Cisco MDS 9250i Multiservice Fabric Switch

Product Overview

The Cisco® MDS 9250i Multiservice Fabric Switch (Figure 1), the next generation of the highly flexible, industry-leading, proven Cisco MDS 9200 Series Multiservice Switches, is an optimized platform for deploying high-performance SAN extension solutions, distributed intelligent fabric services, and cost-effective multiprotocol connectivity for both open systems and mainframe environments. With a compact form factor and advanced capabilities normally available only on director-class switches, the Cisco MDS 9250i is an ideal solution for departmental and remote branch-office SANs as well as in large-scale SANs in conjunction with the Cisco MDS 9710 Multilayer Director.

The Cisco MDS 9250i offers up to forty 16-Gbps Fibre Channel ports, two 1/10 Gigabit Ethernet IP storage services ports, and eight 10 Gigabit Ethernet Fibre Channel over Ethernet (FCoE) ports in a fixed two-rack-unit (2RU) form factor. The Cisco MDS 9250i connects to existing native Fibre Channel networks, protecting current investments in storage networks. The Cisco SAN Extension over IP application package license is enabled as standard on the two fixed 1/10 Gigabit Ethernet IP storage services ports, enabling features such as Fibre Channel over IP (FCIP) and compression on the switch without the need for additional licenses. Also, using the eight 10 Gigabit Ethernet FCoE ports, the Cisco MDS 9250i platform attaches to directly connected FCoE and Fibre Channel storage devices and supports multitiered unified network fabric connectivity directly over FCoE.

Figure 1. Cisco MDS 9250i Multiservice Fabric Switch

Main Features and Benefits

The Cisco MDS 9250i provides unique Multiservice and multiprotocol functions in a compact 2RU form factor:

- SAN consolidation with integrated multiprotocol support: The Cisco MDS 9250i is available in a base configuration of 20 ports of 16-Gbps Fibre Channel for high-performance SAN connectivity, 2 ports of 10-Gigabit Ethernet for FCIP and Small Computer System Interface over IP (iSCSI) storage services, and 8 ports of 10 Gigabit Ethernet for FCoE connectivity.
- High-density Fibre Channel switch with 16-Gbps connectivity: The Cisco MDS 9250i scales up to 40 ports of 16-Gbps Fibre Channel in a fixed configuration switch. The base configuration comes with 20 ports of 16-Gbps Fibre Channel enabled for high-performance SAN connectivity, and it can be upgraded onsite to enable additional 20 ports of 16-Gbps Fibre Channel by adding the Cisco MDS 9250i On-Demand Port Activation license. Additionally, the Cisco MDS 9250i cost-effectively scales up for IBM Fibre Connection (FICON) mainframe environments.[1]

[1] FICON will be supported on the Cisco MDS 9250i in a release after the first customer shipment (FCS).

- Intelligent application services engine: The Cisco MDS 9250i includes as standard a single application services engine that enables the included Cisco SAN Extension over IP software solution package to run on the two fixed 1/10 Gigabit Ethernet storage services ports. The Cisco SAN Extension over IP package provides an integrated, cost-effective, and reliable business-continuance solution that uses IP infrastructure by offering FCIP for remote SAN extension, along with a variety of advanced features to optimize the performance and manageability of FCIP links.
- Hardware-based virtual fabric isolation with virtual SANs (VSANs) and Fibre Channel routing with Inter-VSAN Routing (IVR): VSANs and IVR enable deployment of large-scale multisite and heterogeneous SAN topologies. Integration into port-level hardware allows any port in a system or in a fabric to be partitioned into any VSAN. Included in the optional Cisco MDS 9000 Enterprise advanced software package, IVR provides line-rate routing between any of the ports in a system or in a fabric without the need for external routing appliances.
- Remote SAN extension with high-performance FCIP:
  - Simplifies data protection and business continuance strategies by enabling backup, remote replication, and other disaster-recovery services over WAN distances using open-standards FCIP tunneling.
  - Optimizes utilization of WAN resources for backup and replication by enabling hardware-based compression, hardware-based encryption, FCIP write acceleration, and FCIP tape read and write acceleration; up to 16 virtual Inter-Switch Link (ISL) connections are provided on the two 10 Gigabit Ethernet ports through tunneling.
  - Preserves Cisco MDS 9000 Family enhanced capabilities, including VSANs, IVR, advanced traffic management, and network security across remote connections.
- Cost-effective iSCSI connectivity to Ethernet-attached servers:
  - Extends the benefits of Fibre Channel SAN-based storage to Ethernet-attached servers at a lower cost than is possible using Fibre Channel interconnect alone.
  - Increases storage utilization and availability through consolidation of IP and Fibre Channel block storage.
  - Through transparent operation, preserves the capability of existing storage management applications.
- Advanced FICON services[2]: The Cisco MDS 9250i will support FICON environments, including cascaded FICON fabrics, VSAN-enabled intermix of mainframe and open systems environments, and N-port ID virtualization (NPIV) for mainframe Linux partitions. IBM Control Unit Port (CUP) support enables in-band management of Cisco MDS 9200 Series switches from the mainframe management console. FICON tape acceleration reduces latency effects for FICON channel extension over FCIP for FICON tape read and write operations to mainframe physical or virtual tape. This feature is sometimes referred to as tape pipelining. The Cisco MDS 9250i will also support the IBM Extended Remote Copy (XRC)[3] Acceleration feature that enables acceleration of dynamic updates for IBM z/OS Global Mirror, formerly known as XRC.
- Cisco Data Mobility Manager (DMM) as a distributed fabric service: Cisco DMM is a fabric-based data migration solution that transfers block data nondisruptively across heterogeneous storage volumes and across distances, whether the host is online or offline.

[2] FICON will be supported on the Cisco MDS 9250i in a post-FCS release.
[3] XRC will be supported on the Cisco MDS 9250i in a post-FCS release.

- Platform for intelligent fabric applications: The Cisco MDS 9250i provides an open platform that delivers the intelligence and advanced features required to make multilayer intelligent SANs a reality, including hardware-enabled innovations to host or accelerate applications for data migration, storage backup, and data replication. Hosting or accelerating these applications in the network can dramatically improve scalability, availability, security, and manageability of the storage environment, resulting in increased utility and lower total cost of ownership (TCO).
- In Service Software Upgrade (ISSU) for Fibre Channel interfaces: Cisco MDS 9250i promotes high serviceability by allowing Cisco MDS 9000 NX-OS Software to be upgraded while the Fibre Channel ports are carrying traffic.
- Intelligent network services: Cisco MDS 9250i uses VSAN technology for hardware-enforced, isolated environments within a single physical fabric, access control lists (ACLs) for hardware-based intelligent frame processing, and advanced traffic management features such as fabric wide quality of service (QoS) to facilitate migration from SAN islands to enterprise wide storage networks.
- High-performance ISLs: Cisco MDS 9250i supports up to 16 Fibre Channel ISLs in a single PortChannel. Links can span any port on any module in a chassis for added scalability and resilience. Up to 256 buffer-to-buffer credits can be assigned to a single Fibre Channel port to extend storage networks over long distances.
- Comprehensive network security framework: The Cisco MDS 9250i 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 Standard (AES), VSANs, hardware-enforced zoning, ACLs, and per-VSAN role-based access control (RBAC). Additionally, the 10 Gigabit Ethernet ports offer IP Security (IPsec) authentication, data integrity, and hardware-assisted data encryption for FCIP and iSCSI.
- IP Version 6 (IPv6) capable: The Cisco MDS 9250i supports IPv6 as mandated by the U.S. Department of Defense (DoD), Japan, and China. IPv6 support is provided for FCIP, iSCSI, and management traffic routed inband and out of band.
- FIPS compliance: The Cisco MDS 9250i will be FIPS 140-2 compliant as mandated by the U.S. federal government.[4]
- Sophisticated diagnostics: The Cisco MDS 9250i provides intelligent diagnostics, protocol decoding, and network analysis tools as well as integrated Cisco Call Home capability for added reliability, faster problem resolution, and reduced service costs.

VSANs

VSANs are ideal for efficient, secure SAN consolidation, enabling more efficient storage network utilization by creating hardware-based isolated environments with 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 helping ensure complete segregation of traffic and retaining independent control of configuration on a VSAN-by-VSAN basis.

[4] FIPS compliance will be supported in a post-FCS release.

IVR

In another step toward deploying efficient, cost-effective, consolidated storage networks, the Cisco MDS 9250i supports IVR, the industry's first routing function for Fibre Channel. IVR allows selective transfer of data between specific initiators and targets on different VSANs while maintaining isolation of control traffic within each VSAN. With IVR, data can transit VSAN boundaries while maintaining control plane isolation, thereby maintaining fabric stability and availability. IVR is one of the feature enhancements provided with the Cisco MDS 9000 Enterprise advanced software package and eliminates the need for external routing appliances, greatly increasing routing scalability while delivering line-rate routing performance, simplifying management, and eliminating the challenges associated with maintaining separate systems. Deploying IVR means lower total cost of SAN ownership.

FCIP for Remote SAN Extension

Data distribution, data protection, and business continuance services are significant components of today's information-centric businesses. The capability to efficiently replicate critical data on a global scale not only helps ensure a higher level of data protection for valuable corporate information, but also increases utilization of backup resources and lowers total cost of storage ownership.

- Building on Cisco expertise and knowledge of IP networks, the Cisco MDS 9250i switch uses open-standards FCIP to break the distance barrier of current Fibre Channel solutions, enabling interconnection of SAN islands over extended distances.
- The Cisco MDS 9250i dramatically enhances hardware-based FCIP compression performance for both high-bandwidth and low-bandwidth links, providing immediate cost savings for expensive WAN infrastructure. The Cisco MDS 9250i achieves up to a 43:1 compression ratio, with typical ratios of 4:1 to 5:1 over a wide variety of data sources.
- The Cisco MDS 9250i supports hardware-based IPsec encryption for secure transmission of sensitive data over extended distances. Hardware enablement of IPsec helps ensure high throughput. Used together, hardware-based compression and hardware-based encryption provide high-performance, highly secure SAN extension capabilities.

I/O Accelerator Services

The Cisco MDS 9250i supports Cisco MDS 9000 I/O Acceleration (IOA) services, an advanced software package that can significantly improve application performance when storage traffic is extended across long distances. When Fibre Channel and FCIP write acceleration are enabled, WAN throughput is optimized through reduced latency for command acknowledgments. Similarly, the Cisco MDS 9250i supports Fibre Channel and FCIP tape write acceleration, which allows operation at nearly full throughput over WAN links for remote tape backup and restore operations.

Cisco MDS 9000 IOA can be deployed in conjunction with disk data replication solutions to extend the distance between data centers or reduce the effects of latency. Cisco MDS 9000 IOA can also be used to enable remote tape backup and restore operations without significant throughput degradation. The main features of Cisco MDS 9000 IOA include:

- Extension of acceleration service as a fabric service to any port in the fabric, regardless of where it is attached
- Fibre Channel write acceleration (FC-WA) and Fibre Channel tape acceleration (FC-TA)
- FCIP write acceleration (FCIP-WA) and FCIP tape acceleration (FCIP-TA)
- Fibre Channel and FCIP compression

- High availability using PortChannels with acceleration over Fibre Channel and FCIP
- Unified solution for disk and tape I/O acceleration over metropolitan area networks (MANs) and WANs
- Speed-independent acceleration that accelerates 2/4/8/16-Gbps FC links and consolidates traffic over 8/16-Gigabit ISLs

Cisco DMM

Cisco DMM is an advanced software package comprising a fabric-based data migration solution that transfers block data nondisruptively across heterogeneous storage volumes and across distances, whether the host is online or offline. This data center-class solution helps mitigate the challenges experienced in migrating data, such as downtime, the need to add data migration software to servers, and the potential for data loss and corruption. By simply enabling the Cisco DMM feature on a Cisco MDS 9250i located anywhere in the SAN, data migration can be configured without host agents, without rewiring, without affecting performance, and without downtime.

Mainframe Support

The Cisco MDS 9250i is mainframe ready and will support IBM zSeries FICON and Linux environments provided with the Cisco MDS 9000 Mainframe advanced software package. To be qualified by IBM for attachment to all FICON-enabled devices in an IBM zSeries operating environment, Cisco MDS 9250i switches will support transport of the FICON protocol in both cascaded and noncascaded fabrics, as well as an intermix of FICON and open systems Fibre Channel Protocol traffic on the same switch. VSANs simplify intermixing of SAN resources among IBM z/OS, mainframe Linux, and open systems environments, enabling 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 that a misconfiguration or component failure in one VSAN will affect operation in other VSANs. VSAN-based management access controls simplify partitioning of SAN management responsibilities between mainframe and open systems environments, enhancing security. FICON VSANs can be managed using the standard Cisco Prime Data Center Network Manager (DCNM), the Cisco command-line interface (CLI), or IBM CUP-enabled management tools, including SA/390, Resource Measurement Facility (RMF), and Dynamic Channel Path Management (DCM).

The Cisco MDS 9000 Mainframe package is required for all Cisco MDS 9250i integrated FICON channel extension features. In combination with SAN extension capabilities, it enables FICON tape read and write acceleration. In combination with SAN extension and the Cisco MDS 9000 XRC Acceleration package, it enables acceleration of IBM z/OS Global Mirror (XRC) dynamic updates.

Advanced Traffic Management

The following advanced traffic-management capabilities are integrated as standard on the Cisco MDS 9250i:

- Virtual output queue (VOQ): Helps ensure line-rate performance on each port, independent of traffic pattern, by eliminating head-of-line blocking.
- PortChannels: 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 speed-matched ports from any module in the chassis, helping ensure that the bundle can remain 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.

The following additional advanced traffic-management capabilities are available on the Cisco MDS 9250i with the optional Cisco MDS 9000 Enterprise advanced software package to simplify deployment and optimization of large-scale fabrics:

- Up to 256 buffer-to-buffer credits: Can be assigned to an individual port for optimal bandwidth utilization across long distances.
- QoS: Can be used to manage bandwidth and control latency, to prioritize critical traffic for specific applications.
- IVR: Eliminates the need for external routing appliances, greatly increasing routing scalability while delivering line-rate routing performance, simplifying management, and eliminating the challenges associated with maintaining separate systems.
- SCSI flow statistics: Collects logical unit number (LUN)-level SCSI flow statistics, including read, write, and error statistics, for any combination of initiators and targets.

Comprehensive Solution for Robust Network Security

To address the need for failure-proof security in storage networks, the Cisco MDS 9250i includes as standard an extensive security framework to protect highly sensitive data crossing today's enterprise networks:

- Smart Zoning: When the Smart Zoning feature is enabled, Cisco MDS 9000 Family fabrics provision the hardware access control entries specified by the zone set more efficiently, avoiding the superfluous entries that would allow servers (initiators) to talk to other servers, or allow storage devices (targets) to talk to other storage devices. This feature makes larger zones with multiple initiators and multiple targets feasible without excessive consumption of hardware resources. Thus, smart zones can correspond to applications, application clusters, hypervisor clusters, or other data center entities, saving the time that administrators previously spent creating many small zones, and enabling the automation of zoning tasks.
- Intelligent packet inspection is provided at the port level, including the application of ACLs for hardware enforcement of zones, VSANs, and advanced port-security features.
- Extended zoning capabilities are provided to help ensure that LUNs can be accessed only by specific hosts (LUN zoning), to limit SCSI read commands for a certain zone (read-only zoning), and to restrict broadcasts to only selected zones (broadcast zones).

The following additional advanced security-management capabilities are available on the Cisco MDS 9250i with the Cisco MDS 9000 Enterprise advanced software package to further help ensure the security of large-scale fabrics:

- Switch-to-switch and host-to-switch authentication helps eliminate disruptions that may occur because of unauthorized devices connecting to a large enterprise fabric.
- Port security locks down the mapping of an entity to a switch port to help ensure that SAN security is not compromised by connection of unauthorized devices to a switch port.
- VSAN-based access control allows customers to define roles in which the scope of the roles is limited to certain VSANs.
- FC-SP provides switch-switch and host-switch Diffie-Hellman Challenge Handshake Authentication Protocol (DH-CHAP) authentication supporting RADIUS and TACACS+ to help ensure that only authorized devices access protected storage networks.

- Comprehensive IPsec protocol suite delivers secure authentication, data integrity, and hardware-based encryption for both FCIP and iSCSI deployments.
- Digital certificates are issued by a trusted third party and are used as electronic passports to prove the identity of certificate owners.
- Fabric binding for open systems helps ensure that the ISLs are enabled between only switches that have been authorized in the fabric binding configuration.
- Cisco TrustSec® Fibre Channel link encryption helps ensure data integrity and privacy.

Advanced Diagnostics and Troubleshooting Tools

Management of large-scale storage networks requires proactive diagnostics, tools to verify connectivity and route latency, and mechanisms for capturing and analyzing traffic. The Cisco MDS 9000 Family integrates the industry's most advanced analysis and diagnostic tools, which are included as standard on the Cisco MDS 9250i. The power-on self-test (POST) and Cisco Generic Online Diagnostics (GOLD) provide proactive health monitoring. The Cisco MDS 9250i implements diagnostic capabilities such as Fibre Channel traceroute to identify the exact path and timing of flows, and Switched Port Analyzer (SPAN) to intelligently capture network traffic. After traffic has been captured, it can be analyzed with Cisco Fabric Analyzer, an embedded Fibre Channel analyzer. Comprehensive port-based and flow-based statistics facilitate sophisticated performance analysis and service-level agreement (SLA) accounting. With the Cisco MDS 9000 Family, Cisco delivers a comprehensive tool set for troubleshooting and analysis of storage networks.

Ease of Management

To meet the needs of all users, the Cisco MDS 9250i provides three principal modes of management: the Cisco MDS 9000 Family CLI, Cisco Prime DCNM, and integration with third-party storage management tools.

The Cisco MDS9250i presents a consistent, logical CLI. Adhering to the syntax of the widely known Cisco IOS® Software CLI, the Cisco MDS 9000 Family CLI is easy to learn and delivers broad management capabilities. The Cisco MDS 9000 Family CLI is an extremely efficient and direct interface designed to provide optimal capabilities to administrators in enterprise environments.

Cisco Prime Data Center Network Manager (DCNM) is the network's industry's first converged SAN and LAN management solution[5]. Cisco Prime DCNM can is able to manage all NX-OS based devices, including the Cisco MDS 9000 Family and Cisco Nexus® Family products. The intuitive graphical user interface simplifies day-to-day operations of Cisco unified fabrics in today's highly virtualized data center environments.

The main functions supported by Cisco Prime DCNM include:

- Monitoring of events and performance historically and at scale
- Wizard- and template-based provisioning of technologies and services based on Cisco NX-OS
- Dynamic topology views with extended visibility into virtual infrastructure
- Resource management through trend analysis of inventory and performance
- Rule-based event notification and filtering
- Role Based Access Control, providing separation between the network and storage teams

The solution is designed to scale to large enterprise deployments through scale-out server architecture with automated failover capability. These capabilities provide a resilient management system that centralizes

[5] The earlier version of Cisco Prime DCNM was the Cisco Fabric Manager

infrastructure and path monitoring across geographically dispersed data centers. Cisco Prime DCNM base management functions are available at no charge; advanced features are unlocked with the license.
The Cisco Prime DCNM application can be installed on Linux and Microsoft Windows operating systems and supports both PostgreSQL and Oracle databases.

Advanced Software Packages

The Cisco MDS 9250i can be further enhanced through additional optional licensed software packages that offer advanced intelligence and functions (summarized in Tables 1 and 2). Currently available software packages include the following:

- Cisco MDS 9000 Enterprise package: This package includes a set of traffic engineering and advanced security features, such as extended-distance buffer-to-buffer (B2B) credits, IVR, QoS, switch-to-switch and host-to-switch authentication, LUN zoning, and read-only zones, that are recommended for enterprise SANs.
- Cisco Prime DCNM License: This is the licensed version of Cisco Prime DCNM that provides server federation, historical performance monitoring for network traffic hot-spot analysis, centralized management services, and advanced application integration.
- Cisco MDS 9000 DMM package: This package on the Cisco MDS 9250i enables Cisco DMM to perform fabric-based data migration that transfers block data nondisruptively across heterogeneous storage volumes and across distances, regardless of whether the host is online or offline.
- Cisco MDS 9000 IOA Services package: The Cisco MDS 9250i supports IOA services, an advanced software package that can significantly improve application performance when storage traffic is extended across long distances. When Fibre Channel and FCIP write acceleration is enabled, WAN throughput is optimized through reduced latency for command acknowledgments.
- Cisco MDS 9000 Mainframe package: This package is a comprehensive collection of features required for using the Cisco MDS 9500 Series and MDS 9200 Series switches in mainframe storage networks, including FICON protocol, FICON tape acceleration (read and write), CUP management, switch cascading, fabric binding, and intermixing.[6]
- Cisco MDS 9000 XRC Acceleration package: In conjunction with the SAN Extension over IP and Mainframe packages, this package provides acceleration (channel extension) over IP for the IBM z/OS Global Mirror replication solution, reducing the effects of latency at distances of up to 20,000 km.[7]

Table 1. Advanced Software Packages Not Requiring Application Services Engine

Advanced Software Packages Not Requiring Application Services Engine	Included or Optional
Cisco Prime DCNM base version	Included
Cisco Prime DCNM licensed version	Optional
Cisco MDS 9000 Enterprise	Optional
Cisco MDS 9000 Mainframe	Optional
Cisco MDS 9000 XRC Acceleration	Optional[1]

[6] FICON will be supported on the Cisco MDS 9250i in a post-FCS release.
[7] XRC will be supported on the Cisco MDS 9250i in a post-FCS release.

Table 2. Advanced Software Packages Requiring Application Services Engine

Advanced Software Packages Requiring Application Services Engine	Included or Optional
Cisco MDS 9000 SAN Extension over IP	Included
Cisco MDS 9000 IOA Services	Optional
Cisco DMM	Optional

Notes:
1. XRC requires a Mainframe license. FICON and XRC will be supported on the Cisco MDS 9250i in a post-FCS release.

Product Specifications

Table 3 lists the product specifications for the Cisco MDS 9250i.

Table 3. Product Specifications

Feature	Description
Product compatibility	Cisco MDS 9000 Family
Software compatibility	• Cisco MDS 9000 NX-OS Release 6.2(2) or later • Cisco MDS 9000 NX-OS Release 6.2(2) or later for Cisco Prime DCNM support
Protocols	• Fibre Channel standards ◦ FC-PH, Revision 4.3 (ANSI INCITS 230-1994) ◦ FC-PH, Amendment 1 (ANSI INCITS 230-1994/AM1-1996) ◦ FC-PH, Amendment 2 (ANSI INCITS 230-1994/AM2-1999) ◦ FC-PH-2, Revision 7.4 (ANSI INCITS 297-1997) ◦ FC-PH-3, Revision 9.4 (ANSI INCITS 303-1998) ◦ FC-PI, Revision 13 (ANSI INCITS 352-2002) ◦ FC-PI-2, Revision 10 (ANSI INCITS 404-2006) ◦ FC-PI-3, Revision 4 (ANSI INCITS 460-2011) ◦ FC-PI-4, Revision 8 (ANSI INCITS 450-2008) ◦ FC-PI-5, Revision 6 (ANSI INCITS 479-2011) ◦ 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-FS-3, Revision 1.11 (ANSI INCITS 470-2011) ◦ FC-LS, Revision 1.62 (ANSI INCITS 433-2007) ◦ FC-LS-2, Revision 2.21 (ANSI INCITS 477-2011) ◦ 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-SW-5, Revision 8.5 (ANSI INCITS 461-2010) ◦ 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-GS-6, Revision 9.4 (ANSI INCITS 463-2010) ◦ FCP, Revision 12 (ANSI INCITS 269-1996) ◦ FCP-2, Revision 8 (ANSI INCITS 350-2003) ◦ FCP-3, Revision 4 (ANSI INCITS 416-2006) ◦ FCP-4, Revision 2b (ANSI INCITS 481-2011) ◦ 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-SB-4, Revision 3.0 (ANSI INCITS 466-2011) ◦ FC-BB-2, Revision 6.0 (ANSI INCITS 372-2003) ◦ FC-BB-3, Revision 6.8 (ANSI INCITS 414-2006) ◦ FC-BB-4, Revision 2.7 (ANSI INCITS 419-2008)

Feature	Description
	◦ FC-BB-5, Revision 2.0 (ANSI INCITS 462-2010) ◦ FC-VI, Revision 1.84 (ANSI INCITS 357-2002) ◦ FC-SP, Revision 1.8 (ANSI INCITS 426-2007) ◦ FC-SP-2, Revision 2.71 (ANSI INCITS 496-2012) ◦ FAIS, Revision 1.03 (ANSI INCITS 432-2007) ◦ FAIS-2, Revision 2.23 (ANSI INCITS 449-2008) ◦ FC-IFR, Revision 1.06 (ANSI INCITS 475-2011) ◦ 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-MI-3, Revision 1.03 (INCITS TR-48-2012) ◦ FC-DA, Revision 3.1 (INCITS TR-36-2004) ◦ FC-DA-2, Revision 1.06 (INCITS TR-49-2012) ◦ FC-MSQS, Revision 3.2 (INCITS TR-46-2011) • Fibre Channel classes of service: Class 2, Class 3, and Class F • Fibre Channel standard port types: E, F, FL, and B • Fibre Channel enhanced port types: SD, ST, and TE • IP over Fibre Channel (RFC 2625)
Protocols (continued)	• IPv6, IPv4, and Address Resolution Protocol (ARP) over Fibre Channel (RFC 4338) • Extensive IETF-standards based TCP/IP, SNMPv3, and remote monitoring (RMON) MIBs • IP standards ◦ RFC 791 IPv4 ◦ RFC 793 and 1323 TCP ◦ RFC 894 IP/Ethernet ◦ RFC 1041 IP/802 ◦ RFC 792, 950, and 1256 ICMP ◦ RFC 1323 TCP performance enhancements ◦ RFC 2338 VRRP ◦ RFC 2460 and 4291 IPv6 ◦ RFC 2463 and 4443 ICMPv6 ◦ RFC 2461 and 2462 IPv6 neighbor discovery and stateless autoconfiguration ◦ RFC 2464 IPv6/Ethernet ◦ RFC 3270 and 3980 iSCSI ◦ RFC 3643 and 3821 FCIP • Ethernet standards ◦ IEEE Std 802.3-2005 Ethernet ◦ IEEE Std 802.1Q-2005 VLAN ◦ IPsec ◦ RFC 2401 and 4301 security architecture for IP ◦ RFC 2403 and 2404 HMAC ◦ RFC 2405, 2406, 2451, and 4303 IP ESP ◦ RFC 2407 and 2408 ISAKMP ◦ RFC 2412 OAKLEY Key Determination Protocol ◦ RFC 3566, 3602, and 3686 AES • Internet Key Exchange (IKE) ◦ RFC 2409 IKEv1 ◦ RFC 4306 IKEv2
Cards, ports, and slots	• Fixed configuration with 40 ports of 16-Gbps Fibre Channel and 10 ports of 10 -Gigabit Ethernet

Feature	Description
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 functions	• VSAN • IVR • PortChannel with multipath load balancing • Flow-based and zone-based QoS • FCIP tape read and write acceleration • FICON over FCIP tape read and write acceleration (pipelining) • FICON XRC (z/OS Global Mirror) acceleration
Diagnostics and troubleshooting tools	• POST diagnostics • Cisco Generic Online Diagnostics (GOLD) • Internal port loopbacks • SPAN and Remote SPAN (RSPAN) • Fibre Channel traceroute • Fibre Channel ping • Fibre Channel debug • Cisco Fabric Analyzer • Syslog • Online system health • Port-level statistics • Real-Time Protocol (RTP) debug
Network security	• VSANs • ACLs • Per-VSAN RBAC • Fibre Channel zoning • N-port Worldwide Name (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 • iSCSI zoning • iSCSI name • IP address • FC-SP • DH-CHAP switch-to-switch authentication • DH-CHAP host-to-switch authentication • Port security and fabric binding • IPsec for FCIP and iSCSI • IKEv1 and IKEv2 • Management access • SSHv2 implementing AES • SNMPv3 implementing AES • SFTP

Feature	Description		
FICON	• FC-SB-3 compliant • Cascaded FICON fabrics • Intermix of FICON and Fibre Channel Protocol traffic • CUP management interface		
Serviceability	• Configuration file management • ISSU for Fibre Channel interfaces • Cisco Call Home • Power-management LEDs • Port beaconing • System LED • SNMP traps for alerts • Network boot		
Performance	• Port speed: 4/8/16-Gbps autosensing, optionally configurable • Buffer credits: 64 per port (shared-mode ports) and up to 256 on an individual port (dedicated-mode ports with optional Cisco MDS 9000 Enterprise package license activated) • Ports per chassis: 40 ports of 16-Gbps Fibre Channel and 10 ports of 10-Gigabit Ethernet • Ports per rack: Up to 1050 • PortChannel: Up to 16 physical links • FCIP tunnels: Up to 6 per port		
	Speed	**Media**	**Distance**
Supported Cisco optics, media, and transmission distances	• 8-Gbps SW, LC Enhanced Small Form-Factor Pluggable (SFP+) • 8-Gbps SW, LC SFP+ • 8-Gbps SW, LC SFP+ • 8-Gbps LW, LC SFP+ • 16-Gbps SW, LC SFP+ • 16-Gbps SW, LC SFP+ • 16-Gbps SW, LC SFP+ • 16-Gbps SW, LC SFP+ • 16-Gbps LW, LC SFP+	• 50-micron multimode (OM3) • 50-micron multimode (OM2) • 62.5-micron multimode • 9-micron single mode • 50-micron multimode (OM4) • 50-micron multimode (OM3) • 50-micron multimode (OM2) • 62.5-micron multimode (OM1) • 9-micron single mode	• 150m • 50m • 21m • 10 km • 125m • 100m • 35m • 15m • 10 km
Reliability and availability	• ISSU • Hot-swappable, 2+1 redundant power supplies • Hot-swappable fan tray with integrated temperature and power management • Hot-swappable SFP+ optics • Passive backplane • Stateful process restart • Any port configuration for PortChannels • Fabric-based multipathing • Per-VSAN fabric services • Port tracking • VRRP for management and FCIP or iSCSI connections • Online diagnostics		
Network management	• Access methods ◦ Out-of-band 10/100 Gigabit Ethernet port ◦ RS-232 serial console port ◦ In-band IP over Fibre Channel ◦ In-band FICON CUP over Fibre Channel • Access protocols ◦ CLI using the console and Ethernet ports ◦ SNMPv3 using the Ethernet port and in-band IP over Fibre Channel access ◦ Storage Networking Industry Association (SNIA) Storage Management Initiative Specification (SMI-S) ◦ FICON CUP • Distributed device alias service • Network security		

Feature	Description
	◦ Per-VSAN RBAC using RADIUS and TACACS+-based authentication, authorization, and accounting (AAA) functions ◦ SFTP ◦ SSHv2 implementing AES ◦ SNMPv3 implementing AES • Management applications ◦ Cisco MDS 9000 Family CLI ◦ Cisco Prime DCNM ◦ Cisco Device Manager
Programming interfaces	• Scriptable CLI • Cisco Prime DCNM web services API • Cisco Device Manager GUI
Environmental	• Temperature, ambient operating: 32 to 104°F (0 to 40°C) • Temperature, ambient nonoperating and storage: 40 to 158°F (-40 to 70°C) • Relative humidity, ambient (noncondensing) operating: 10 to 90% • Relative humidity, ambient (noncondensing) nonoperating and storage: 10 to 95% • Altitude, operating: -197 to 6500 ft (-60 to 2000m)
Physical dimensions	• Dimensions (H x W x D): 3.84 x 17.22 x 21.4 in. (9.75 x 43.74 x 54.36 cm), 2RUs; all units rack mountable in standard 19-inch Electronic Industries Alliance [EIA] rack) • Weight of fully configured chassis: 22.4 lb (10.2 kg)
Power and cooling	• Power supply: 300W AC • Power cord: Notched C15 socket connector connecting to C16 plug on power supply • AC input characteristics • 100 to 240V AC (10% range) • 50 to 60 Hz (nominal) • Airflow (front to back) • 200 linear feet per minute (LFM) through system fan assembly • Cisco recommends maintaining a minimum air space of 2.5 in. (6.4 cm) between walls and chassis air vents and a minimum horizontal separation of 6 in. (15.2 cm) between two chassis to prevent overheating
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 (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

Ordering Information

Table 4 lists ordering information for the Cisco MDS 9250i.

Table 4. Ordering Information

Part Number	Description
OSM-Specific Information	
DS-C9250I-K9	MDS 9250i 50 port switch base config(20xFC, 8xFCoE, 2xFCIP)
DS-C9250I-K9=	MDS 9250i 50 port switch base config(20xFC, 8xFCoE, 2xFCIP), spare
M9250IP20-16G=	MDS 9250i 20-port Fibre Channel Upgrade License, spare
L-M9250IP20-16G=	MDS 9250i 20-port Fibre Channel Upgrade License, spare, eDelivery
DS-9250I-KITCCO	MDS 9200 Accessory Kit for Cisco
DS-9250I-KITCCO=	MDS 9200 Accessory Kit for Cisco, spare
DS-9250I-KITEMC	MDS 9200 Accessory Kit for EMC
DS-9250I-KITHDS	MDS 9200 Accessory Kit for HDS
DS-9250I-KITHP	MDS 9200 Accessory Kit for HP
DS-9250I-KITIBM	MDS 9200 Accessory Kit for IBM
Cisco Direct Information	
DS-C9250ID16GSFPK9	MDS 9250i 50 port switch base config bundle with 20 16G FC SFPs
DS-C9250ID8GSFPK9	MDS 9250i 50 port switch base config bundle with 20 8G FC SFPs
M9250IPD20-16GSFP=	MDS 9250i 20-port FC Upgrade License bundle with 20 16G FC SFPs
M9250IPD20-8GSFP=	MDS 9250i 20-port FC Upgrade License bundle with 20 8G FC SFPs
DS-9250I-KITCCO	MDS 9200 Accessory Kit for Cisco
DS-9250I-KITCCO=	MDS 9200 Accessory Kit for Cisco, spare
Optional Components: Configure-to-Order (See Notes 1, 2, and 3)	
DS-SFP-GE-T	1 Gigabit Ethernet Copper SFP, RJ-45 (supported only with 1G Ethernet port)
DS-SFP-FCGE-SW	1 Gbps Ethernet and 2 Gbps Fibre Channel-SW SFP, LC (supported only with 1G Ethernet port)
DS-SFP-FCGE-LW	1 Gbps Ethernet and 2 Gbps Fibre Channel-LW SFP, LC (supported only with 1G Ethernet port)
SFP-10G-SR	10 Gigabit Ethernet Short-range SFP (Supported only with 10 Gigabit Ethernet ports)
SFP-10G-LR	10 Gigabit Ethernet Long-range SFP (Supported only with 10 Gigabit Ethernet ports)
SFP-10G-ER	10 Gigabit Ethernet ER SFP (Supported only with 10 Gigabit Ethernet ports)
DS-SFP-FC8G-SW	Cisco MDS 9000 Family 2/4/8-Gbps Fibre Channel-Shortwave, SFP, LC, spare (Supported only on FC ports)
DS-SFP-FC8G-LW	Cisco MDS 9000 Family 2/4/8-Gbps Fibre Channel-Longwave, SFP, LC (10-km reach), spare (Supported only on FC ports)
DS-SFP-FC8G-ER	Cisco MDS 9000 Family 2/4/8-Gbps Fibre Channel ER SFP, LC (10-km reach), spare (Supported only on FC ports)
DS-SFP-FC16G-SW	Cisco MDS 9000 Family 4/8/16-Gbps Fibre Channel-Shortwave, SFP+, LC, Spare (Supported only on FC ports)
DS-SFP-FC16G-LW	Cisco MDS 9000 Family 4/8/16-Gbps Fibre Channel-Longwave, SFP+, LC (10-km reach), Spare (Supported only on FC ports)
CAB-9K10A-AR	Power Cord, 250VAC 10A IRAM 2073 Plug, Argentina
CAB-9K10A-AU	Power Cord, 250VAC 10A 3112 Plug, Australia
CAB-9K10A-CH	Power Cord, 250VAC 10A GB1002 Plug, China
CAB-9K10A-EU	Power Cord, 250VAC 10A CEE 7/7 Plug, EU
CAB-9K10A-ISR	Power Cord, 250VAC 10A SI16S3 Plug, Israel
CAB-9K10A-IT	Power Cord, 250VAC 10A CEI 23-16/VII Plug, Italy
CAB-9K10A-KOR	Power Cord, 125VAC 13A KSC8305 Plug, Korea

Part Number	Description
CAB-9K10A-SA	Power Cord, 250VAC 10A SABS 164/1 Plug, South Africa
CAB-9K10A-SW	Power Cord, 250VAC 10A, Straight C15, MP232 Plug, SWITZ
CAB-9K10A-TWN	Power Cord, 125VAC 15A CNS10917-2, Taiwan
CAB-9K10A-UK	Power Cord, 250VAC 13A BS1363 Plug (13 A fuse), UK
CAB-9K12A-NA	Power Cord, 125VAC 15A NEMA 5-15 Plug, North America
CAB-C15-CBN	Cabinet Jumper Power Cord, 250 VAC 16A, C14-C15 Connectors
Optional Advanced Software Packages: Configure-to-Order	
M9200ENT1K9	Cisco MDS 9200 Series Enterprise Package
DCNM-SAN-M92-K9	Cisco Prime Data Center Network Manager
M9250IIOA	Cisco MDS 9250i I/O Accelerator Services package
M9250IDMMK9	Cisco MDS 9250i Data Mobility Manager package
M9250IDMMT6M	Cisco MDS 9250i DMM License - 6 month period
M9200FIC1K9	Cisco MDS 9200 Series Mainframe Package
M9200XRC	Cisco MDS 9200 XRC Acceleration Package for IBM series z, spare
Spare Components (See Notes 1, 2, and 3)	
DS-C50I-FAN=	Cisco MDS 9200 Fan Module, spare
DS-C50I-300AC=	Cisco MDS 9250i AC power supply 300W, spare
DS-SFP-GE-T=	1 Gigabit Ethernet Copper SFP, RJ-45, spare (supported only with 1G Ethernet port)
DS-SFP-FCGE-SW=	1 Gbps Ethernet and 2 Gbps Fibre Channel-SW SFP, LC, Spare (supported only with 1G Ethernet port)
DS-SFP-FCGE-LW=	1 Gbps Ethernet and 2 Gbps Fibre Channel-LW SFP, LC, Spare (supported only with 1G Ethernet port)
SFP-10G-SR=	10 Gigabit Ethernet Short-range SFP, spare (Supported only with 10 Gigabit Ethernet ports)
SFP-10G-LR=	10 Gigabit Ethernet Long-range SFP, spare (Supported only with 10 Gigabit Ethernet ports)
SFP-10G-ER=	10 Gigabit Ethernet ER SFP, spare (Supported only with 10 Gigabit Ethernet ports)
DS-SFP-FC8G-SW=	Cisco MDS 9000 Family 2/4/8-Gbps Fibre Channel-Shortwave, SFP, LC, spare (Supported only on FC ports)
DS-SFP-FC8G-LW=	Cisco MDS 9000 Family 2/4/8-Gbps Fibre Channel-Longwave, SFP, LC (10-km reach), spare (Supported only on FC ports)
DS-SFP-FC8G-ER=	Cisco MDS 9000 Family 2/4/8-Gbps Fibre Channel ER SFP, LC (10-km reach), spare (Supported only on FC ports)
DS-SFP-FC16G-SW=	Cisco MDS 9000 Family 4/8/16-Gbps Fibre Channel-Shortwave, SFP+, LC, Spare (Supported only on FC ports)
DS-SFP-FC16G-LW=	Cisco MDS 9000 Family 4/8/16-Gbps Fibre Channel-Longwave, SFP+, LC (10-km reach), Spare (Supported only on FC ports)
CAB-9K10A-AR=	Power Cord, 250VAC 10A IRAM 2073 Plug, Argentina, spare
CAB-9K10A-AU=	Power Cord, 250VAC 10A 3112 Plug, Australia, spare
CAB-9K10A-CH=	Power Cord, 250VAC 10A GB1002 Plug, China, spare
CAB-9K10A-EU=	Power Cord, 250VAC 10A CEE 7/7 Plug, EU, spare
CAB-9K10A-ISR=	Power Cord, 250VAC 10A SI16S3 Plug, Israel
CAB-9K10A-IT=	Power Cord, 250VAC 10A CEI 23-16/VII Plug, Italy, spare
CAB-9K10A-KOR=	Power Cord, 125VAC 13A KSC8305 Plug, Korea, spare
CAB-9K10A-SA=	Power Cord, 250VAC 10A SABS 164/1 Plug, South Africa, spare
CAB-9K10A-SW=	AC Power Cord, 250VAC 10A, Straight C15, MP232 Plug, SWITZ, spare
CAB-9K10A-TWN=	Power Cord, 125VAC 15A CNS10917-2, Taiwan, spare
CAB-9K10A-UK=	Power Cord, 250VAC 13A BS1363 Plug (13 A fuse), UK, spare
CAB-9K12A-NA=	Power Cord, 125VAC 15A NEMA 5-15 Plug, North America, spare
CAB-C15-CBN=	Cabinet Jumper Power Cord, 250 VAC 16A, C14-C15 Connectors, spare
M9200ENT1K9=	Cisco MDS 9200 Series Enterprise Package, spare

Part Number	Description
DCNM-SAN-M92-K9=	Cisco Prime Data Center Network Manager, spare
L-DCNM-S-M92-K9=	Cisco Prime Data Center Network Manager, spare, E-delivery
M9250IIOA=	Cisco MDS 9250i I/O Accelerator Services package, spare
L-M9250IIOA=	Cisco MDS 9250i I/O Accelerator Services package, spare, E-delivery
M9250iDMMK9=	Cisco MDS 9250i Data Mobility Manager package, spare
L-M9250iDMMK9=	Cisco MDS 9250i Data Mobility Manager package, spare, E-delivery
M9250IDMMT6M=	Cisco MDS 9250i DMM License - 6 month period, spare
L-M9250IDMMT6M=	Cisco MDS 9250i DMM License - 6 month period, spare, E-delivery
M9200FIC1K9=	Cisco MDS 9200 Series Mainframe Package, spare
M9200XRC=	Cisco MDS 9200 XRC Acceleration Package for IBM series z, spare

Notes

1. For detailed information about all supported transceivers, see the Cisco MDS 9000 Family pluggable transceivers data sheet.
2. For detailed information about the optional Cisco MDS 9000 Family Enterprise Package Software and the Cisco Prime DCNM software, see http://www.cisco.com/en/US/prod/collateral/ps4159/ps6409/ps6029/product_data_sheet09186a00801ca6ac.html and http://www.cisco.com/go/dcnm, respectively.
3. Bundled and configure-to-order optical transceivers are shipped in the box with the product unit, but are not installed in the port cages on the unit. Spares ship separately.
4. License documentation ships with the switch unit in the accessory kit for customer installation on the switch.
5. License documentation ships with the switch unit in the accessory kit for customer installation on the management server.

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For More Information

For more information about the Cisco MDS 9250i, visit http://www.cisco.com/en/US/products/hw/ps4159/ps4358/index.html or contact your local account representative.

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