

# Cisco MDS 9000 Family Software Release 1.0(1)

Use this publication for the Cisco MDS 9509 Multilayer Directors and the Cisco MDS 9216 Multilayer Fabric Switches that run Cisco MDS 9000 Family Software Release 1.0(1).

## Hardware Supported

**Table 1** Hardware Supported in Software Release 1.0(1)

Hardware Feature	Description
<b>Cisco MDS 9509 Director (DS-C9509)</b>	A 9-slot Multilayer Director. The modular chassis requires 2-slots for Supervisor Modules with 7-slots available for Switching Modules. The Supervisor Module consists of a Control Engine and an Integrated Crossbar.
<b>Cisco MDS 9216 Fabric Switch (DS-C9216-K9)</b>	A 3-RU semi-modular Fabric Switch with sixteen (16) 1 / 2-Gbps auto-sensing Fibre Channel (FC) ports and an optional Switching Module.
<b>2500WAC power supply (DS-CAC-2500W)</b>	AC power supply for Cisco MDS 9509 Multilayer Director
<b>2500WDC power supply (DS-CDC-2500W)</b>	DC power supply for Cisco MDS 9509 Multilayer Director
<b>950WAC power supply (DS-CAC-950W)</b>	AC power supply for Cisco MDS 9216 Fabric Switch
<b>Supervisor Module 1 (DS-X9530-SF1-K9)</b>	Supervisor Module for Cisco MDS 9509 Director. The software supports Directors with single and dual Supervisor Modules. Dual Supervisor Modules are required for non-disruptive software upgrades and High-Availability (HA) features.
<b>16-port 1 / 2-Gbps auto-sensing Fibre Channel switching module (DS-X9016)</b>	16-port 1 / 2-Gbps auto-sensing Fibre Channel Switching Module for Cisco MDS 9216 Fabric Switch and Cisco MDS 9509 Director.
<b>32-port 1 / 2-Gbps auto-sensing Fibre Channel switching module (DS-X9032)</b>	32-port 1 / 2-Gbps auto-sensing Fibre Channel Switching Module for Cisco MDS 9216 Fabric Switch and Cisco MDS 9509 Director.
<b>512 MB Compact Flash (MEM-MDS-FLD512M)</b>	Cisco MDS 9509 external 512 MB CompactFlash for Supervisor Module
<b>1 GB MicroDrive (MEM-MDS-MD1G)</b>	Cisco MDS 9509 1 GB Microdrive for Supervisor Module



**Table 1** Hardware Supported in Software Release 1.0(1)

Hardware Feature	Description
<b>1 / 2-Gbps auto-sensing SFP/LC interface, SW (DS-SFP-FC-2G-SW)</b>	SFP (LC type) for 1 / 2-Gbps Fibre Channel or ShortWave (SW) mode
<b>1 / 2-Gbps auto-sensing SFP/LC interface, LW (DS-SFP-FC-2G-LW)</b>	SFP (LC type) for 1 / 2-Gbps Fibre Channel for LongWave (LW) mode

Software Features

**Table 2** Software Release 1.0(1) Software Features

Software Feature	Description		
<b>Fibre Channel (FC) Standards Compliance</b>	<ul style="list-style-type: none"> <li>• FC-PH, revision 4.3</li> <li>• FC-PH-2, revision 7.4</li> <li>• FC-PH-3, revision 9.4</li> <li>• FC-GS-2, revision 5.3</li> <li>• FC-GS-3, revision 7.01</li> <li>• FC-FLA, revision 2.7</li> <li>• FC-FG, revision 3.5</li> <li>• FC-SW-2, revision 5.3</li> <li>• FC-AL, revision 4.5</li> <li>• FC-AL-2, revision 7.0</li> <li>• FC-PLDA, revision 2.1</li> <li>• FC-VI, revision 1.61</li> <li>• FCP, revision 12</li> <li>• FCP-2, revision 7a</li> <li>• FC-SB-2, revision 2.1</li> <li>• FC-BB, revision 4.7</li> <li>• FC-FS, revision 1.7</li> <li>• FC-PI, revision 13</li> <li>• FC-MI, revision 1.99</li> <li>• C-Tape, revision 1.17</li> </ul>		
<b>FC Fabric Services</b>	<ul style="list-style-type: none"> <li>• Fabric Login Server: for Fibre Channel ID (FC-ID) assignment and capability exchange</li> <li>• Domain Manager: for principal switch selection and domain ID allocation</li> <li>• State Change Registration (SCR) and Registration State Change Notification (RSCN): for notification of configuration changes and resetting events</li> <li>• Broadcast Server: for broadcasting frames to end points within a virtual storage area network (VSAN)</li> <li>• Fabric Shortest Path First (FSPF): for dynamically building fabric-wide reachability</li> <li>• Name Server: for managing database about node ports</li> <li>• Fabric Zone Server: for supporting zone sets, zone members, active zones, inactive zones, and zone merge</li> <li>• Fabric Configuration Server: for discovering topology and physical attributes of switches and node ports</li> </ul>		
<b>FC Class of Service</b>	Class 2, Class 3, and Class F		
<b>FC Port Types</b>	<table border="0" style="width: 100%;"> <tr> <td style="vertical-align: top; width: 50%;">           Standard FC ports           <ul style="list-style-type: none"> <li>• F-Port: Fabric port for connecting end devices (nodes)</li> <li>• E-Port: Expansion port for connecting two FC switches</li> <li>• FL-Port: Fibre loop port for connecting loop devices</li> </ul> </td> <td style="vertical-align: top; width: 50%;">           Enhanced FC ports           <ul style="list-style-type: none"> <li>• TE-Port: Trunking E-port with Cisco product-specific enhancements</li> <li>• SD-Port: Span destination port for debugging FC messages</li> <li>• TL-Port: Translative loop port for connecting to private loop devices</li> </ul> </td> </tr> </table>	Standard FC ports <ul style="list-style-type: none"> <li>• F-Port: Fabric port for connecting end devices (nodes)</li> <li>• E-Port: Expansion port for connecting two FC switches</li> <li>• FL-Port: Fibre loop port for connecting loop devices</li> </ul>	Enhanced FC ports <ul style="list-style-type: none"> <li>• TE-Port: Trunking E-port with Cisco product-specific enhancements</li> <li>• SD-Port: Span destination port for debugging FC messages</li> <li>• TL-Port: Translative loop port for connecting to private loop devices</li> </ul>
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<b>VSANs</b>	This feature partitions a single physical SAN infrastructure in to multiple virtual SANs (VSANs). Each VSAN is a logically and functionally separate SAN with its own set of fabric services. This partitioning of fabric services provides security and greatly reduces network instability by containing fabric reconfigurations and error conditions within an individual VSAN.
<b>Zoning</b>	Zoning provides mechanisms to control access between devices in a SAN (or VSANs). Zoning can be specified using any of the following: (a) N_Port WWN (b) N_Port FC_ID (c) Fx_Port WWN To provide strict security, zoning is always enforced via per frame access control lists (ACLs) that are applied at the ingress switch.
<b>PortChannel</b>	The PortChannel feature refers to the aggregation of multiple physical FC ports into one logical link to achieve higher aggregate bandwidth and port redundancy. With this feature up to 16 E_Ports/TE_Ports can be bundled into a PortChannel to achieve a maximum of 32-Gbps of aggregate bandwidth. The ports can reside on any switching module without the need for designating a master port. The traffic within a PortChannel, traffic is load balanced using a hash of {source FC-ID, destination FC-ID} or {source FC-ID, destination FC-ID, exchange ID}
<b>High-Availability (HA) Software</b>	This feature provides a resilient software architecture for mission-critical HA deployments. Specifically: <ul style="list-style-type: none"> <li>• Non-disruptive software upgrades</li> <li>• Automatic detection and restart of applications with error conditions without any traffic disruption</li> <li>• Non-disruptive stateful switchover of supervisor modules</li> <li>• Switching module redundancy using PortChannels spanning multiple modules</li> <li>• Management network redundancy using Virtual Routing Redundancy Protocol (VRRP)</li> </ul>
<b>Security</b>	This feature provides a security framework that encompasses management access controls, zoning, and VSAN based traffic segregation. This includes: <ul style="list-style-type: none"> <li>• Fabric-wide, role-based authentication, authorization, and accounting (AAA) services using Remote Access Dial-In User Service (RADIUS)</li> <li>• Secure Shell Protocol Version 2 (SSHv2) and Simple Network Management Protocol Version 3 (SNMPv3) protocols for authentication, data integrity, and confidentiality of management traffic</li> <li>• Hardware-based enforcement of zoning polices on a per-frame basis without any performance degradation</li> <li>• VSANs provide strict traffic segregation to ensure that traffic (control and data) of a given VSAN is confined within its own domain.</li> </ul>
<b>Switch Management Interfaces</b>	The following switch management interfaces are supported: <ul style="list-style-type: none"> <li>• Command-line interface (CLI) via serial port, Out of Band (OOB) Ethernet port, and in-band IP-over-FC.</li> <li>• SNMP v1, v2, and v3 over OOB Ethernet port and in-band IP-over-FC.</li> </ul>
<b>Role based Management Access</b>	This feature provides access controls for fabric management operations by assigning roles to users. There are 64 predefined, customer configurable roles that are applicable for CLI, and SNMP access These roles describe the access control policies (read, write) for various feature-specific commands (fspf, zoning etc).



**Table 2** Software Release 1.0(1) Software Features

Software Feature	Description
<b>Diagnostics and Troubleshooting Tools</b>	<p>This feature provides diagnostics and troubleshooting tools for managing the fabric. These tools consist of the following:</p> <ul style="list-style-type: none"> <li>• Switched Port Analyzer (SPAN) to analyze traffic between ports (called SPAN source ports); the SPAN session traffic is non-intrusively directed to a SPAN destination port that has an external analyzer attached to it.</li> <li>• Cisco Fabric Analyzer to debug FC control messages; the switch sends IP encapsulated FC control messages to an external PC; the PC, which has IP connectivity to the fabric, displays these messages in textual and graphical user interface (GUI) (Ethereal) format.</li> <li>• FC Ping to check the connectivity of an N_Port.</li> <li>• FC Traceroute to check the reachability of a switch; it traces the path followed by the frame, estimates the round trip time, and determines the latency of each hop (switch) on the path.</li> <li>• Internal port loopback for various diagnostics and test purposes; it isolates the port from the external links and internally loops the traffic from the transmit path back to the receive path.</li> </ul>
<b>In-band IP-over-FC</b>	<p>This feature provides the ability to carry IP packets over a Fibre Channel network. With this feature, an external management station, attached via a 10/100 Ethernet port to a single switch in the fabric, has the ability to manage all other switches in the fabric via in-band IP-over-FC protocol.</p>
<b>Virtual Router Redundancy Protocol (VRRP)</b>	<p>This feature provides redundant paths to gateway switches (switches with Ethernet connections). VRRP protocol runs over both Ethernet and Fiber Channel networks. When running between switches on the Ethernet interface, VRRP provides redundant paths for the external management application, making it transparent to switch failures. When running in the fabric (on a per VSAN basis), VRRP provides redundant paths for non-gateway switches to communicate with external management application.</p>
<b>Traffic Management</b>	<p>This feature provides the following traffic management functions:</p> <ul style="list-style-type: none"> <li>• The internally and externally generated control traffic is assigned a higher priority. This ensures faster convergence of fabric-wide protocols such as FSPF, zone merge, and principal switch selection etc.</li> <li>• Fibre Channel Congestion Control (FCC) is a flow control mechanism that alleviates congestion in the Fibre Channel network. A switch experiencing congestion explicitly signals this condition to the ingress switch (the entry point for traffic in the fabric that is causing congestion). The ingress switch on receiving an explicit notification throttles the N_Port/NL_Port traffic by reducing the buffer-to-buffer credits.</li> </ul>
<b>Call Home</b>	<p>The Call Home feature in switches provides a notification system for alarms and events. A Call Home message is triggered by software or hardware events. The call-home feature forwards the alarms and events packaged with other relevant information in standard format to external entities. External entities can include, but are not restricted to, the administrator's pager or a server in a customer location, or Cisco System Technical Assistance Center (TAC).</p>
<b>Network Time Protocol (NTP)</b>	<p>The NTP synchronizes system clocks in the fabric, providing a precise time-base for all switches. An NTP server must be accessible from the fabric via the OOB Ethernet port. Within the fabric, NTP protocol messages are transported using IP-over-FC.</p>



**Table 2** Software Release 1.0(1) Software Features

Software Feature	Description
<b>Management Information Bases (MIBs)</b>	This release supports the Fibre Channel Element MIB (Internet Engineering Task Force [IETF] RFC 2837) and various IETF-standards based TCP/IP MIBs. Additionally, extensive sets of custom MIBs are provided for various Cisco specific enhancements.

### Orderable Software Images

The following table lists the software images and applicable ordering information for the Cisco MDS 9509 Series of Multilayer Directors and the Cisco MDS 9216 Multilayer Fabric Switches.

#### Caution:

- Enable the auto-sync command when migrating Cisco MDS 9509 Director from a single Supervisor Module to dual Supervisor Modules. This will ensure that both Supervisor Modules have the same software image and configuration files.
- Disable the auto-sync command when performing a non-disruptive upgrade of supervisor software on the Cisco MDS 9509 Director. Otherwise, the Supervisor Modules will attempt to synchronize the new software image, potentially causing a disruption in traffic.
- Always back up the switch configuration file before upgrading or downgrading the switch software to avoid losing all or part of the configuration. Back up the configuration to any of the following: Trivial File Transfer Protocol (TFTP) server, one of the external CompactFlash cards (only available on the Cisco MDS 9509), internal BootFlash.

**Table 3** Software Ordering Information

Orderable Product Number	Description
<b>M9500-SF1EK9-1.0.1</b>	Cisco MDS 9500 Supervisor/Fabric-I, Enterprise SW, Release 1.0.1
<b>M9200-EK9-1.0.1</b>	Cisco MDS 9216 Enterprise SW, Release 1.0.1

## CISCO SYSTEMS



Corporate Headquarters  
Cisco Systems, Inc.  
170 West Tasman Drive  
San Jose, CA 95134-1706  
USA  
www.cisco.com  
Tel: 408 526-4000  
800 553-NETS (6387)  
Fax: 408 526-4100

European Headquarters  
Cisco Systems International BV  
Haarlerbergpark  
Haarlerbergweg 13-19  
1101 CH Amsterdam  
The Netherlands  
www-europe.cisco.com  
Tel: 31 0 20 357 1000  
Fax: 31 0 20 357 1100

Americas Headquarters  
Cisco Systems, Inc.  
170 West Tasman Drive  
San Jose, CA 95134-1706  
USA  
www.cisco.com  
Tel: 408 526-7660  
Fax: 408 527-0883

Asia Pacific Headquarters  
Cisco Systems, Inc.  
Capital Tower  
168 Robinson Road  
#22-01 to #29-01  
Singapore 068912  
www.cisco.com  
Tel: +65 317 7777  
Fax: +65 317 7799

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