

# Cisco MDS 9500 Series Multilayer Directors for IBM System Storage

*Intelligent storage networking for IBM System Storage  
IT simplification and business continuity solutions*



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## Highlights

- Offers scalability to 192, 336 and 528 maximum Fibre Channel port count at 1, 2, 4, 8 and 10 Gbps Fibre Channel speed
  - Multilayer architecture transparently integrates Fibre Channel, Fibre Channel over Ethernet (FCoE), IBM FICON, Internet Small Computer System Interface (iSCSI), and Fibre Channel over IP (FCIP) in one system
  - 32- and 48-port 8 Gbps Advanced Fibre Channel switching modules designed to allow a port to be configured as either 1, 2, 4, 8 or 10 Gbps, consolidating all ports into the same Fibre Channel switching module
  - High-performance Inter-Switch Links (ISLs) that provide additional availability at the fabric level; PortChannel capability allows users to aggregate up to 16 physical links into one logical bundle
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The Cisco MDS 9500 Series Multilayer Directors for IBM® System Storage® are director-class storage area networking (SAN) switches designed for deployment in scalable enterprise and service provider clouds to enable flexibility, resiliency and reliability. Layering a comprehensive set of intelligent features onto a high-performance, protocol-independent switch fabric, the MDS 9500 Series Multilayer Directors address the critical requirements of large virtualized data center storage environments such as high availability, security, scalability, ease-of-management and simple integration of new technologies for extremely flexible data center SAN solutions.

Sharing the same operating system and management interface with other Cisco data center switches, the MDS 9500 Directors can help enable smooth deployment of unified fabrics with high-performance Fibre Channel and FCoE connectivity for low total cost of ownership (TCO). Compatible with all generations of Cisco MDS 9000 Family Fibre Channel Switching Modules, the MDS 9500 Series Multilayer Directors can help provide outstanding investment protection.



## Business transformation with enterprise cloud deployment

Enterprise clouds can help provide organizations with elastic compute and network capabilities, enabling IT to scale up or scale down resources on a real-time basis in a quick and cost efficient manner. MDS 9500 Series Multilayer Directors can provide pay-as-you-grow flexibility to meet the scalability needs of enterprise clouds; multihop FCoE required to provision storage in a multiprotocol unified fabric; robust security required for multitenancy cloud applications; predictable high performance required to meet strict service level agreements (SLAs); resilient connectivity required for always-on cloud infrastructure; and advanced traffic management capabilities such as quality of service (QoS) and port bandwidth reservation. This can help organizations to quickly and cost efficiently allocate elastic network capabilities to cloud applications. Furthermore, Cisco Data Center Network Manager for SAN (DCNM) can help provide resource monitoring and capacity planning on a per-virtual machine basis for efficient consolidated enterprise cloud deployments through the concept of federation. With federation, multiple servers can be deployed while still maintaining a consolidated view across distributed data centers.

## Convergence with multihop FCoE

Cisco Unified Fabric is a crucial building block for both traditional and virtualized data centers. It unifies storage and data networking with the data center operating system to help deliver transparent convergence, scalability, and network intelligence. The MDS 9000 10 Gbps 8-port FCoE module, a new multihop-capable FCoE module for the core data center SAN, provides simple coexistence in a unified fabric with any-to-any connectivity for Fibre Channel, FCoE, iSCSI and



The Cisco MDS 9513 for IBM System Storage offers 1, 2, 4, 8 and 10 Gbps link speeds with up to 528 Fibre Channel ports in a 14U enclosure

network-attached (NAS) storage. Now it is possible to extend the benefits of FCoE beyond the access layer into the core of the data center with a full line-rate FCoE module for the MDS 9500 Series Multilayer Directors.

## Scalable expansion with outstanding investment protection

Using MDS 9000 Family Switching Modules, the MDS 9500 Directors combine nondisruptive software upgrades, stateful process restart and failover, and full redundancy of all major components for enhanced availability.

The Cisco MDS 9513 offers up to 528 1, 2, 4 and 8 Gbps autosensing Fibre Channel ports and up to 264 10 Gbps Fibre Channel ports in an 11-slot modular chassis. The MDS 9513 provides up to 1056 Fibre Channel ports in a single rack. The Cisco MDS 9509 offers up to 432 1, 2, 4 and 8 Gbps autosensing Fibre Channel ports and up to 216 10 Gbps Fibre Channel ports in a nine-slot modular chassis. The MDS 9509 provides up to 864 Fibre Channel ports in a single rack. The Cisco MDS 9506 provides up to 288 1, 2, 4 and 8 Gbps autosensing Fibre Channel ports and up to 144 10 Gbps Fibre Channel ports in a six-slot modular chassis.

MDS 9000 Family Fibre Channel Switching Modules are compatible with all MDS 9500 Series Multilayer Directors. Designed to grow with your storage environment, the MDS 9500 Series Multilayer Directors can help provide smooth migration, common sparing and outstanding investment protection.

### Expanded capabilities

The MDS 9513, 9509 and 9506 for System Storage can help provide 1, 2, 4, 8 and 10 Gbps ports on the new 8 Gbps Advanced Fibre Channel switching modules as well as existing 8 Gbps MDS 9000 Family Fibre Channel switch connectivity and intelligent network services to help improve the security, performance and manageability required to consolidate geographically dispersed SAN islands into a large enterprise SAN.

MDS 9000 Family 8 Gbps Advanced Fibre Channel switching modules are available in two configurations:

For the most demanding storage networking environments, the MDS 9000 Family 32-Port 8 Gbps Advanced Fibre Channel switching module is designed to deliver line-rate performance



The Cisco MDS 9509 for IBM System Storage offers 1, 2, 4, 8 and 10 Gbps link speeds with up to 336 Fibre Channel ports in a 14U enclosure

across all ports. The 32-port advanced switching module can deliver full-duplex aggregate performance of 256 Gbps and is ideal for high-end storage subsystems and for ISL connectivity.

For large-scale storage networking environments, the MDS 9000 Family 48-Port 8 Gbps Advanced Fibre Channel switching module can help deliver full-duplex aggregate backplane switching performance of 256 Gbps (and 384 Gbps across locally switched ports on the module with Arbitrated Local Switching) making this module ideal for connection of high-performance virtualized servers.

Both 32-port and 48-port modules support up to twenty-four 10 Gbps Fibre Channel interfaces which can help consolidate 1, 2, 4, 8 and 10 Gbps ports into the same Fibre Channel switching module, thereby conserving space on the MDS 9000 Family chassis. With the introduction of the Fabric3 Switching module for MDS 9513, the active backplane bandwidth is increased to 256 Gbps per slot. Thus, the 32- and 48-port Advanced Fibre Channel switching modules are capable of providing 256 Gbps when used in an MDS 9513 for System Storage containing the Fabric3 switching modules.

The MDS 9000 Family 8 Gbps Advanced Fibre Channel switching modules continue to provide predictable performance and high availability, advanced traffic management capabilities, integrated virtual storage area network (VSANs) and Inter-VSAN Routing (IVR), resilient high-performance Inter-Switch Links, intelligent fabric services, comprehensive security frameworks, fault detection and isolation of errored packets, and sophisticated diagnostics.

### Advanced switching technology

The MDS 9500 Series Supervisor-2A Module is designed to deliver advanced switching technology with proven Cisco NX-OS software, powering a new generation of scalable and intelligent multilayer switching solutions for SANs. Designed to integrate multiprotocol switching and routing, intelligent SAN services, and storage applications onto highly scalable SAN switching platforms, the MDS 9500 Series Supervisor-2A Module can help provide intelligent, resilient, scalable and security-rich high-performance multilayer SAN switching solutions. In addition to providing the same capabilities as the MDS 9500 Series Supervisor-2 Module, the MDS 9500 Series Supervisor-2A Module is designed to support deployment of FCoE in the MDS 9500 Multilayer Director chassis.



The Cisco MDS 9506 for IBM System Storage offers 1, 2, 4, 8 and 10 Gbps link speeds with up to 192 Fibre Channel ports in a 7U enclosure

The Fabric3 Switching module for MDS 9513 is another important product enhancement designed to increase active backplane bandwidth to 256 Gbps per slot.

The MDS 9000 Family can help lower total cost of ownership (TCO) for storage networking by combining a robust and flexible hardware architecture, multiple layers of network and storage intelligence, and compatibility with all MDS 9000 Family Switching Modules. This powerful combination helps organizations build highly available, scalable storage networks with comprehensive security features and unified management.

### Enterprise-class availability

The MDS 9500 Series Multilayer Directors were designed for high availability. Beyond meeting the basic requirements of nondisruptive software upgrades and redundancy of all critical hardware components, the MDS 9500 Series Multilayer

Directors' software architectures offer an enterprise level of availability. The MDS 9500 Series Supervisor Modules automatically restart failed processes, making the MDS 9500 Series Multilayer Directors even more robust. In the rare event that a supervisor module is reset, complete synchronization between the active and standby supervisor modules helps ensure stateful failover with no disruption to traffic.

High availability is implemented at the fabric level using robust and high-performance ISL. PortChannel capability allows users to aggregate up to 16 physical links into one logical bundle. The bundle can consist of any speed-matched ports in the chassis, helping ensure that the bundle can remain active in the event of a port, application-specific integrated circuit (ASIC), or module failure. The MDS 9500 Series Multilayer Directors take high availability to a new level, helping ensure that solutions exceed the 99.999 percent uptime requirements of today's most demanding environments.

### **Ease of management**

Modern data centers are becoming increasingly complex. Proliferation of new technologies such as virtualization is adding yet another level of complexity while enabling higher workloads to be placed on the network. IT departments today are challenged to look beyond traditional silos of networking and storage to manage this converged, virtualized data center. Meeting this challenge requires unifying the management plane to help enable holistic management of the data center infrastructure.

Recognizing the need to support this convergence in management, Cisco is merging two management solutions—Cisco Fabric Manager and Cisco Data Center Network Manager. This unified product, Cisco Data Center Network Manager (DCNM), is an easy-to-use application that simplifies management across multiple switches and converged fabrics.

Focused on supporting efficient operations and management of virtual machine-aware fabrics, DCNM is designed to provide a robust framework and comprehensive feature set that meets the routing, switching and storage administration needs of present and future virtualized data centers. It also delivers timely management support for data center hardware platforms and Cisco NX-OS innovations (requires Cisco MDS NX-OS 5.2, or later).

### **Cisco Storage Media Encryption**

Cisco Storage Media Encryption (SME) is a fabric-based service developed to protect data at rest on heterogeneous environments. SME enables data on disk arrays, on tapes and in virtual tape libraries (VTLs) in a SAN environment to be compressed, encrypted and authenticated for centralized security management, and data management and recovery, using highly secure IEEE Advanced Encryption Standard (AES) algorithms. This can help companies to address Payment Card Industry (PCI) Data Security Standards (DSS) 2.0 compliance

or other legislative regulations such as the Health Insurance Portability and Accountability Act (HIPAA), which require companies to store and protect data at rest for a specified number of years while publicly disclosing security breaches.

SME hardware and software are fully integrated with the MDS 9000 Family. Encryption is performed as a transparent Fibre Channel fabric service, which greatly simplifies the deployment and management of sensitive data on SAN-attached storage devices. SME employs clustering technology to enhance reliability and availability, enable automated load balancing and failover capabilities, and simplify provisioning as a single, logical SAN fabric feature rather than as individual switches or modules. Secure lifecycle key management is included, with essential features such as key archival, shredding, automatic key replication across data centers, high-availability deployments, and export and import for single- and multiple-site environments. Provisioning and key management for SME are both integrated into DCNM; no additional software is required for management.

### **Lower TCO with SAN consolidation**

With the exponential growth of data in today's business environment, organizations need to deploy large-scale SANs in the most efficient and cost-effective ways. To meet scalability requirements while managing TCO, MDS 9513 offers

improved port densities of up to 528 8 Gbps or 264 10 Gbps Fibre Channel ports per chassis, multihop FCoE, high per-slot performance, unparalleled functionality with intelligent fabric services, VSANs for consolidating individual physical SAN islands while maintaining logical delineations, and IVR for sharing resources across VSANs. These capabilities can help consolidate an organization's data assets into fewer, larger and more manageable SANs, thus reducing the hardware footprint and associated capital and operational expenses. For unified fabric deployments that have converged LAN and SAN using Lossless Ethernet, Cisco MDS 9513 provides multihop FCoE capability to protect your investment in existing storage infrastructure with any-to-any connectivity across multiple protocols.

### **Why IBM?**

IBM is committed to helping you achieve measurable business value with the right combination of storage products to meet your needs. A market leader in the storage industry, IBM offers innovative technology, open standards, excellent performance and a broad portfolio of storage proven software, hardware and solutions offerings. Technology and services from IBM help provide an infrastructure for securely managing information, and open the door to new insights and innovation for your business.

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**Cisco MDS 9500 Series Multilayer Directors for IBM System Storage at a glance<sup>1</sup>**

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**Product characteristics**

Product numbers	<ul style="list-style-type: none"> <li>• MDS 9513 for System Storage (2054-E11)</li> <li>• MDS 9509 for System Storage (2054-E07)</li> <li>• MDS 9506 for System Storage (2054-E04)</li> </ul>
Base machine	<p><i>Base chassis includes the following components:</i>            One Director chassis, fans, shelf bracket kit, cable management kit, manuals and accessory kit from Cisco  <b>2054-E11</b>—MDS 9513 for System Storage includes two Supervisor-2A cards, two Fabric3 cards, and two AC power supplies  <b>2054-E07</b>—MDS 9509 for System Storage includes two Supervisor-2A cards and two AC power supplies  <b>2054-E04</b>—MDS 9506 for System Storage includes two Supervisor-2A cards and two AC power supplies  <i>Base Functionality:</i>            DCNM, VSAN, ACLs, fabric zoning and trunking. All models include NX-OS Software Release 5.2 or later firmware with DCNM, VSAN and Port Channel capabilities and one-year IBM warranty</p>
Transceivers	<ul style="list-style-type: none"> <li>• 4 Gbps Fibre Channel-Shortwave (SW) and Longwave (LW) 10 km, SFP transceivers</li> <li>• 8 Gbps Fibre Channel-SW and LW, SFP+ transceivers</li> <li>• 10 Gbps Fibre Channel SW and LW, SFP+ transceivers</li> <li>• Tri-rate Fibre Channel-SW and LW, SFP transceivers</li> <li>• Copper GbE SFP transceivers</li> <li>• 10 Gbps Fibre Channel Shortreach (SR), LW and ER X2 transceivers</li> <li>• 10 Gbps Ethernet-SR X2 transceivers</li> <li>• 10GBASE-SR and LR SFP+</li> </ul> <p><i>Note: Some SFPs are available in 4-pack</i></p>
Hot-swap components	Supervisor modules, crossbar modules, power supplies, fan modules, SFPs, SFP X2, switching modules
Rack support	Directors are rack-mountable in a standard 19-inch EIA rack, meeting Cisco requirements defined in the recommended installation procedures. IBM TotalStorage SAN Cabinet Model C36 (2109-C36) meets these requirements.

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Management software	MDS 9000 Family Command Line Interface Cisco Data Center Network Manager Cisco Device Manager
Servers supported ***	<ul style="list-style-type: none"> <li>• IBM Power Systems™ servers, IBM System p® and selected IBM RS/6000® servers</li> <li>• IBM System z®</li> <li>• IBM System i®</li> <li>• IBM System x® and selected IBM Netfinity® servers</li> <li>• Other Intel processor-based servers running the Linux, Microsoft Windows NT or Microsoft Windows 2000 operating systems</li> <li>• Selected Sun and HP servers</li> </ul>
Operating systems supported	Microsoft Windows, UNIX, Linux, NetWare, IBM OS/400®, IBM z/OS®
Storage products supported <sup>2</sup>	<ul style="list-style-type: none"> <li>• IBM XIV® Storage System</li> <li>• System Storage DS8000® storage servers</li> <li>• IBM System Storage N3000, N6000 and N7000 series</li> <li>• IBM System Storage N series Gateway</li> <li>• System Storage DS6800®</li> <li>• System Storage DS5000, DS4000®</li> <li>• System Storage DS3400</li> <li>• IBM TotalStorage Enterprise Storage Server® systems</li> <li>• TotalStorage 3590 and 3592 tape drives</li> <li>• TotalStorage 3494, 3582, 3583 and 3584 tape libraries</li> <li>• TotalStorage 3581 Tape Autoloader</li> <li>• System Storage TS1120 tape drives</li> <li>• System Storage TS3100, TS3200, TS3310 and TS3500 tape libraries</li> <li>• System Storage SAN Volume Controller (SVC)</li> <li>• Other selected storage systems</li> </ul>
Fibre optic cables	Singlemode and multimode (9u/50u respectively) fiber optical cables with LC connectors are available
Power cords	Jumper cables are included for installation; country-specific power cords must be ordered for desktop/stand-alone installation
Warranty	one year; 24x7 same-day maintenance service options are available

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Optional features	<ul style="list-style-type: none"> <li>• 4-port 10 Gbps Fibre Channel Switching Module</li> <li>• 18/4 Multiservice Module (includes two 4 Gbps shortwave SFPs)</li> <li>• 16-port GbE Storage Services Node-16 (SSN-16) Module</li> <li>• 32-port 8 Gbps Advanced Fibre Channel Switching Module</li> <li>• 48-port 8 Gbps Advanced Fibre Channel Switching Module</li> <li>• 24-port 8 Gbps Fibre Channel Switching Module</li> <li>• 48-port 8 Gbps Fibre Channel Switching Module</li> <li>• 4/44-port 8 Gbps Host Optimized Fibre Channel Switching Module</li> <li>• 8-port 10Gbps FCoE Module</li> <li>• Cisco MDS 9500 Series Supervisor-2 and Supervisor-2A Module</li> <li>• 9513 Fabric2/Fabric3 Switching Modules</li> <li>• Flash memory card</li> <li>• IBM FICON Package</li> <li>• MDS 9500 Enterprise and Mainframe Packages</li> <li>• MDS 9500 Fabric Manager Server Package</li> <li>• Storage Media Encryption (SME) package for one MSM 18/4-port for MDS 9500</li> <li>• SME License (1 engine) for one SSN-16 on MDS 9500</li> <li>• MDS 9500 DCNM for SAN Advanced Edition</li> <li>• MDS 9500 I/O Acceleration for 18/4 Module</li> <li>• MDS 9500 FCIP Activation for SSN-16</li> <li>• MDS 9500 FCIP Activation for MSM</li> <li>• MDS 9500 I/O Acceleration for SSN-16</li> <li>• MDS 9500 SAN Extension Over IP package for one 18/4-Port Multiservice Module</li> <li>• MDS 9500 SAN Extension License (1 engine) for the SSN-16 module</li> </ul> <p><i>Note: Switching modules do not include optics unless specified otherwise</i></p>
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**Physical characteristics**

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Dimensions (height x width x depth)	<ul style="list-style-type: none"> <li>• MDS 9513:             <ul style="list-style-type: none"> <li>– Dimensions: 62.3 cm x 44.1 cm x 71.1 cm (24.5 in. x 17.37 in. x 28.0 in.) in 14 Rack Units (RU)</li> <li>– Weight:                 <ul style="list-style-type: none"> <li>◦ Chassis (includes fans and clock modules): 45.4 kgs (100.0 lbs)</li> <li>◦ Power supply: 14.7 kgs (32.5 lbs)</li> <li>◦ Fabric module: 2.6 kgs (75 lbs)</li> <li>◦ MDS 9500 Series Supervisor-2 and Supervisor-2A Module: 3.3 kgs (7.2 lbs)</li> </ul> </li> </ul> </li> <li>• MDS 9509:             <ul style="list-style-type: none"> <li>– Dimensions: 62.3 cm x 44.1 cm x 46.8 cm (24.5 in. x 17.37 in. x 18.4 in.) in 14 RU</li> <li>– Depth including cable guide: 67.9 cm (26.75 in)</li> <li>– Weight:                 <ul style="list-style-type: none"> <li>◦ Chassis only: 25 kgs (55 lbs)</li> <li>◦ Chassis fully configured with two supervisor/fabric modules, seven switching modules, and two power supplies: 78 kgs (170 lbs)</li> </ul> </li> </ul> </li> <li>• MDS 9506:             <ul style="list-style-type: none"> <li>– Dimensions: 31.1 cm x 44.1 cm x 55.2 cm (12.25 in. x 17.37 in. x 21.75 in.) in 7 RU</li> <li>– Depth including cable guide: 67.9 cm (26.75 in)</li> <li>– Weight:                 <ul style="list-style-type: none"> <li>◦ Chassis (includes fan tray): 20.9 kgs (46 lbs)</li> <li>◦ Chassis fully configured with two supervisor/fabric modules, four switching modules, and two power supplies: 56 kgs (124 lbs)</li> </ul> </li> </ul> </li> </ul>
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**Cisco MDS 9500 Series Multilayer Directors for IBM System Storage at a glance<sup>1</sup>**

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**Operating environment (ambient)**

Temperature	0 to 40°C (32 to 104°F)
Relative humidity (noncondensing)	10 to 90 percent
Altitude	Up to 2000m (6500 ft)
Airflow	Because these directors are designed with side-to-side airflow, Cisco recommends a minimum air space of 16 cm (6 in) between walls and the chassis air vents, and a minimum separation of 30 cm (12 in.) between two chassis to prevent overheating.

**Electrical requirements**

Power and cooling	<ul style="list-style-type: none"> <li>• Cisco MDS 9513: Power supplies (6000 W ac) <ul style="list-style-type: none"> <li>– Input: 100 - 240 V ac , 50 - 60 Hz nominal</li> <li>– Output: 6000W (200 V ac at 16 A)</li> </ul> </li> <li>• Cisco MDS 9509: Power supplies (3000 W ac) <ul style="list-style-type: none"> <li>– Input: 100 - 240 V ac , 50 - 60 Hz nominal</li> <li>– Output: 3000W (200 V ac at 16 A)</li> </ul> </li> <li>• Cisco MDS 9506: Power supplies (1900 W ac) <ul style="list-style-type: none"> <li>– Input: 100 - 240 V ac, 50 - 60 Hz nominal</li> <li>– Output: 1900W (200 V ac at 12 A)</li> </ul> </li> </ul>
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## For more information

To learn more about the Cisco MDS 9500 for IBM System Storage, please contact your IBM marketing representative or IBM Business Partner, or visit the following website:

[ibm.com/systems/networking/switches/san/ctype](http://ibm.com/systems/networking/switches/san/ctype)

Additionally, financing solutions from IBM Global Financing can enable effective cash management, protection from technology obsolescence, improved total cost of ownership and return on investment. Also, our Global Asset Recovery Services help address environmental concerns with new, more energy-efficient solutions. For more information on IBM Global Financing, visit: [ibm.com/financing](http://ibm.com/financing)



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<sup>1</sup> For complete and current Cisco specifications, visit:  
<http://www.cisco.com/go/ibm/storage>

<sup>2</sup> For the most current list of supported servers and storage, visit:  
[ibm.com/systems/storage/san/ctype](http://ibm.com/systems/storage/san/ctype)



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