in other VSANs. VSAN-based management access control simplifies partitioning of SAN management responsibilities between mainframe and open systems environments, enhancing security. FICON VSANs can be managed using the integrated Cisco Fabric Manager, Cisco CLI, or IBM CUP-enabled management tools including SA/390 Resource Measurement Facility (RMF), or Dynamic Channel Path Management (DCM).

PRODUCT SPECIFICATIONS

Table 1 lists the product specifications for the Cisco MDS 9000 Family IP Storage Services Modules.

Table 1. Product Specifications

Feature	Description
Product Compatibility	• Cisco MDS 9000 Family
Software Compatibility	• 8-port IP Storage Services Module: Cisco MDS SAN-OS Release 1.1(1) or later • 4-port IP Storage Services Module: Cisco MDS SAN-OS Release 1.3(4) or later
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 ICMPv6 – RFC 2461, 2462 IPv6 neighbor discovery and stateless auto-configuration – RFC 2464 IPv6/Ethernet – RFC 3270 iSCSI – RFC 3643, 3821 FCIPd • Ethernet Standards – IEEE 802.3z Gigabit Ethernet – IEEE 802.1Q VLAN
Cards/Ports/Slots	• Four or eight fixed 1-Gbps Ethernet ports
Features and Functions	
IP Storage Services	• FCIP • iSCSI • Internet Storage Name Server (iSNS) • iSCSI Network Boot Protocol (iNBP)
Advanced Functionality	• VSAN • Inter-VSAN Routing • EtherChannel® with Multipath Load Balancing • FCIP compression • FCIP Write Acceleration • FCIP Tape Acceleration

Feature	Description
Diagnostics and Troubleshooting Tools	• Power-on-self-test (POST) diagnostics • Online diagnostics • Internal port loopbacks • SPAN and Remote SPAN • Cisco Fabric Analyzer • Syslog • Online system health • Port-level statistics • Real Time Protocol Debug
Network Security	• VSANs • Access Control Lists • Per-VSAN role-based access control • iSCSI zoning – iSCSI name – IP address • Management access – SSH v2 implementing AES – SNMPv3 implementing AES – SFTP
FICON	• FC-SB-3 Compliant • Cascaded FICON fabrics • Intermix of FICON and Fibre Channel FCP traffic • CUP management interface
Serviceability	• Configuration file management • Call Home • Power-management LEDs • Port beaconing • System LED • SNMP traps for alerts • Network boot

<table>
<tr><th>Feature</th><th>Description</th></tr>
<tr><td>Performance</td><td>

Port speed: 1-Gbps Ethernet
IP storage services ports per chassis: 4 to 48 ports per chassis
IP storage services ports per rack: Up to 144 ports per 42U rack
FCIP tunnels: up to 3 per ports
EtherChannel: Up to 2 1-Gbps ports
Supported Optics, Media, and Transmission Distances

<table>
<tr><th>Optics</th><th>Media</th><th>Distance</th></tr>
<tr><td>1-Gbps-SX, LC SFP</td><td>50/125 micron multimode</td><td>550 m</td></tr>
<tr><td>1-Gbps-SX, LC SFP</td><td>62.5/125 micron multimode</td><td>275 m</td></tr>
<tr><td>1-Gbps-LX/LH, LC SFP</td><td>9/125 or 10/125 micron single-mode</td><td>10 km</td></tr>
<tr><td>1-Gbps-CWDM, LC SFP</td><td>9/125 micron single-mode</td><td>Up to 100 km</td></tr>
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<tr><td>Reliability and Availability</td><td>

Hot-swappable module
Hot-swappable SFP optics
Online diagnostics
Stateful Process Restart
Non-disruptive Supervisor Failover
Fabric-based multipathing
Per-VSAN fabric services
Virtual Routing Redundancy Protocol (VRRP) for management and FCIP or iSCSI connections

</td></tr>
<tr><td>Network Management</td><td>

Access methods through Cisco MDS 9500 Series Supervisor module

Out-of-band 10/100 Ethernet port
RS-232 serial console port
In-band IP-over-Fibre Channel
DB-9 COM port

Access protocols

CLI-via console and Ethernet ports
SNMPv3-via Ethernet port and in-band IP-over-Fibre Channel access
Storage Networking Industry Association (SNIA) Storage Management Initiative Specification (SMI-S)

Distributed Device Alias service
Network Security

Per-VSAN role-based access control using RADIUS and TACACS+ based authentication, authorization, and accounting (AAA) functions
SFTP
SSH v2 implementing AES
SNMPv3 implementing AES

Management applications

Cisco MDS 9000 Family CLI
Cisco Fabric Manager

</td></tr>
</table>

Feature	Description
	– Cisco Device Manager – CiscoWorks 2000 Resource Manager Essentials
Programming Interfaces	• Scriptable CLI • Fabric Manager GUI • Device Manager GUI
Environmental	• Temperature, ambient operating: –32° to 104°F (0° t o 40°C) • Temperature, ambient non-operating and storage: –40°F to 167°F (–40°C to 75°C) • Relative humidity, ambient (non-condensing) operating: 10 to 90 percent • Relative humidity, ambient (non-condensing) non-operating and storage: 10 to 95 percent • Altitude, operating: –197 to 6500 feet (–60 to 2000 meter)
Physical Dimensions	• Dimensions (H x W x D): 1.75 x 14.4 x 16 inches (3.0 x 35.6 x 40.6 centimeter) – Occupies one slot in a Cisco MDS 9200 Series or MDS 9500 Series chassis • Weight – IP Storage Services Module only: 10 pound (4.5 kilogram)
Approvals and Compliance	• Safety Compliance – CE Marking – CAN/CSA-C22.2 No. 60950 – IEC 60950 – AS/NZS 3260 – EN60825 – UL 60950 – EN 60950 – TS 001 – IEC60825 – 21 CFR 1040 • EMC Compliance – FCC Part 15 (CFR 47) Class A – EN 55022 Class A – AS/NZS 3548 Class A – EN 55024 – EN 61000-6-1 – EN 61000-3-3 – ICES-003 Class A – CISPR 22 Class A – VCCI Class A – EN 50082-1

ORDERING INFORMATION

Table 2 provides ordering information for the Cisco MDS 9000 Family IP Storage Services Modules.

Table 2. Ordering Information

Part Number	Product Description
DS-X9304-SMIP	Cisco MDS 9000 Family 4-port IP Storage Services Module
DS-X9308-SMIP	Cisco MDS 9000 Family 8-port IP Storage Services Module
DS-SFP-FCGE-SW	Cisco MDS 9000 Family 1-Gbps Ethernet, 1/2-Gbps Fibre Channel-SW, SFP, LC
DS-SFP-FCGE-LW	Cisco MDS 9000 Family 1-Gbps Ethernet, 1/2-Gbps Fibre Channel-LW, SFP, LC
Advanced Software Packages	
M9200EXT14K9	Cisco MDS 9200 SAN Extension over IP Package for the Cisco MDS 9000 Family 4-port IP Storage Services Module
M9200EXT1K9	Cisco MDS 9200 SAN Extension over IP Package for the Cisco MDS 9000 Family 8-port IP Storage Services Module
M9200ENT1K9	Cisco MDS 9200 Enterprise Package
M9200FMS1K9	Cisco MDS 9200 Fabric Manager Server Package
M9200FIC1K9	Cisco MDS 9200 Mainframe Package
M9500EXT14K9	Cisco MDS 9500 SAN Extension over IP Package for the Cisco MDS 9000 Family 4-port IP Storage Services Module
M9500EXT1K9	Cisco MDS 9500 SAN Extension over IP Package for the Cisco MDS 9000 Family 8-port IP Storage Services Module
M9500ENT1K9	Cisco MDS 9500 Enterprise Package
M9500FMS1K9	Cisco MDS 9500 Fabric Manager Server Package
M9500FIC1K9	Cisco MDS 9500 Mainframe Package
Spare Components	
DS-X9304-SMIP=	Cisco MDS 9000 Family 4-port IP Storage Services Module, Spare
DS-X9308-SMIP=	Cisco MDS 9000 Family 8-port IP Storage Services Module, Spare
DS-SFP-FCGE-SW=	Cisco MDS 9000 Family 1-Gbps Ethernet, 1/2-Gbps Fibre Channel—Shortwave, SFP, LC, Spare
DS-SFP-FCGE-LW=	Cisco MDS 9000 Family 1-Gbps Ethernet, 1/2-Gbps Fibre Channel—Longwave, SFP, LC, Spare
CWDM-SFP-1470=	Cisco 1470 NM CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
CWDM-SFP-1490=	Cisco 1490 NM CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
CWDM-SFP-1510=	Cisco 1510 NM CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
CWDM-SFP-1530=	Cisco 1530 NM CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
CWDM-SFP-1550=	Cisco 1550 NM CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
CWDM-SFP-1570=	Cisco 1570 NM CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
CWDM-SFP-1590=	Cisco 1590 NM CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
CWDM-SFP-1610=	Cisco 1610 NM CWDM Gigabit Ethernet and 1/2-Gbps Fibre Channel SFP, Spare
M9200EXT14K9=	Cisco MDS 9200 SAN Extension over IP Package for MDS 9000 Family 4-port IP Storage Services Module, Spare
M9200EXT1K9=	Cisco MDS 9200 SAN Extension over IP Package for MDS 9000 Family 8-port IP Storage Services Module, Spare
M9200ENT1K9=	Cisco MDS 9200 Enterprise Package, Spare
M9200FMS1K9=	Cisco MDS 9200 Fabric Manager Server Package, Spare
M9200FIC1K9=	Cisco MDS 9200 Mainframe Package, Spare

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