




# Cisco MDS 9000 Series Switches




## Overview of Cisco Storage Networking Solutions






## Cisco® MDS 9000 Series 32-Gbps Directors

Cisco Model	Cisco MDS 9718 multilayer director	Cisco MDS 9710 multilayer director	Cisco MDS 9706 multilayer director
			
<b>Configuration</b>	Chassis, dual Supervisor-1E Module, and up to 16 x 3000-Watt (W) power supplies	Chassis, dual Supervisor-1 Module, and up to 8 x 3000W power supplies	Chassis, dual Supervisor-1 Module, and up to 4 x 3000W power supplies
<b>Maximum 2/4/8/10/16/32-Gbps Fibre Channel ports per chassis</b>	768	384	192
<b>Maximum 10-Gbps Fibre Channel over Ethernet (FCoE) ports per chassis</b>	768	384	192
<b>Maximum 40-Gbps FCoE ports per chassis</b>	384	192	96
<b>Maximum Fibre Channel over IP (FCIP) ports per chassis</b>	128 x 1/10 Gigabit Ethernet 32 x 40 Gigabit Ethernet <sup>1</sup>	64 x 1/10 Gigabit Ethernet 16 x 40 Gigabit Ethernet <sup>1</sup>	32 x 1/10 Gigabit Ethernet 8 x 40 Gigabit Ethernet <sup>1</sup>
<b>Port speed</b>	2/4/8/10/16/32-Gbps Fibre Channel 10/40-Gbps FCoE 1/10/40-Gbps <sup>1</sup> FCIP		
<b>Port modules and Cisco part numbers</b>	48-port 4/8/16/32-Gbps Fibre Channel switching module 48-port 2/4/8/10/16-Gbps Fibre Channel switching module 24-port 2/4/8/10/16-Gbps Fibre Channel, 8-port 1/10 Gigabit Ethernet for FCIP, and 2-port 40 Gigabit Ethernet <sup>1</sup> for FCIP 24-port 40-Gbps FCoE module 48-port 10-Gbps FCoE module		DS-X9648-1536K9 DS-X9448-768K9 DS-X9334-K9 DS-X9824-960K9 DS-X9848-480K9

<sup>1</sup> 40 Gigabit Ethernet ports on the 24/10-SAN extension module will be enabled in the future.

Cisco Model	Cisco MDS 9718 multilayer director	Cisco MDS 9710 multilayer director	Cisco MDS 9706 multilayer director
			
<b>Licenses and Cisco part numbers</b>	<p>SAN Insights Package for MDS 9700 32G Directors Enterprise package license for 1 MDS9700 switch</p> <p>DCNM for SAN License for MDS 9700</p> <p>Mainframe package license for 1 MDS 9700 Series Multilayer Director switch</p> <p>IOA License for 24/10 Module (1x engine) on MDS 9700</p> <p>IOA License Pack for 24/10 Module (2X engines) on MDS 9700</p>		<p>L-D-M97S-AXK9=M97ENTK9</p> <p>DCNM-SAN-M97-K9</p> <p>M97FIC1K9</p> <p>M97IOA2410=</p> <p>M97IOA24102X=</p>
<b>IBM Fibre Connection (FICON) certification</b>	No	Yes	Yes
<b>Expandability</b>	16 module slots	8 module slots	4 module slots
<b>Rack units</b>	26	14	9
<b>Chassis per rack</b>	1	2	3
<b>Crossbar switching fabric module</b>	DS-X9718-FAB1	DS-X9710-FAB1	DS-X9706-FAB1
<b>Supervisor</b>	DS-X97-SF1E-K9	DS-X97-SF1-K9	DS-X97-SF1-K9
<b>Power supply</b>	DS-CAC97-3KW AC PSU, DS-CDC97-3KW= DC PSU, DS-CHV-3.5KW HVDC PSU	DS-CAC97-3KW AC PSU, DS-CDC97-3KW= DC PSU, DS-CHV-3.5KW HVDC PSU	DS-CAC97-3KW AC PSU, DS-CDC97-3KW= DC PSU, DS-CHV-3.5KW HVDC PSU
<b>Features</b>	<ul style="list-style-type: none"> <li>• Data center SAN consolidation</li> <li>• Business continuance</li> <li>• Centralized SAN management</li> <li>• Advanced SAN security for compliance and regulation</li> <li>• Centralized backup, recovery, and archiving through intelligent fabric applications</li> <li>• Native switch-based programming and Representational State Transfer (REST) API support</li> </ul>		

## Cisco MDS 9000 Series 32-Gbps Fabric Switches

Cisco Model	Cisco MDS 9132T 32G Multilayer Fabric Switch	Cisco MDS 9148T 32G Multilayer Fabric Switch	Cisco MDS 9396T 32G Multilayer Fabric Switch
			
<b>Configuration</b>	Semi-modular 1RU chassis; configurable to 8, 16, 24 or 32 ports enabled	Fixed 1RU chassis; configurable to 24, 32, 40 or 48 ports enabled	Semi-modular 2RU chassis; configurable to 48, 64, 80 or 96 ports enabled
<b>Ports</b>	<ul style="list-style-type: none"> <li>16 X 4/8/16/32-Gbps Fibre channel (line rate) base switch</li> <li>16X 4/8/16/32-Gbps Fibre channel (line rate) expansion module</li> </ul>	<ul style="list-style-type: none"> <li>48 X 4/8/16/32-Gbps Fibre channel (line rate) fixed switch</li> </ul>	<ul style="list-style-type: none"> <li>96 X 4/8/16/32-Gbps Fibre channel (line rate) semi-modular switch</li> </ul>
<b>Port speed</b>	4/8/16/32-Gbps Fibre Channel	4/8/16/32-Gbps Fibre Channel	4/8/16/32-Gbps Fibre Channel
<b>License keys</b>	L-D-M91S-AXK9= M9100ENT1K9 DCNM-SAN-M91-K9 DCNM-S-M91XK9=	L-D-M91S-AXK9= <sup>2</sup> M9100ENT1K9 DCNM-SAN-M91-K9 DCNM-S-M91XK9=	M9300ENT1K9 DCNM-SAN-M93-K9 DCNM-SAN-M93X-K9 M93ENTDCNMX-K9 M93ENTDCNM-K9
<b>Features</b>	<ul style="list-style-type: none"> <li>Modular high availability</li> <li>Autozone capable</li> <li>Integrated SAN Telemetry</li> <li>FC-NVMe ready</li> <li>Slow drain detection and link isolation</li> <li>Sophisticated Diagnostics</li> <li>Virtual Machine awareness</li> <li>Up to 8270 Buffer-to-Buffer (B2B) credits per port (up to 612-km native 32-Gbps Fibre Channel SAN extension capability)</li> <li>Native on-switch REST API and PYTHON interpreter</li> <li>FC Link encryption</li> <li>16-member port channel</li> <li>Power-On Auto Provisioning (POAP) and intelligent diagnostics</li> <li>Cisco In-Service Software Upgrade (ISSU) and dual redundant hot-swappable power supplies for high availability</li> <li>High-performance ISLs with multipath load balancing</li> <li>Smart zoning and VOQ</li> <li>Anti-counterfeit technology</li> </ul>		

<sup>2</sup> Feature available in a future software upgrade. Feature available for the MDS 9132T switch.

## Cisco MDS 9000 Series 16-Gbps Fabric Switches

Cisco Model	Cisco MDS 9148S 16G Multilayer Fabric Switch	Cisco MDS 9396S 16G Multilayer Fabric Switch	Cisco MDS 9250i 16G Multiservice Fabric Switch
			
<b>Configuration</b>	Fixed 1-Rack-Unit (1RU) chassis; configurable to 12, 24, 36, or 48 ports enabled	Fixed 2RU chassis; configurable to 48, 60, 72, 84, or 96 ports enabled	Fixed 2RU chassis; configurable to 20 or 40 Fibre Channel ports enabled
<b>Ports</b>	48 x 2/4/8/16- Gbps Fibre Channel (line rate)	96 x 2/4/8/10/16- Gbps Fibre Channel (line rate)	<ul style="list-style-type: none"> <li>• 20 x 2/4/8/16-Gbps Fibre Channel (line rate) with option to expand to 40</li> <li>• 8 x 10 Gigabit Ethernet for FCoE</li> <li>• 2 x 1/10 Gigabit Ethernet for FCIP and Small Computer System Interface over IP (Internet Small Computer Systems Interface) gateway</li> </ul>
<b>Port speed</b>	2/4/8/16-Gbps Fibre Channel	2/4/8/16-Gbps Fibre Channel and 10-Gbps Fibre Channel nonautosensing	2/4/8/10/16-Gbps Fibre Channel, 10 Gigabit FCoE, and 1/10 Gigabit Ethernet FCIP and Internet Small Computer Systems Interface gateway
<b>License keys</b>	M9100ENT1K9 DCNM-SAN-M91-K9	M9300ENT1K9 DCNM-SAN-M93-K9 DCNM-SAN-M93X-K9 M93ENTDCNMX-K9 M93ENTDCNM-K9	M9200ENT1K9 DCNM-SAN-M92-K9 M9250IIOA M9250IDMMK9 M9250IDMMT6M M9200FIC1K9 M9200XRC

Cisco Model	Cisco MDS 9148S 16G Multilayer Fabric Switch	Cisco MDS 9396S 16G Multilayer Fabric Switch	Cisco MDS 9250i 16G Multiservice Fabric Switch
<b>Features</b>	<ul style="list-style-type: none"> <li>• Power-On Auto Provisioning (POAP) and intelligent diagnostics</li> <li>• Role-based Authentication, Authorization, and Accounting (AAA) services to support regulatory requirements</li> <li>• High-performance Inter-Switch Links (ISLs) with multipath load balancing</li> <li>• Smart zoning and Virtual Output Queuing (VOQ)</li> <li>• Hardware-based slow-port detection and recovery</li> <li>• Native on-switch REST API</li> <li>• 16-member port channel</li> </ul>	<ul style="list-style-type: none"> <li>• POAP and intelligent diagnostics</li> <li>• Role-based AAA services to support regulatory requirements</li> <li>• High-performance ISLs with multipath load balancing</li> <li>• Smart zoning and VOQ</li> <li>• Hardware-based slow-port detection and recovery</li> <li>• Native on-switch REST API</li> <li>• 16-member port channel</li> <li>• Up to 4095 Buffer-to-Buffer (B2B) credits per port (up to 512-km native Fibre Channel SAN extension capability)</li> </ul>	<ul style="list-style-type: none"> <li>• SAN consolidation and convergence with integrated multiprotocol support for Fibre Channel, FCoE, FCIP, Internet Small Computer Systems Interface, and FICON</li> <li>• Optimized for performance, power, and space, with 40 line-rate 16-Gbps Fibre Channel ports and 10 x 10-Gbps Ethernet ports</li> <li>• Remote SAN extension with high-performance FCIP for remote replication and other disaster-recovery services</li> <li>• Intelligent fabric services, such as the Cisco I/O Accelerator (IOA) and Data Mobility Manager (DMM)</li> <li>• Flexibility for future growth and capacity expansion</li> <li>• Native on-switch REST API</li> <li>• 16-member port channel</li> <li>• Smart zoning and VOQ</li> </ul>

## Cisco MDS 9000 Series Software License Packages

Licensed package	Description	Features
<b>SAN Insights</b>	This package includes features that enable On-board SAN Telemetry, SAN Insights DCNM visualization and SAN Telemetry Streaming to 3 <sup>rd</sup> Party tools for Visualization	<p>On-board SAN Telemetry:</p> <ul style="list-style-type: none"> <li>Point in time views on a per switch basis with end-to-end metrics</li> <li>DCNM provides visualizations</li> </ul> <p>SAN Insights:</p> <ul style="list-style-type: none"> <li>DCNM visualization with historical data</li> <li>Topology Views, end-to-end metrics, port level metrics, etc...</li> </ul> <p>SAN Telemetry Streaming:</p> <ul style="list-style-type: none"> <li>Streams data out of the switches to any platform using industry standard formats</li> <li>Enables 3<sup>rd</sup> party applications to leverage telemetry data</li> </ul>
<b>Enterprise license</b>	This package includes advanced traffic engineering and advanced security features for enterprise SANs.	<p>Advanced traffic management</p> <ul style="list-style-type: none"> <li>Inter-VSAN Routing (IVR)</li> <li>Quality of Service (QoS)</li> <li>Extended buffer-to-buffer credits</li> </ul> <p>Security</p> <ul style="list-style-type: none"> <li>Switch-to-switch and host-to-switch authentication</li> <li>Port security</li> <li>VSAN-based access control</li> <li>IP Security (IPsec) for Internet Small Computer Systems Interface and FCIP</li> <li>Internet Key Exchange (IKE) digital certificates</li> <li>Fabric binding for Fibre Channel</li> </ul>

Licensed package	Description	Features
<b>Cisco Data Center Network Manager (DCNM) license</b>	<p>Data Center Network Manager is designed to help customers efficiently implement and manage next-generation virtualized data centers. It provides timely management support for data center hardware platforms and Cisco NX-OS Software innovations.</p>	<p>SAN management</p> <ul style="list-style-type: none"> <li>▪ Virtual machine-aware path management</li> <li>▪ Monitoring and troubleshooting</li> <li>▪ Single-pane management</li> <li>▪ Scalability: Federation and VSAN</li> <li>▪ Scoping</li> </ul> <p>LAN management</p> <ul style="list-style-type: none"> <li>▪ Network virtualization through creation of Virtual Device Contexts (VDCs)</li> <li>▪ Full automation of virtual-Port-Channel (vPC) operations</li> <li>▪ Cisco FabricPath</li> </ul>
<b>Cisco I/O Accelerator (IOA) license</b>	<p>IOA provides a fabric-based service to accelerate SCSI disk write and tape read and write I/O operations across Metropolitan Area Network (MAN) and WAN links. The IOA feature is a highly available service with clustering capability that increases reliability, performance, scalability, and application stability.</p>	<ul style="list-style-type: none"> <li>▪ Accelerate disk write and tape read and write operations over FC and FCIP</li> <li>▪ Compression for Fibre Channel links</li> <li>▪ Transparent insertion of fabric service</li> <li>▪ Clustered IOA service engines with load balancing and failover</li> <li>▪ Port-channel flexibility across multiple slots within a chassis</li> </ul>
<b>Mainframe license</b>	<p>This package includes features required in mainframe environments. FICON is an architecture for high-speed connectivity between mainframe and I/O devices.</p>	<ul style="list-style-type: none"> <li>▪ VSAN for FICON and Fibre Channel Protocol (FCP) intermode channel-to-channel operations</li> <li>▪ FICON Control Unit Protocol (CUP)</li> <li>▪ Fabric binding</li> <li>▪ Switch cascading</li> <li>▪ IBM TotalStorage virtual tape server</li> <li>▪ IBM TotalStorage Extended Remote Copy (XRC)</li> <li>▪ FICON native mode and native mixing operation</li> <li>▪ Persistent FICON FCID assignment</li> <li>▪ Port swapping for host channel cable connectors</li> <li>▪ FICON tape acceleration</li> </ul>