# Cisco MDS 9500 Series Multilayer Directors

## Cisco MDS 9500 Series—Defining the Multilayer Director

The Cisco MDS 9500 Series multilayer directors elevate the standard for director-class switches. Providing industry-leading availability, scalability, security, and management, the Cisco MDS 9500 Series allows businesses to deploy the highest-performance SANs, with the lowest TCO in the industry. Layering a rich set of intelligent features onto a high-performance, protocol-independent switch fabric, the Cisco MDS 9500 Series addresses the stringent requirements of large data center storage environments. Available in 6-slot, 9-slot, and 13-slot configurations, the Cisco MDS 9500 Series supports 1-Gbps, 2-Gbps, 4-Gbps, 8-Gbps, and 10-Gbps Fibre Channel port speeds, up to 528 1/2/4/8-Gbps autosensing Fibre Channel ports in a single chassis, and up to 1584 Fibre Channel ports per rack. Cisco MDS 9500 Series multilayer directors are also ready for integration of future high-speed standards, helping ensure continued investment protection.

## Cisco MDS NX-OS Software

The Cisco® NX-OS, included at no charge with every Cisco MDS 9000 Multilayer SAN Switch, is the underlying system software that powers the award-winning Cisco MDS 9000 Family. NX-OS provides many unique features that help the Cisco MDS 9000 Family deliver low total cost of ownership (TCO) and a quick return on investment (ROI). By providing an open, standards based platform, NX-OS enables Intelligent Fabric Applications, such as Cisco MDS Storage Media Encryption (SME), Cisco MDS Data Mobility Manager (DMM), Cisco MDS I/O Accelerator, FAIS-based network-hosted intelligent storage applications for heterogeneous volume management, point-in-time copy, data protection, and nondisruptive data migration; and FC Write Acceleration for high performance replication over long-distances; and network-assisted applications such as SANTap, that enables customers to attach external appliances for storage applications (such as asynchronous replication and CDP).

The Cisco NX-OS provides virtual-machine optimized and blade-server optimized services that let IT managers dynamically respond to changing business needs in virtual environments. Cisco's commitment to standards will foster industry-wide interoperability to provide customers more flexibility in choosing the best solution for their business/IT requirements while driving down the total costs associated with managing their data. NX-OS also supports IPv6 as mandated by US Department of Defense (DoD), Japan, and China.

**Table 1.** Cisco MDS 9500 Series Multilayer Directors

| Switch Type | Cisco MDS 9513 Multilayer Director | Cisco MDS 9509 Multilayer Director | Cisco MDS 9506 Multilayer Director |
|---|---|---|---|
| Cisco Part Number | DS-C9513 | DS-C9509 | DS-C9506 |
| Description | Modular, Multilayer, Multiprotocol, Highly Available, Dual Supervisor-2 modules, eleven module slots (14RU) | Modular, Multilayer, Multiprotocol, Highly Available, Dual Supervisor modules, seven module slots (14RU) | Modular, Multilayer, Multiprotocol, Highly Available, Dual Supervisor modules, four module slots (7RU) |
| Maximum Ports | 528 | 336 | 192 |
| Target Group | SAN Core, Large Enterprise, Service Provider | SAN Core, Medium to Large Enterprise, Service Provider | SAN Core, Medium to Large Enterprise, Service Provider |
| Support Modules | • 8-Gbps FC: 24, 48, and 4/44-port 8-Gbps Fibre Channel Switching Modules<br>• 4-Gbps FC: 12, 24, and 48-port 4-Gbps Fibre Channel Switching Modules | • IP, and Storage Services: 18/4-port Multiservice Module, 16-Port Storage Services Node<br>• 10-Gbps FC: 4-port 10-Gbps Fibre Channel Switching Module | |
| Recommended Solutions | • Data Center SAN Consolidation<br>• Business Continuance<br>• Centralized SAN Management<br>• Encryption of Data-at-Rest | • Data Mobility and Migration<br>• Advanced SAN Security for Compliance and Regulation<br>• Centralized Backup, Recovery and Archive through Intelligent Fabric Applications (Network-Hosted Storage Virtualization; Network Assisted storage applications using Cisco SANTap protocol) | |

## Cisco MDS 9000 Family Software License Packages

In addition to the unique software features included in the base switch configuration such as integrated VSANs, an advanced security suite, advanced diagnostics and troubleshooting tools, and the comprehensive Cisco Fabric Manager, Cisco offers an advanced set of software features logically grouped in software license packages.

**Table 2.** Cisco MDS 9000 Family Licenses

| License Type | Enterprise License Package | Fabric Manager Server (FMS) | SAN Extension over IP | I/O Accelerator (IOA) | Storage Media Encryption (SME) | Data Mobility Manager (DMM) | Storage Services Enabler (SSE) | Mainframe Package | XRC Acceleration |
|---|---|---|---|---|---|---|---|---|---|
| **Description** | Cisco MDS 9000 Family Enterprise package includes advanced traffic engineering and advanced security features for enterprise SANs. | Cisco Fabric Manager Server (FMS) package extends the features and functionality in Cisco Fabric Manager by providing historical performance monitoring for network traffic hot-spot analysis, centralized management services, and advanced application integration. | Cisco MDS 9000 Family SAN Extension over IP package provides an integrated, cost-effective, and reliable business continuance solution that uses the existing IP infrastructure. | Cisco MDS 9000 IOA provides a fabric-based service to accelerate SCSI disk write and tape read and write I/O operations across MAN and WAN links. The Cisco IOA feature is delivered as a highly available service with clustering capability, increasing reliability, performance, scalability, and application stability. | The Cisco Storage Media Encryption feature for Cisco MDS 9000 Family switches encrypts data at rest on heterogeneous tape devices and virtual tape libraries. | This license is required to enable Cisco's MDS-based data migration feature. The license is available in 2 flavors. A permanent license that does not have any expiration period is only available to end user customers that want to use this feature for their own data mobility needs and do not plan to sell services using this product. Service provider customers expecting to sell services based on DMM must purchase the 180-day license. | The Cisco MDS 9000 Storage Services Enabler (SSE) package provides the underlying infrastructure and program-matic interface to enable intelligent fabric applications. | This package includes features required in mainframe environ-ments. FICON is an architecture for high-speed connectivity between mainframe and I/O devices, a) or later. | Cisco MDS 9000 XRC Acceleration accelerates dynamic updates for IBM z/OS Global Mirror (formerly called XRC) over WAN links when used in conjunction with the Cisco MDS 9000 SAN Extension over IP and Mainframe Packages. |
| **Features** | Includes advanced traffic mgmt (Inter-VSAN Routing, QoS, Extended Credits) and security features (Switch-Switch and Host-Switch authentication, LUN Zoning, Read-Only Zones, Port Security, VSAN Based Access Control, IPsec for iSCSI and FCIP), IKE Digital Certificates, and Fabric Binding for Fibre Channel. | Fibre Channel Statistics Monitoring, Reporting and Graphing, Intelligent Setup, Performance Database, Management Server, Multiple Fabric Management, Continuous Health and event monitoring, Common discovery, roaming user profiles, Cisco traffic analyzer integration, Performance Threshold, Web Client, FMS Proxy Services. Data collection auto-update; Customized analytics, performance charts, and reporting; and filtering by user defined groups. | FCIP Protocol Support, FCIP Compression, FCIP Write Acceleration, FCIP Read/Write Tape Acceleration, SAN Extension Tuner, Inter-VSAN Routing for FCIP | Provides acceleration of disk write and tape read and write operations over both WAN FCIP and MAN Fibre Channel links, transparent insertion of fabric service, clustering of IOA service engines with load balancing and failover, PortChannels across line cards for Fibre Channel and FCIP, and compression for Fibre Channel links | Securely encrypts data at rest on heterogeneous tape drives and virtual tape libraries, integrates seamlessly into SAN as a transparent fabric service, requires no SAN rewiring or recon-figuration, offers high availability with clustering and fail-over capabilities, provides comprehensive key management with integration to enterprise key managers, sure role-based managed using CLI and Cisco Fabric Manager. | Transparent insertion of service—MDS customers can turn on this service and proceed to move data from one array to another without any disruption to host applications. Other capabilities include ability to schedule the cutover to the new array (point at which old array is phased out) and rate control of administrative traffic. Migrations can be performed synchronously and asynchronously both within and across geographically dispersed data centers. | Network-hosted storage applications (such as storage virtualization for heterogeneous volume management, non-disruptive data migration, and heterogeneous data replication and snapshots) with FAIS-based Intelligent Storage API, SANTap Protocol for network-assisted storage applications, and Secure Erase.. | VSAN for FICON and FCP inter-mixing, FICON Control Unit Protocol (CUP), Fabric Binding, Switch Cascading, IBM TotalStorage Virtual Tape Server, IBM TotalStorage Extended Remote Copy (XRC), FICON Native Mode and Native Mode Channel-to-Channel Operation, Persistent FICON FCID assignment, Port Swapping for host channel cable connectors, and FICON Tape Acceleration. | Eliminates the need for a separate FICON acceleration appliance by running on the Cisco MDS 9222i or MDS 9000 18/4-Port Multiservice Module used for FCIP; supports multiple IBM SDMs, multiple readers, PAVs, and HyperPAVs; and offers simple management from the CLI, Cisco Fabric Manager GUI, or IBM z/OS tools |

# Cisco MDS 9500 Series Multilayer Directors

To help ensure true investment protection, flexibility, and scalability for businesses of all sizes, all Cisco MDS 9000 Family modules (Table 3) are fully backward and forward compatible across Cisco MDS 9000 modular chassis (Cisco MDS 9500 Series Multilayer Switches).

**Table 3.** Cisco MDS 9000 Family Modules

| Switching Modules | 8-Gbps FC Modules | 4-Gbps FC Modules | 18 FC/4GE Multiservice Module | 4-Port 10-Gbps FC Module | Storage Services Module (SSM) | Cisco MDS 9000 16-Port Storage Services Node |
|---|---|---|---|---|---|---|
| Cisco Part Number | • DS-X9224-96K9 MDS 9000 24-port 8-Gbps FC Module<br>• DS-X9248-96K9 MDS 9000 48-port 8-Gbps FC Module<br>• DS-X9248-48K9 MDS 9000 4/44-port 8-Gbps FC Module | • DS-X9112 MDS 9000 12-port 1/2/4/ Gbps FC Module<br>• DS-X9124 MDS 9000 24-port 1/2/4/ Gbps FC Module<br>• DS-X9148 MDS 9000 48-port 1/2/4/ Gbps FC Module | • DS-X9304-18K9 MDS 9000 18/4-port Multiservice Module | • DS-X9704 MDS 9000 4-port 10 Gbps FC Module | • DS-X9032-SSM MDS 9000 32-Port 1/2-Gbps Fibre Channel Storage Services Module | • DS-X9316-SSNK9 MDS 9000 16-Port Storage Services Node |
| Advanced Features | • Port speed: 1/2/4/8-Gbps autosensing, optionally configurable<br>• Buffer credits: 16 per port (sharedmode ports), up to 500 per port (dedicated-mode ports), up to 4095 on an individual port (dedicated-mode ports with optional Enterprise Package license activated)<br>• PortChannel: up to 16 ports<br>• Cisco TrustSec FC Link Level Encryption<br>• FICON:<br>　· FC-SB-3 compliant–Cascaded FICON fabrics<br>　· Intermix of FICON and Fibre Channel FCP traffic<br>　· CUP management interface | • Port speed: 1/2/4/ Gbps autosensing, optionally configurable<br>• Buffer credits: 16 per port (shared-mode ports), up to 250 per port (dedicated-mode ports), up to 4095 on an individual port (dedicated-mode ports with optional Enterprise Package license activated)<br>• PortChannel: Up to 16 ports<br>• FICON:<br>　· FC-SB-3 compliant–Cascaded FICON fabrics<br>　· Intermix of FICON and Fibre Channel FCP traffic<br>　· CUP management interface | • Port speed: 18 1/2/4-Gbps FC autosensing, optionally configurable<br>• 4 Gigabit Ethernet IP Storage Services ports<br>• IP Storage Services:<br>　· FCIP<br>　· IPSec Encryption<br>　· FCIP Compression<br>　· FCIP Tape Acceleration<br>　· FCIP Tape Read/Write Acceleration<br>　· iSCSI<br>　· Internet Storage Name Server (iSNS)<br>　· iSCSI Network Boot Protocol (iNBP)<br>　· CUP management interface<br>• Performance:<br>　· Port speed: 1-Gbps Ethernet<br>　· IP storage services ports per chassis: Up to 44 ports per chassis<br>　· IP storage services ports per rack: Up to 132 ports per 42U rack<br>　· FCIP tunnels: Up to 3 per port<br>• Cisco Storage Media Encryption (SME)<br>• Cisco I/O Accelerator (IOA)<br>• Cisco Data Mobility Manager (DMM)<br>• Buffer credits: 16 per port (shared-mode ports), up to 250 per port (dedicated-mode ports), up to 4095 on an individual port (dedicated-mode ports with optional Enterprise Package license activated)<br>• PortChannel: Up to 16 ports<br>• FICON:<br>　· FC-SB-3 compliant<br>　· Cascaded FICON fabrics<br>　· Intermix of FICON and Fibre Channel FCP traffic<br>　· CUP management interface | • Port speed: 10-Gbps<br>• Buffer credits: 16 per port (shared-mode ports), up to 750 per port (dedicated-mode ports), up to 4095 on an individual port (dedicated-mode ports with optional Enterprise Package license activated)<br>• PortChannel: Up to 16 ports<br>• FICON:<br>　· FC-SB-3 compliant<br>　· Cascaded FICON fabrics<br>　· Intermix of FICON and Fibre Channel FCP traffic<br>　· CUP management interface | • 32-port 1/2-Gbps Fibre Channel switching<br>• Fibre Channel Write Acceleration (FC-WA)<br>• Interface (SCSI) flow-statistics monitoring<br>• Cisco Data Mobility Manager (DMM)<br>• Network-Assisted Applications with the SANTap protocol<br>• Capable of delivering network-hosted Applications<br>• Secure Erase | • 16 Gigabit Ethernet IP Storage Services ports<br>• IP Storage Services<br>　· FCIP<br>　· IPSec Encryption<br>　· FCIP Compression<br>　· FCIP Tape Acceleration<br>　· FCIP Tape Read/Write Acceleration<br>• Performance<br>　· Port speed: 1-Gbps Ethernet<br>　· IP storage services ports per chassis: Up to 208 ports per chassis<br>　· IP storage services ports per rack: Up to 628 ports per 42U rack<br>　· FCIP tunnels: Up to 3 per port<br>• Cisco Storage Media Encryption (SME)<br>• Cisco I/O Accelerator (IOA)<br>• PortChannel: Up to 16 ports<br>• FICON<br>　· FC-SB-3 compliant<br>　· Cascaded FICON fabrics<br>　· Intermix of FICON and Fibre Channel FCP traffic<br>　· IBM CUP management interface |
| SFP Optics Supported | • 8-Gbps—SW, LW SFP<br>• 4-Gbps—CWDM, SW, MR, LW LC SFP<br>• 2-Gbps—CWDM, DWDM SFP | • 4-Gbps—CWDM, SW, MR, LW, LC SFP<br>• 2-Gbps—CWDM, DWDM, SW, LW, LC SFP | • 4-Gbps—CWDM, SW, MR, LW, LC SFP<br>• GE, GE Copper<br>• 2-Gbps—CWDM, DWDM, LC SFP | • 10-Gbps—SR, LR, ER , CX4 X2 to 40km<br>• 10-Gbps Ethernet SR, DWDM | • 2-Gbps—CWDM, DWDM, SW, LW, LC SFP | • GE, GE Copper<br>• 2-Gbps: CWDM, DWDM, LC SFP |

Industry Recognition for Cisco MDS 9000 FAMILY Solutions