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Cisco MDS 9200 Series Hardware Installation Guide

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New and Changed Information

The *Cisco MDS 9200 Series Hardware Installation Guide* applies to the Cisco MDS SAN-OS Release 2.0(1b) or later.

Table 1 lists the new and changed features available with each supported Cisco MDS SAN-OS release for the Cisco MDS 9200 Series, with the latest release first.

Table 1 ***Documented Features for the Cisco MDS 9200 Series Hardware Installation Guide***

Feature	Description	Changed in Release	Where Documented
32-port Fibre Channel Storage Services Module (SSM)	Added 32-port Fibre Channel Storage Services Module (SSM).	2.0(2b)	32-Port Fibre Channel Storage Services Module, page 1-18
14/2-port Multiprotocol Services (MPS-14/2) module	Added 14/2-port Multiprotocol Services module.	2.0(1b)	14/2-Port Multiprotocol Services Module, page 1-12

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Preface

This preface describes the audience, organization, and conventions of the *Cisco MDS 9200 Series Hardware Installation Guide*. It also provides information on how to obtain related documentation.

Audience

To use this installation guide, you need to be familiar with electronic circuitry and wiring practices and preferably be an electronic or electromechanical technician.

Organization

This guide is organized as follows:

Chapter	Title	Description
Chapter 1	Product Overview	Provides an overview of the Cisco MDS 9200 Series and its components.
Chapter 2	Installing the Cisco MDS 9200 Series	Describes how to install the Cisco MDS 9200 Series, and includes installing modules, power supplies, and fan assemblies.
Chapter 3	Connecting the Cisco MDS 9200 Series	Describes how to connect the Cisco MDS 9200 Series, including the modules.
Appendix A	Cabinet and Rack Installation	Provides guidelines for selecting an enclosed cabinet, and the procedure for installing a switch using the optional Telco and EIA Shelf Bracket Kit.
Appendix B	Troubleshooting	Provides troubleshooting procedures for problems encountered during installation.
Appendix C	Technical Specifications	Lists the Cisco MDS 9200 Series specifications, and includes safety information, site requirements, and power connections.
Appendix D	Cable and Port Specifications	Lists cable and port specifications for the Cisco MDS 9200 Series.
Appendix E	Site Planning and Maintenance Records	Provides site planning and maintenance records.

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Conventions

This document uses the following conventions for notes, cautions, and safety warnings.

Notes and Cautions contain important information that you should be aware of.



Note

Means *reader take note*. Notes contain helpful suggestions or references to material not covered in the publication.



Caution

Means *reader be careful*. You are capable of doing something that might result in equipment damage or loss of data.

Safety warnings appear throughout this publication in procedures that, if performed incorrectly, may harm you. A warning symbol precedes each warning statement.



Warning

This warning symbol means *danger*. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. To see translations of the warnings that appear in this publication, refer to the *Regulatory Compliance and Safety Information* document that accompanied this device.

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Related Documentation

The documentation set for the Cisco MDS 9000 Family includes the following documents:

- *Cisco MDS 9000 Family Release Notes for Cisco MDS SAN-OS Releases*
- *Cisco MDS 9000 Family Interoperability Support Matrix*
- *Cisco MDS SAN-OS Release Compatibility Matrix for IBM SAN Volume Controller Software for Cisco MDS 9000*
- *Cisco MDS SAN-OS Release Compatibility Matrix for VERITAS Storage Foundation for Networks Software*
- *Regulatory Compliance and Safety Information for the Cisco MDS 9000 Family*
- *Cisco MDS 9500 Series Hardware Installation Guide*
- *Cisco MDS 9200 Series Hardware Installation Guide*
- *Cisco MDS 9216 Switch Hardware Installation Guide*
- *Cisco MDS 9100 Series Hardware Installation Guide*
- *Cisco MDS 9000 Family Software Upgrade Guide*
- *Cisco MDS 9000 Family Configuration Guide*
- *Cisco MDS 9000 Family Command Reference*
- *Cisco MDS 9000 Family Fabric Manager Configuration Guide*
- *Cisco MDS 9000 Family Fabric and Device Manager Online Help*
- *Cisco MDS 9000 Family SAN Volume Controller Configuration Guide*
- *Cisco MDS 9000 Family MIB Quick Reference*
- *Cisco MDS 9000 Family CIM Programming Reference*
- *Cisco MDS 9000 Family System Messages Reference*
- *Cisco MDS 9000 Family Troubleshooting Guide*
- *Cisco MDS 9000 Family Port Analyzer Adapter 2 Installation and Configuration Note*
- *Cisco MDS 9000 Family Port Analyzer Adapter Installation and Configuration Note*

For information on VERITAS Storage Foundation™ for Networks for the Cisco MDS 9000 Family, refer to the VERITAS website: <http://support.veritas.com/>

For information on IBM TotalStorage SAN Volume Controller Storage Software for the Cisco MDS 9000 Family, refer to the IBM TotalStorage Support website: <http://www.ibm.com/storage/support/2062-2300/>

Obtaining Documentation

Cisco documentation and additional literature are available on Cisco.com. Cisco also provides several ways to obtain technical assistance and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

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<http://www.cisco.com/techsupport>

Access to all tools on the Cisco Technical Support Website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a user ID or password, you can register at this URL:

<http://tools.cisco.com/RPF/register/register.do>



Note

Use the Cisco Product Identification (CPI) tool to locate your product serial number before submitting a web or phone request for service. You can access the CPI tool from the Cisco Technical Support Website by clicking the **Tools & Resources** link under Documentation & Tools. Choose **Cisco Product Identification Tool** from the Alphabetical Index drop-down list, or click the **Cisco Product Identification Tool** link under Alerts & RMAs. The CPI tool offers three search options: by product ID or model name; by tree view; or for certain products, by copying and pasting **show** command output. Search results show an illustration of your product with the serial number label location highlighted. Locate the serial number label on your product and record the information before placing a service call.

Submitting a Service Request

Using the online TAC Service Request Tool is the fastest way to open S3 and S4 service requests. (S3 and S4 service requests are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Service Request Tool provides recommended solutions. If your issue is not resolved using the recommended resources, your service request is assigned to a Cisco TAC engineer. The TAC Service Request Tool is located at this URL:

<http://www.cisco.com/techsupport/servicerequest>

For S1 or S2 service requests or if you do not have Internet access, contact the Cisco TAC by telephone. (S1 or S2 service requests are those in which your production network is down or severely degraded.) Cisco TAC engineers are assigned immediately to S1 and S2 service requests to help keep your business operations running smoothly.

To open a service request by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)

EMEA: +32 2 704 55 55

USA: 1 800 553-2447

For a complete list of Cisco TAC contacts, go to this URL:

<http://www.cisco.com/techsupport/contacts>

Definitions of Service Request Severity

To ensure that all service requests are reported in a standard format, Cisco has established severity definitions.

Severity 1 (S1)—Your network is “down,” or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

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Severity 2 (S2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

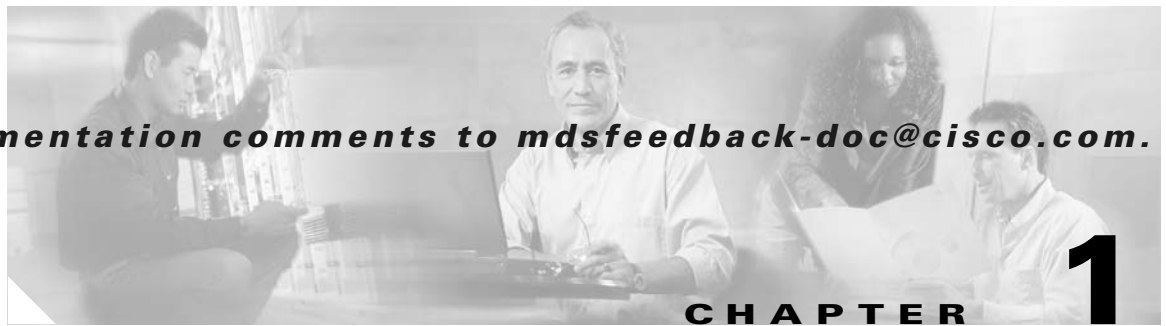
Severity 3 (S3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Severity 4 (S4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Publications and Information

Information about Cisco products, technologies, and network solutions is available from various online and printed sources.

- Cisco Marketplace provides a variety of Cisco books, reference guides, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:
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- The Cisco *Product Catalog* describes the networking products offered by Cisco Systems, as well as ordering and customer support services. Access the Cisco Product Catalog at this URL:
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- World-class networking training is available from Cisco. You can view current offerings at this URL:
<http://www.cisco.com/en/US/learning/index.html>



Product Overview

The Cisco MDS 9200 Series of multilayer fabric switches supports storage area network (SAN) applications. It provides scalability, multi-transport capability, security, and manageability to enterprise SANs. The Cisco MDS 9200 Series shares a consistent architecture with the Cisco MDS 9500 Series of multilayer directors, making it an intelligent and flexible fabric switch series. The Cisco MDS 9200 Series includes the Cisco MDS 9216i Multilayer Fabric Switch and the Cisco MDS 9216A Multilayer Fabric Switch.

The Cisco MDS 9200 Series provides the following features:

- An interface module providing local and remote management interfaces for the supervisor module.
- A spare slot for an optional hot-swappable switching or services module.
- Redundant and hot-swappable power supplies and fan modules.
- Power and cooling management and environmental monitoring.
- Switch module port interfaces that support field-replaceable, hot-swappable small form-factor pluggable (SFP) transceivers.
- Nondisruptive code load and activation.
- Redundant and self-monitoring system clocks.

The Cisco 9216i Switch includes a nonremovable supervisor module with an integrated 14-port Fibre Channel and 2-port Gigabit Ethernet switching module. The integrated supervisor module supports IP Services on the 2 Gigabit Ethernet ports. It also provides switching and local and remote management.

The Cisco 9216A Switch includes a nonremovable supervisor module with an integrated 16-port Fibre Channel switching module. The integrated supervisor module provides switching and local and remote management.

The Cisco MDS 9200 Series enhances the Cisco MDS 9216 Switch with a flexible backplane that is designed to meet the needs of future linecards in the Cisco MDS 9000 family, while maintaining backward compatibility with all existing linecards. The Cisco MDS 9200 Series is also compatible with all existing Cisco MDS 9216 power supplies and fan trays, and provides a COM1 port interface that is compatible with a standard RJ45 to DB9 adapter.

For information about how to configure the Cisco MDS 9200 Series, refer to the *Cisco MDS 9000 Family Configuration Guide*.



Note

The Cisco MDS 9200 Series requires Cisco MDS SAN-OS Release 2.0(x) or later.

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The following hot-swappable, field-replaceable modules are supported by the Cisco MDS 9200 Series:

- 16-port Fibre Channel switching module.
- 32-port Fibre Channel switching module.
- 4-port IP Storage services (IPS-4) module.
- 8-port IP Storage services (IPS-8) module.
- 14/2-port Multiprotocol Services (MPS-14/2) module.
- Advanced Services Module (ASM).
- Storage Services Module (SSM).
- Caching Services Module (CSM).

This chapter includes the following information:

- Chassis, page 1-3
- Integrated Supervisor Modules, page 1-4
- Interface Module, page 1-7
- Switching Modules, page 1-9
- Services Modules, page 1-13
- Fan Modules, page 1-26
- Supported SFP Transceivers, page 1-26

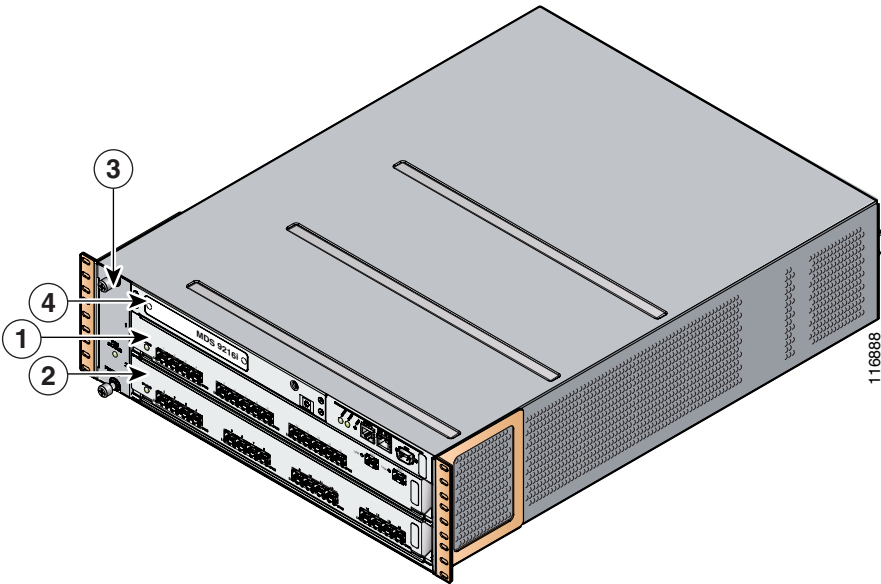
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Chassis

The Cisco MDS 9200 Series switches have two-slot chassis . The Cisco MDS 9216i (see Figure 1-1) has a nonremovable supervisor module (in slot 1) with an integrated 14-port Fibre Channel and 2-port Gigabit Ethernet switching module. See the “Cisco MDS 9216i Integrated Supervisor Module” section on page 1-5.

The Cisco MDS 9216A (see Figure 1-2) has a nonremovable supervisor module (in slot 1) with an integrated 16-port Fibre Channel switching module. See the “Cisco MDS 9216A Integrated Supervisor Module” section on page 1-5.

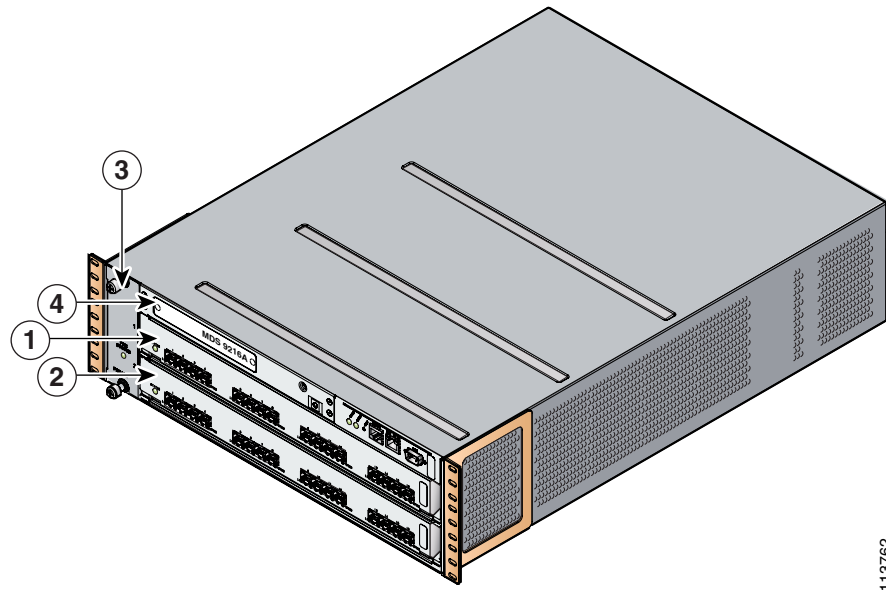
Figure 1-1 Cisco MDS 9216i Chassis



1	Supervisor module with integrated 14-port Fibre Channel and 2-port Gigabit Ethernet switching module	3	Fan module
2	Switching module or services module (such as the IPS module)	4	Interface module

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Figure 1-2 Cisco MDS 9216A Chassis



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1	Supervisor module with integrated 16-port Fibre Channel switching module	3	Fan module
2	Switching module or services module (such as the IPS module)	4	Interface module

The Cisco MDS 9200 Series supports the following additional modules:

- The nonremovable interface module (located above the integrated supervisor module), provides the console port (COM1 port) and the MGMT 10/100 Ethernet port for the integrated supervisor module. See the “Interface Module” section on page 1-7.
- An optional module in the open slot (slot 2).
- Two power supplies that are redundant by default and can be configured to be combined if desired.
- A hot-swappable fan module with four fans provides redundancy. See the “Fan Modules” section on page 1-26.

Integrated Supervisor Modules

The Cisco MDS 9200 Series switches have nonremovable integrated supervisor modules in each chassis. These modules include the following:

- Cisco MDS 9216i Integrated Supervisor Module, page 1-5
- Cisco MDS 9216A Integrated Supervisor Module, page 1-5

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Cisco MDS 9216i Integrated Supervisor Module

The nonremovable Cisco MDS 9216i integrated supervisor module provides the control and management functions for the Cisco MDS 9216i Switch, and it includes an integrated 14-port Fibre Channel switching and 2-port Gigabit Ethernet with IP services module. The Cisco MDS 9216i integrated supervisor module provides multiple communication and control paths to avoid a single point of failure.

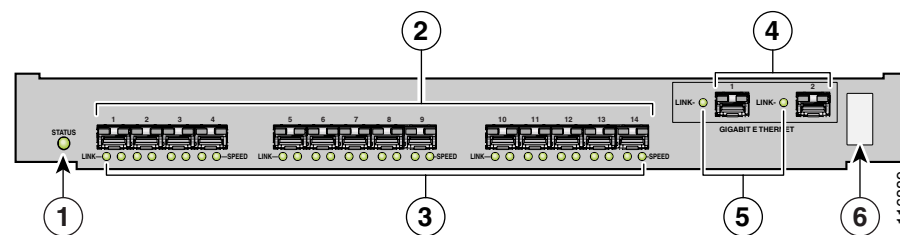


Note

For a description of the integrated 14/2-port Multiprotocol Services module and its capabilities, see the “14/2-Port Multiprotocol Services Module” section on page 1-13.

Figure 1-3 shows a Cisco MDS 9216i integrated supervisor module.

Figure 1-3 Cisco MDS 9216i Supervisor Module with Integrated 14-Port Fibre Channel and 2-Port Gigabit Ethernet Module



1	Status LED	4	Gigabit Ethernet ports
2	1-Gbps/2-Gbps Fibre Channel ports	5	Link LEDs
3	Link LEDs (under ports, on left) and Speed LEDs (under ports, on right)	6	Asset tag

The Cisco MDS 9216i integrated supervisor module has a Pentium III class processor, 1 GB of DRAM, and an internal CompactFlash card that provides 256 MB of storage for software images.

Cisco MDS 9216A Integrated Supervisor Module

The nonremovable Cisco MDS 9216A integrated supervisor module provides the control and management functions for the Cisco MDS 9216A Switch, and it includes an integrated 16-port switching module. The Cisco MDS 9216A integrated supervisor module provides multiple communication and control paths to avoid a single point of failure.



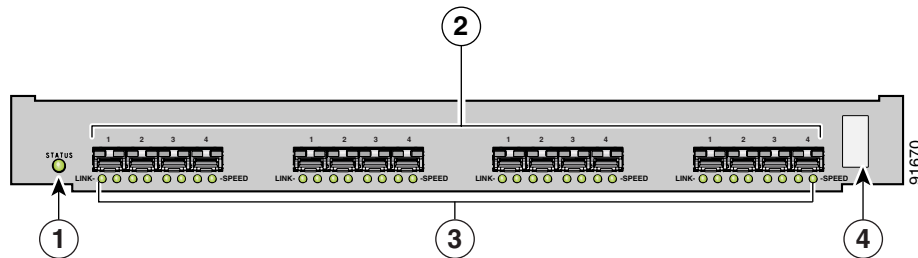
Note

For a description of the integrated 16-port switching module and its capabilities, see the “16-Port 1-Gbps/2-Gbps Fibre Channel Switching Module” section on page 1-9.

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Figure 1-4 shows a Cisco MDS 9216A supervisor module.

Figure 1-4 Cisco MDS 9216A Supervisor Module with Integrated 16-Port Switching Module.



1	Status LED	4	Link LEDs (under ports, on left) and Speed LEDs (under ports, on right)
2	1-Gbps/2-Gbps Fibre Channel ports	5	Asset tag

The Cisco MDS 9216A integrated supervisor module has a Pentium III class processor, 1 GB of DRAM, and an internal CompactFlash card that provides 256 MB of storage for software images.

LEDs on the Cisco MDS 9200 Series Integrated Supervisor Modules

Table 1-1 describes the LEDs for the Cisco MDS 9200 Series integrated supervisor modules.

Table 1-1 LEDs for the Cisco MDS 9200 Series Supervisor Modules

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (normal initialization sequence).
	Orange	The module is booting or running diagnostics (normal initialization sequence). or The inlet air temperature of the system exceeded the maximum system operating temperature limit (a minor environmental warning). To ensure maximum product life, you should immediately correct the environmental temperature and restore the system to normal operation.
	Red	The diagnostic test failed. The module is not operational because a fault occurred during the initialization sequence. or The inlet air temperature of the system exceeded the safe operating temperature limits of the card (a major environmental warning). The card shut down to prevent permanent damage. The system will be shut down after two minutes if this condition is not cleared.

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Table 1-1 LEDs for the Cisco MDS 9200 Series Supervisor Modules (continued)

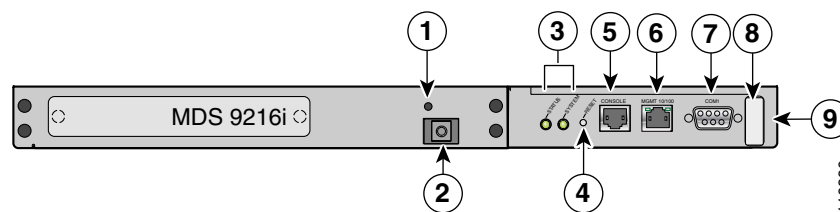
LED	Status	Description
Speed	On	2-Gbps mode.
	Off	1-Gbps mode.
Link	Solid green	Link is up.
	Flashing green	Link is up (beacon used to identify port).
	Solid yellow	Link is disabled by software.
	Flashing yellow	A fault condition exists.
	Off	No link.

Interface Module

The nonremovable interface module is located above slot 1 (see Figure 1-5) and is identical for all Cisco MDS 9200 Series switches. It provides the following local and remote management interfaces:

- RS-232 (EIA/TIA-232) console port with an RJ-45 connection that you can use to:
 - Configure the switch from the CLI.
 - Monitor network statistics and errors.
 - Configure SNMP agent parameters.
- MGMT 10/100 Ethernet port with an RJ-45 connection that provides network management capabilities.
- RS-232 COM1 port with a DB-9 connector, that can be attached to a modem.

Figure 1-5 Interface Module for the Cisco MDS 9200 Series



1	ESD socket (for ESD strap)	6	MGMT 10/100 Ethernet port (with integrated Link and Activity LEDs)
2	Grounding pad (beneath tape)	7	COM1 port
3	Status and System LEDs	8	Asset tag
4	Reset button	9	Interface module
5	Console port		

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The clock module is also part of the interface module.



Note

The system clocks in the Cisco MDS 9200 Series have a field-measured mean time between failures (MTBF) of approximately 3.2 million hours or 365 years. In the unlikely event of a clock module failure, the system generates an error message and a switchover from one clock module to the other occurs, causing the system to reset automatically.

LEDs on the Interface Module

Table 1-2 describes the LEDs for the Cisco MDS 9200 Series interface module.

Table 1-2 LEDs on the Cisco MDS 9200 Series Interface Module

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (normal initialization sequence).
	Orange	The module is booting or running diagnostics (normal initialization sequence). or The inlet air temperature of the system exceeded the maximum system operating temperature limit (a minor environmental warning). To ensure maximum product life, you should immediately correct the environmental temperature and restore the system to normal operation.
	Red	The diagnostic test failed. The module is not operational because a fault occurred during the initialization sequence. or The inlet air temperature of the system exceeded the safe operating temperature limits of the card (a major environmental warning). The card shut down to prevent permanent damage.
System	Green	All chassis environmental monitors are reporting OK.
	Orange	The power supply failed or the power supply fan failed. or Incompatible power supplies are installed. or The redundant clock failed.
	Red	The temperature of the supervisor module exceeded the major threshold.

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Table 1-2 LEDs on the Cisco MDS 9200 Series Interface Module(continued)

LED	Status	Description
MGMT 10/100 Ethernet Link LED	Green	Link is up.
	Off	No link.
MGMT 10/100 Ethernet Activity LED	Green	Traffic is flowing through port.
	Off	No link or no traffic.

Switching Modules

The Cisco MDS 9200 Series supports the following hot-swappable Fibre Channel switching modules:

- 16-Port 1-Gbps/2-Gbps Fibre Channel Switching Module
- 32-Port 1-Gbps/2-Gbps Fibre Channel Switching Module

The Cisco MDS 9200 Series supports one hot-swappable switching or services module in addition to the integrated module that is part of the supervisor module.

The Fibre Channel switching modules provide system-wide power management and autonegotiation, which allows ports to negotiate for speed at the other end of the link. Each module has temperature sensors and an EEPROM that stores serial number and model number information.

The Fibre Channel port interfaces support hot-swappable Fibre Channel SFP transceivers, that can be short wavelength (SWL) or long wavelength (LWL). The port interfaces also support coarse wavelength-division multiplexing (CWDM) SFP transceivers, which can be used for extended long wavelength (ELWL) transmission or for CWDM. See the “Supported SFP Transceivers” section on page 1-26.



Note

The internal bootflash installed on the modules are not field replaceable units. Do not remove or replace internal bootflash on the modules. Modifying the factory installed bootflash is not supported.

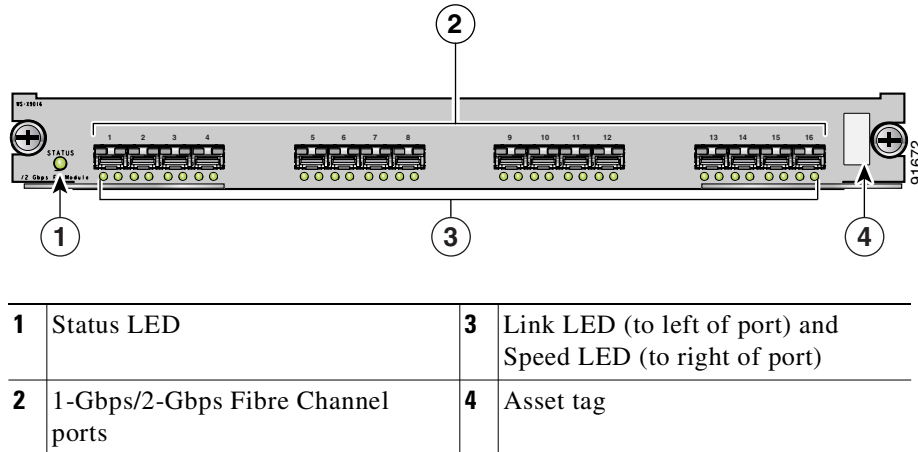
16-Port 1-Gbps/2-Gbps Fibre Channel Switching Module

The 16-port 1-Gbps/2-Gbps switching module is best used for applications requiring high bandwidth; for example, Inter-Switch Link (ISL) connections between switches and high-performance host or storage controllers. The 16-port switching module supports a sustained data rate of up to 2 Gbps in each direction, on all ports simultaneously. Figure 1-6 shows a 16-port 1-Gbps/2-Gbps switching module.

The autosensing 1-Gbps/2-Gbps ports of the 16-port Fibre Channel switching module deliver up to 64 Gbps of continuous, aggregate bandwidth when attached to high performance servers and storage subsystems.

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Figure 1-6 Cisco MDS 9000 Family 16-Port 1-Gbps/2-Gbps Switching Module



32-Port 1-Gbps/2-Gbps Fibre Channel Switching Module

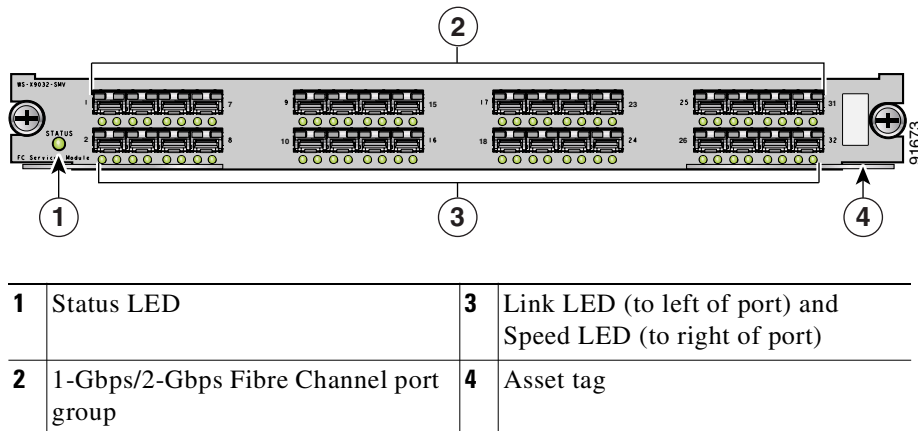
The 32-port 1-Gbps/2-Gbps Fibre Channel switching module can be used to allocate bandwidth optimally, and it delivers the industry's highest linecard port density. The module is organized into eight four-port groups. Only the first port in each four-port group can be an ISL. If the first port is an ISL, the other three ports in the group are disabled. The four ports within a port group share a single internal channel resulting in a subscription ratio of approximately 3.2:1. The 32-port 1-Gbps/2-Gbps switching module provides more ports at a lower price per port. Figure 1-7 shows a 32-port switching module.



Tip

For a full 2-Gbps bandwidth between two hosts, connect one host to the first port group and the second host to the second port group.

Figure 1-7 Cisco MDS 9000 Family 32-Port 1-Gbps/2-Gbps Switching Module



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Switching Module Features

Each switching module draws its power from the 42 V supplied on the backplane with local DC/DC power converters and regulators.

The control processor on the switching module provides power-on, offline, and online diagnostics. The control processor can be used to configure devices on the switching module and to gather statistical data from each port.

The control processor can determine which slot it is plugged into, and it can monitor its DC/DC power source and temperature. The control processor signals the supervisor module and displays an alarm on its front panel when a problem is detected.

The front panel on the switching module provides basic status information, such as power-on, self-test running, self-test passed, alarm, and ready.

The binary image for the switching module is downloaded from the supervisor module. Prior to the image download, the control processor on the switching module runs from code stored on its local CompactFlash card.



Note

Routine software downloads are not required.

The integrated supervisor module can force a reset on the switching module and controls whether power is applied to the switching module.

If a single component or a set of components on the switching module fails, this does not disable other switching modules if that is the only failure in the system.

Each switching module has a hardware watchdog timer to detect most component failures. The watchdog timer resets the card if it is not serviced periodically.

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LEDs on the Switching Modules

Table 1-3 describes the LEDs for the 16-port and 32-port switching modules.

Table 1-3 LEDs for the Cisco MDS 9000 Family Fibre Channel Switching Modules

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (normal initialization sequence).
	Orange	The module is booting or running diagnostics (normal initialization sequence). or The inlet air temperature of the system exceeded the maximum system operating temperature limit (a minor environmental warning). To ensure maximum product life, you should immediately correct the environmental temperature and restore the system to normal operation.
	Red	The diagnostic test failed. The module is not operational because a fault occurred during the initialization sequence. or The inlet air temperature of the system exceeded the safe operating temperature limits of the card (a major environmental warning). The card shut down to prevent permanent damage.
Speed	On	2-Gbps mode.
	Off	1-Gbps mode.
	Steady flashing green	Link is up (beacon used to identify port).
Link	Solid green	Link is up.
	Intermittent flashing green	Link is up (traffic on port).
	Solid yellow	Link is disabled by software.
	Flashing yellow	A fault condition exists.
	Off	No link.

The Fibre Channel switching modules provide auto-configuring Fibre Channel ports that support Fibre Channel speeds of 1.0625 Gbps and 2.125 Gbps. For more information about supported port types, refer to <http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

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Services Modules

The Cisco MDS 9200 Series supports the following hot-swappable services modules:

- 14/2-Port Multiprotocol Services Module
- IP Storage Services Modules
- 32-Port Fibre Channel Advanced Services Module
- 32-Port Fibre Channel Storage Services Module
- Caching Services Module

The Cisco MDS 9200 Series supports one hot-swappable switching or services module in addition to the integrated module that is part of the supervisor module. Each module has temperature sensors and an EEPROM that stores serial number and model number information.



Note

The internal bootflash installed on the modules are not field replaceable units. Do not remove or replace internal bootflash on the modules. Modifying the factory installed bootflash is not supported.

14/2-Port Multiprotocol Services Module

The 14/2-port Multiprotocol Services (MPS-14/2) module provides 14 1-Gbps/2-Gbps Fibre Channel autosensing ports and two 1-Gigabit Ethernet ports for iSCSI and FCIP over Gigabit Ethernet. The MPS-14/2 module supports the intelligent features available on other modules, including VSANs, security, and traffic management.

The 14 1-Gbps/2-Gbps autosensing Fibre Channel ports (labeled 1 through 14) are best used for applications requiring high bandwidth; for example, Inter-Switch Link (ISL) connections between switches and high-performance host or storage controllers. Each Fibre Channel port supports a sustained data rate of up to 2 Gbps in each direction.

The Cisco MDS 9216 Switch supports one MPS-14/2 module. The two Gigabit Ethernet ports (labeled 1 and 2) provide 1-Gbps throughput for IP services, including iSCSI and FCIP over Gigabit Ethernet. The MPS-14/2 also supports hardware-based encryption and compression for these Gigabit Ethernet ports. This hardware-based encryption handles the computationally intensive IPsec feature for IP services.

The MPS-14/2 modules support FCIP compression to maximize the effective WAN bandwidth of SAN extension solutions. It achieves up to a 30 to 1 compression ratio, with typical ratios of 2 to 1 over a wide variety of data sources. With the addition of hardware-based compression, the MPS-14/2 module is able to provide optimal levels of compressed throughput for implementations across low to high-bandwidth links.

The Gigabit Ethernet ports on the MPS-14/2 module support iSCSI protocol, FCIP protocol, or both protocols simultaneously. For information about configuring the ports, refer to the following website for the latest Cisco MDS 9000 Family configuration guides:

<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

The Fibre Channel port interfaces support hot-swappable Fibre Channel SFP transceivers, which can be short wavelength (SWL) for connectivity up to 500 meters (1640 feet), or long wavelength (LWL) for connectivity up to 10 km (6.2 miles). All interfaces are autosensing 1-Gbps or 2-Gbps compatible. The

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port interfaces also support coarse wavelength-division multiplexing (CWDM) SFP transceivers, which can be used for extended long wavelength (ELWL) transmission or for CWDM. See the “Supported SFP Transceivers” section on page 1-26.

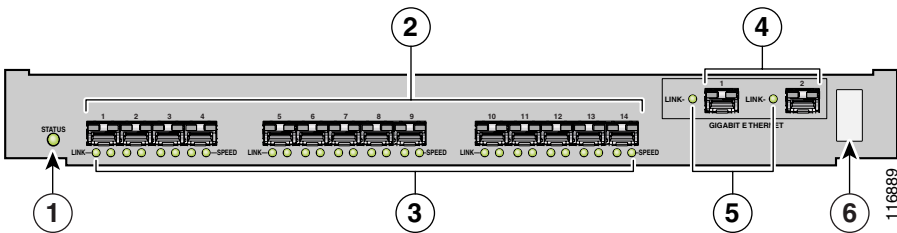


Note

Cisco MDS 9200 Series switches running Cisco MDS SAN-OS Release 2.0(1b) or later support the MPS-14/2 module.

Figure 1-8 shows an MPS-14/2 module.

Figure 1-8 MPS-14/2 Module



1	Status LED	4	Gigabit Ethernet ports
2	1-Gbps/2-Gbps Fibre Channel ports	5	Link LEDs
3	Link LEDs (under ports, on left) and Speed LEDs (under ports, on right)	6	Asset tag

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LEDs on the 14/2-Port Multiprotocol Services Module

Table 1-4 describes the LEDs for the MPS-14/2 modules.

Table 1-4 LEDs for the Cisco MDS 9000 Family MPS-14/2 Modules

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (normal initialization sequence).
	Orange	The module is booting or running diagnostics (normal initialization sequence). or The inlet air temperature of the system exceeded the maximum system operating temperature limit (a minor environmental warning). To ensure maximum product life, you should immediately correct the environmental temperature and restore the system to normal operation.
	Red	The diagnostic test failed. The module is not operational because a fault occurred during the initialization sequence. or The inlet air temperature of the system exceeded the safe operating temperature limits of the card (a major environmental warning). The card shut down to prevent permanent damage.
Speed	On	2-Gbps mode.
	Off	1-Gbps mode.
	Flashing green	Link is up (beacon used to identify port).
Link	Solid green	Link is up.
	Solid yellow	Link is disabled by software.
	Flashing yellow	A fault condition exists.
	Off	No link.

IP Storage Services Modules

The 4-port and 8-port IP Storage services (IPS-4 and IPS-8) modules provide four or eight 1-Gigabit Ethernet ports for iSCSI as well as FCIP over Gigabit Ethernet, and they support the intelligent features available on other modules, including VSANs, security, and traffic management.

The IPS module ports supports the iSCSI protocol, the FCIP protocol, or both protocols simultaneously. For information about configuring the ports, refer to the following website for the latest Cisco MDS 9000 Family configuration guides:

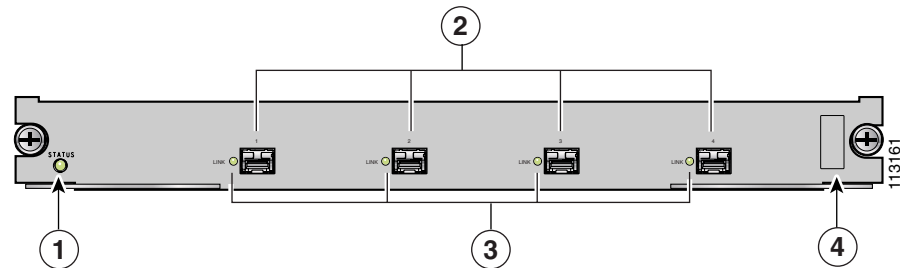
<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

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The Fibre Channel port interfaces support hot-swappable Fibre Channel SFP transceivers, which can be short wavelength (SWL) for connectivity up to 500 meters (1640 feet), or long wavelength (LWL) for connectivity up to 10 km(6.2 miles). The port interfaces also support coarse wavelength-division multiplexing (CWDM) SFP transceivers, which can be used for extended long wavelength (ELWL) transmission or for CWDM. See the “Supported SFP Transceivers” section on page 1-26.

Figure 1-9 shows an IPS-4 module.

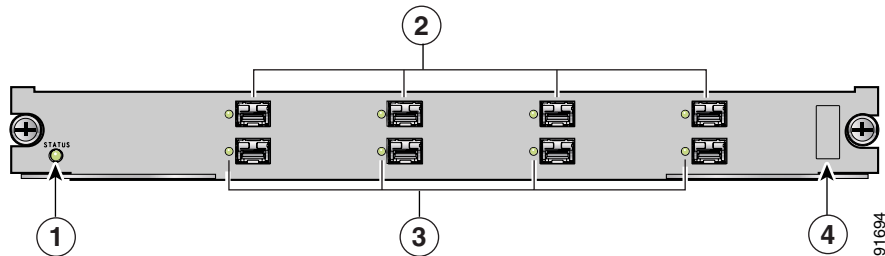
Figure 1-9 Cisco MDS 9000 Family IPS-4 Module



1	Status LED	3	Link LEDs
2	Gigabit Ethernet ports	4	Asset tag

Figure 1-10 shows an IPS-8 module.

Figure 1-10 Cisco MDS 9000 Family IPS-8 Module



1	Status LED	3	Link LEDs
2	Gigabit Ethernet ports	4	Asset tag

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LEDs on IP Storage Services Modules

Table 1-5 describes the LEDs for the IPS module.

Table 1-5 LEDs for the Cisco MDS 9000 Family IPS Modules

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (normal initialization sequence).
	Orange	The module is booting or running diagnostics (normal initialization sequence). or The inlet air temperature of the system exceeded the maximum system operating temperature limit (a minor environmental warning). To ensure maximum product life, you should immediately correct the environmental temperature and restore the system to normal operation.
	Red	The diagnostic test failed. The module is not operational because a fault occurred during the initialization sequence. or The inlet air temperature of the system exceeded the safe operating temperature limits of the card (a major environmental warning). The card shut down to prevent permanent damage.
Link	Solid green	Link is up.
	Flashing green	Link is up (beacon used to identify port).
	Solid yellow	Link is disabled by software.
	Flashing yellow	A fault condition exists.
	Off	No link.

32-Port Fibre Channel Advanced Services Module

The Cisco MDS 9000 Family 32-port Fibre Channel Advanced Services Module (ASM) enables pooling of heterogeneous storage for increased storage utilization, simplified storage management, and reduced total cost of storage ownership. The Advanced Services Module incorporates all the capabilities of the Cisco MDS 9000 DS-X9032 Fibre Channel switching module and also provides scalable, in-band storage virtualization services. The module makes it possible to allocate bandwidth optimally and delivers the industry's highest line-card port density.

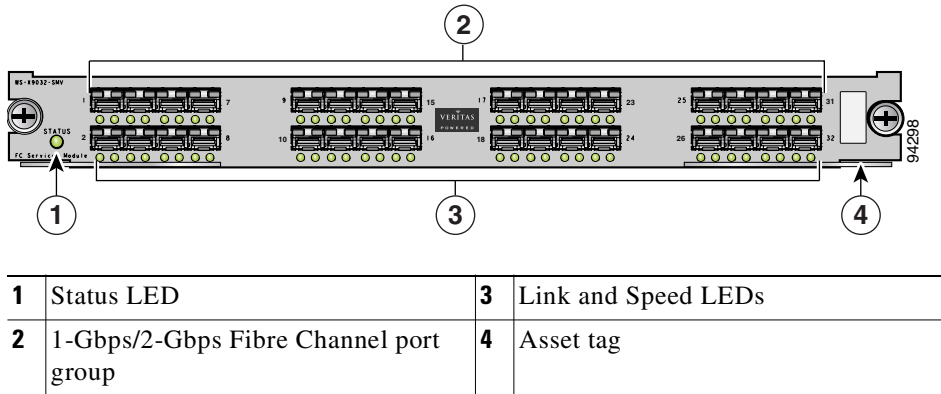
The Fibre Channel port interfaces support hot-swappable Fibre Channel SFP transceivers, which can be short wavelength (SWL) for connectivity up to 500 meters (1640 feet), or long wavelength (LWL) for connectivity up to 10 km (6.2 miles). All interfaces are autosensing 1-Gbps or 2-Gbps compatible. The

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port interfaces also support coarse wavelength-division multiplexing (CWDM) SFP transceivers, which can be used for extended long wavelength (ELWL) transmission or for CWDM. See the “Supported SFP Transceivers” section on page 1-26.

Figure 1-11 shows the Fibre Channel ASM.

Figure 1-11 Fibre Channel ASM



Each module draws power from the 42 V supplied on the backplane with local DC/DC power converters and regulators.

The control processor on the module provides power-on, offline, and online diagnostics. The control processor can be used to configure devices on the switching module and to gather statistical data from each port.

The control processor monitors the DC/DC power source and temperature. The control processor signals the supervisor module and displays an alarm on its front panel when a problem is detected.

The front panel on the services module provides basic status information, such as power-on, self-test running, self-test passed, alarm, and ready.

The binary image for the services module is downloaded from the supervisor module. Prior to the image download, the control processor on the switching module runs from code stored on its local CompactFlash card. The image for an ASM-SFN can be specified using the ASM-SFN boot variable. For details on how to specify the SSI boot variable, refer to the *Cisco MDS 9000 Family Configuration Guide*.


Note

Software downloads are only necessary when a revision of the code is needed.

The supervisor module can force a reset on the services module and controls whether power is applied to the switching module.

If a single component or a set of components on the switching module fails, this failure does not disable another switching module if that is the only failure in the system.

Each ASM has a hardware watchdog timer to detect most component failures. The watchdog timer resets the card if it is not serviced periodically.

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LEDs on the Fibre Channel Advanced Services Modules

Table 1-6 describes the LEDs for the ASM.

Table 1-6 LEDs for the Cisco MDS 9000 Family Fibre Channel ASM

LED	Status	Description
Status	Green	All diagnostics pass and the module is operational (normal initialization sequence).
	Orange	The module is booting or running diagnostics (normal initialization sequence). or The inlet air temperature of the system exceeded the maximum system operating temperature limit (a minor environmental warning). To ensure maximum product life, you should immediately correct the environmental temperature and restore the system to normal operation.
	Red	The diagnostic test failed. The module is not operational because a fault occurred during the initialization sequence. or The inlet air temperature of the system exceeded the safe operating temperature limits of the card (a major environmental warning). The card shut down to prevent permanent damage.
Speed	On	2-Gbps mode.
	Off	1-Gbps mode.
Link	Solid green	Link is up.
	Steady flashing green	Link is up (beacon used to identify port).
	Intermittent flashing green	Link is up (traffic on port).
	Solid yellow	Link is disabled by software.
	Flashing yellow	A fault condition exists.
	Off	No link.

32-Port Fibre Channel Storage Services Module

The 32-port Fibre Channel Storage Services Module (SSM) for the Cisco MDS 9000 Family supports up to 32 Fibre Channel ports, provides distributed intelligent storage services, and supports future storage services.



Note

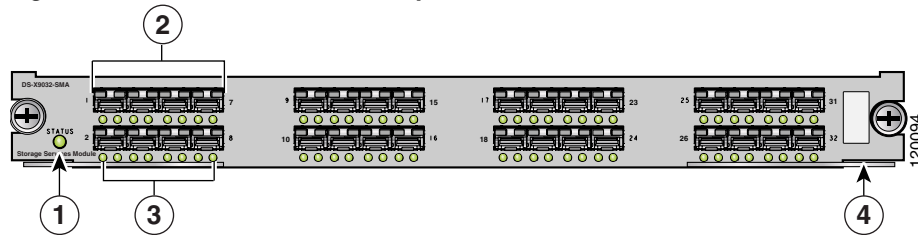
Cisco MDS 9200 Series switches running Cisco MDS SAN-OS Release 2.0(2b) or later support the SSM.

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The Fibre Channel ports support hot-swappable Fibre Channel SFP transceivers, which can be short wavelength (SWL) for connectivity up to 500 m, or long wavelength (LWL) for connectivity up to 10 km. All interfaces are autosensing 1-Gbps/2-Gbps compatible. The ports also support coarse wavelength-division multiplexing (CWDM) SFP transceivers, which can be used for extended long wavelength (EWL) transmission or for CWDM. For more information about SFP transceivers, see the “Supported SFP Transceivers” section on page 1-26.

Figure 1-12 shows the SSM, which has the part number “DS-X9032-SSM” on the left side.

Figure 1-12 Cisco MDS 9000 Family SSM



1	Status LED	3	Link and speed LEDs
2	1-Gbps/2-Gbps Fibre Channel port group	4	Asset tag

Each module draws power from the 42 V supplied on the backplane with local DC/DC power converters and regulators.

The control processor on the module provides power-on, offline, and online diagnostics. The control processor can be used to configure devices on the switching module and to gather statistical data from each port.

The control processor monitors the DC/DC power source and temperature. The control processor signals the supervisor module and displays an alarm on its front panel when it detects a problem.

The front panel on the services module provides basic status information, such as power-on, self-test running, self-test passed, alarm, and ready.

The binary image for the services module is downloaded from the supervisor module. Prior to the image download, the control processor on the services module runs from code stored on its local CompactFlash card. The image for an SSM can be specified using the SSI boot variable. For details on how to specify the SSI boot variable, refer to the *Cisco MDS 9000 Family Configuration Guide*.



Note

Software downloads are only necessary when a revision of the code is needed.

The supervisor module can force a reset on the services module and controls whether or not power is applied to the switching module.

If a single component or a set of components on the switching module fails, this failure will not disable another switching module if that is the only failure in the system.

For the detection of most component failures, each switching module has a hardware watchdog timer that resets the card if it is not serviced periodically.

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LEDs on the Storage Services Module

Table 1-7 describes the LEDs for the Storage Services Module.

Table 1-7 LEDs for the Cisco MDS 9000 Family Storage Services Module

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (normal initialization sequence).
	Orange	The module is booting or running diagnostics (normal initialization sequence). or The inlet air temperature of the system exceeded the maximum system operating temperature limit (a minor environmental warning). To assure maximum product life, you should immediately correct the environmental temperature and restore the system to normal operation.
	Red	The diagnostic test failed. The module is not operational because a fault occurred during the initialization sequence. or The inlet air temperature of the system exceeded the safe operating temperature limits of the card (a major environmental warning). The card shut down to prevent permanent damage.
Speed	On	2-Gbps mode.
	Off	1-Gbps mode.
Link	Solid green	Link is healthy.
	Steady flashing green	Link is healthy and beacon is enabled.
	Intermittent flashing green	Link is up and traffic is flowing through port.
	Solid yellow	Link is disabled by software.
	Flashing yellow	A fault condition exists.
	Off	No link.

Caching Services Module

The Caching Services Module (CSM) provides virtualization services that allow the Cisco MDS 9000 Family switches to reallocate physical resources as virtual resources for increased efficiency. The CSM receives and sends data through the switch backplane. It has two disk drives, two internal batteries for backup in case of power failure, and no external ports.

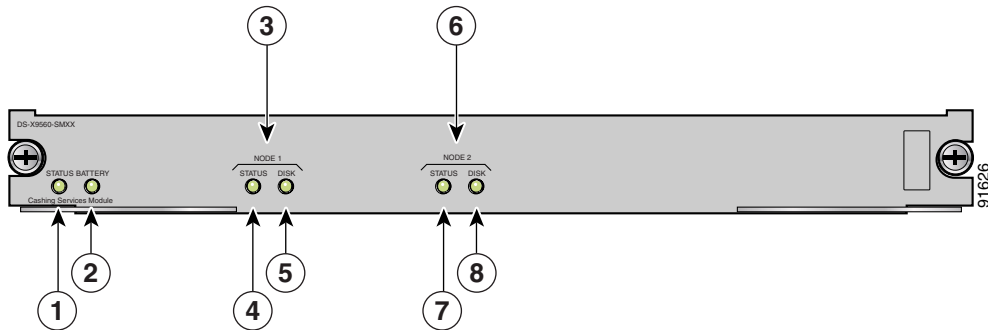
CSMs must be implemented in pairs in the fabric to provide redundancy and backup. Only two or more CSMs in a fabric are supported. However, the CSMs do not have to be installed in the same switch.

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The CSM may shut down due to the software, an external power failure occurred, or the module separated from the backplane while it still had power. The CSM automatically backs up the data in memory to the disk drives and then shuts down. The CSM batteries provide adequate power to back up data without external power.

Figure 1-13 shows the CSM.

Figure 1-13 CSM



1	Status LED	5	Disk 1 Status LED
2	Battery LED	6	Node 2 LEDs
3	Node 1 LEDs	7	Node 2 Status LED
4	Node 1 Status LED	8	Disk 2 Status LED

Figure 1-14 shows the location of the disk drives and batteries on the CSM.

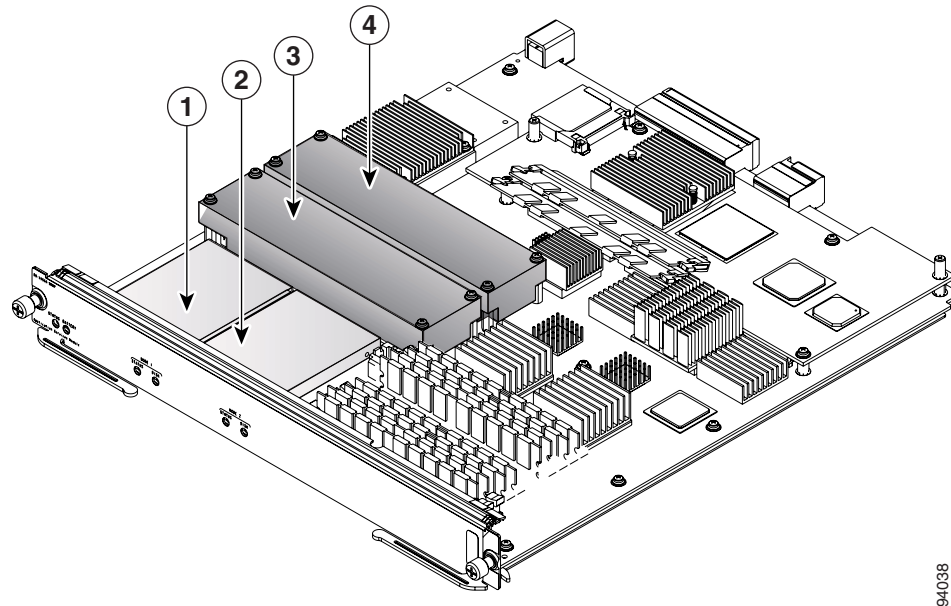


Caution

The batteries are shipped fully charged and should be handled accordingly.

Send documentation comments to mdsfeedback-doc@cisco.com.

Figure 1-14 CSM (Internal View)



1	Disk drive 2	3	Battery 2
2	Disk drive 1	4	Battery 1

See the “Removing and Installing Switching and Services Modules” section on page 2-23 for information about removing and installing the CSM and maintaining the CSM batteries.

Send documentation comments to mdsfeedback-doc@cisco.com.

LEDs on the Caching Services Module

Table 1-8 describes the LEDs for the CSM.

Table 1-8 LEDs for the Cisco MDS 9000 Family CSM

LED	Status	Description
Status	Green	All diagnostics pass, and the module is operational (normal initialization sequence).
	Orange	The module is booting or running diagnostics (normal initialization sequence). or The inlet air temperature of the system exceeded the maximum system operating temperature limit (a minor environmental warning). To ensure maximum product life, you should immediately correct the environmental temperature and restore the system to normal operation.
	Red	The diagnostic test failed. The module is not operational because a fault occurred during the initialization sequence. or The inlet air temperature of the system exceeded the safe operating temperature limits of the card (a major environmental warning). The card shut down to prevent permanent damage.
Node	Green	Node is fully operational.
	Flashing green	Node is not yet part of a cluster.
	Orange	The module is booting or node is administratively down.
	Flashing orange	Node is in service mode.
	Red	Node failure.
	Off	Node does not have power.
Battery	Green	Battery has sufficient charge to dump cache.
	Flashing green	Battery is charging and has sufficient charge to dump cache. Battery conditioning in progress.
	Flashing orange	Battery is charging but has insufficient charge to dump cache.
	Red	Battery failure or battery is charged to the extent possible but insufficient to dump cache; replace CSM.
	Off	Battery does not have power and is not charged.
Disk	Solid green	Disk is operational.
	Flashing orange	Dumping cache to disk.
	Flashing green	Restoring cache from disk.
	Red	Disk failure.
	Off	Disk does not have power.

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Power Supplies

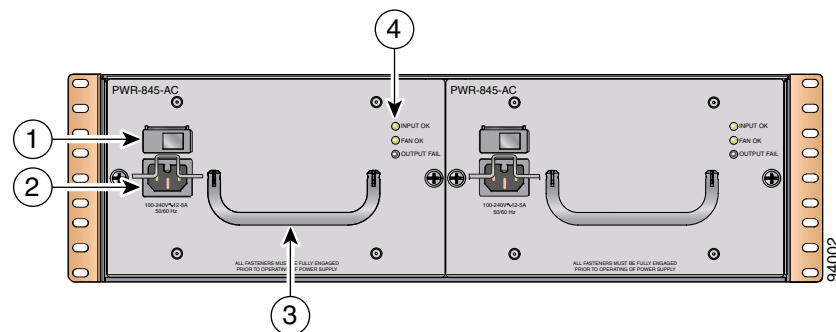
The Cisco MDS 9200 Series supports dual hot-swappable 845-W AC power supplies, each of which can supply sufficient power to the entire chassis should one power supply fail. The power supplies monitor their output voltage and provide status to the supervisor module. To prevent the unexpected shutdown of an optional module, power management software only allows a module to power up if adequate power is available.

The Cisco MDS 9200 Series power supplies can be configured to be redundant or combined. By default, they are configured as redundant, so that if one fails, the remaining power supply can still power the entire system. For information on how to configure the power supplies, refer to the following website for the latest Cisco MDS 9000 Family configuration guides:

<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

The power supplies, which are accessed from the rear of the chassis, are illustrated in Figure 1-15.

Figure 1-15 Cisco MDS 9200 Series with 845-W Dual Power Supplies



1	Power supply switch	3	Power supply handle
2	AC power connection	4	Power supply LEDs

Table 1-9 describes the LEDs for the Cisco MDS 9200 Series power supplies.

Table 1-9 LEDs for the Cisco MDS 9200 Series Power Supplies

LED	Status	Description
Input OK	Green	AC input is good and power supply is functioning normally.
	Off	Power supply is turned off or is not seated properly in the chassis.
Fan OK	Green	Power supply fans are operating properly.
	Off	Fan is not operating or power supply is off.
Output Fail	Red	Power supply is not in a stable state. If this indication continues after initial power on, check that all connections are secure, including the system fan tray.
	Off	Normal operation or power supply is turned off.

Send documentation comments to mdsfeedback-doc@cisco.com.

Fan Modules

The Cisco MDS 9200 Series supports a hot-swappable fan module with four fans. The fan module provides 80 cfm (cubic feet per minute) of cooling per slot, allowing 400 W of power dissipation per slot. Sensors on the supervisor module monitor the internal air temperature. If the air temperature exceeds a preset threshold, the environmental monitor displays warning messages.

If one or more fans within the fan module fail, the Fan Status LED turns red. Individual fans cannot be replaced, you must replace the entire fan module. The Cisco MDS 9200 Series continues to run if the fan module is removed, as long as preset temperature thresholds have not been exceeded. This means you can swap out a fan module without having to bring the system down. To replace a fan module, see the “Removing and Installing the Fan Module” section on page 2-32. The fan module has one Status LED that indicates the following conditions:

- Green—Fan module is operating normally.
- Red—One or more fans failed. Fan module should be replaced.
- Off—Fan module is not properly seated in the chassis or power supply has failed.



Note

The Cisco MDS 9200 Series can operate for five minutes without a fan module.

Supported SFP Transceivers

The following types of SFP transceivers are available from Cisco and are supported on the Cisco MDS 9200 Series:

- Fibre Channel SFP transceivers, in either SWL or LWL
- Combination Fibre Channel/Gigabit Ethernet SFP transceivers, in either SWL or LWL
- Combination Fibre Channel/Gigabit Ethernet coarse wavelength-division multiplexing (CWDM) SFP transceivers, which can be used for extended long wavelength (ELWL) transmission or for CWDM

SFP transceivers are field-replaceable. You can use any combination of SFP transceivers that are supported by the switch. The only restrictions are that SWL transceivers must be paired with SWL transceivers, LWL transceivers with LWL transceivers, and the cable must not exceed the stipulated cable length for reliable communications.

Refer to the following website for the *Cisco MDS 9000 Family Release Notes for Cisco MDS SAN-OS Release* for your software release to get the list of supported SFP transceivers:

<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

See the “SFP Transceiver Specifications” section on page D-6.

SFP transceivers can be ordered separately or with the Cisco MDS 9200 Series.



Note

Use only Cisco SFP transceivers on the Cisco MDS 9200 Series. Each Cisco SFP transceiver is encoded with model information that enables the switch to verify that the SFP transceiver meets the requirements for the switch.

Send documentation comments to mdsfeedback-doc@cisco.com.

Fibre Channel SFP Transceivers

The Cisco Fibre Channel SFP transceivers are available in SWL or LWL versions. Both of these versions are 1-Gbps and 2-Gbps capable.

The Cisco Fibre Channel SFP transceivers have LC connectors and comply with 1-Gbps and 2-Gbps Fibre Channel standards as defined in FC-P1 10.0 2.

Transmission ranges for 2 Gbps are as follows:

- Long wavelength: Up to 10 km (6.2 miles) on 9 micron single mode fiber
- Short wavelength: Up to 300 m (984 ft) on 50 micron multi-mode fiber
- Short wavelength: Up to 150 m (492 ft) on 62.5 micron multi-mode fiber

See “SFP Transceiver Specifications” section on page D-6.

Combination Fibre Channel/Gigabit Ethernet SFP Transceivers

The Cisco combination Fibre Channel/Gigabit Ethernet SFP transceivers are available in SWL or LWL versions. Both of these versions are 1-Gbps and 2-Gbps capable.

The Cisco combination SFP transceivers have LC connectors and comply with 1-Gbps and 2-Gbps Fibre Channel as defined in FC-P1 10.0 2 and Gigabit Ethernet as defined in IEEE 802.3z.

Transmission ranges are as follows:

- Long wavelength: Up to 10 km (6.2 miles) on 9 micron single mode fiber
- Short wavelength: Up to 300 m (984 ft) on 50 micron multi-mode fiber
- Short wavelength: Up to 150 m (492 ft) on 62.5 micron multi-mode fiber

See the “SFP Transceiver Specifications” section on page D-6.

CWDM Combination Fibre Channel/Gigabit Ethernet SFP Transceivers

All Fibre Channel and Gigabit Ethernet ports in the Cisco MDS 9200 Series support CWDM SFP transceivers.

The Cisco CWDM SFP transceivers have LC connectors and support both Gigabit Ethernet and Fibre Channel (1-Gbps and 2-Gbps). They match the wavelength plan of Cisco CWDM GBICs and Cisco CWDM optical add/drop multiplexers (OADMs).

CWDM SFP transceivers can be used in two ways:

- Send CWDM transmissions, which allow you to send and receive up to eight laser wavelengths carrying different signals simultaneously on the same optical fiber, using an OADM.
- Send ELWL signals, which are capable of transmitting over longer distances than LWL SFP transceivers.

There are eight different “colors” of CWDM SFP transceivers, one for each fixed wavelength. The fiber optic cables from the CWDM SFP transceivers must be connected to an OADM. The OADM combines the wavelengths of the different outgoing signals into one composite send signal. The OADM also separates the received transmissions into the different wavelengths and sends them to the corresponding CWDM SFP transceiver. See the “SFP Transceiver Specifications” section on page D-6.

Send documentation comments to mdsfeedback-doc@cisco.com.



Installing the Cisco MDS 9200 Series

This chapter describes how to install the Cisco MDS 9200 Series and its components, and it includes the following information:

- Pre-Installation, page 2-2
- Installing the Chassis in a Cabinet or Rack, page 2-5
- Installing the Switch in a Cabinet with Insufficient Front Clearance, page 2-11
- Grounding the Chassis, page 2-19
- Starting Up the Switch, page 2-21
- Removing and Installing Components, page 2-23



Note

Before you install, operate, or service the system, read the *Regulatory Compliance and Safety Information for the Cisco MDS 9000 Family* for important safety information.

Send documentation comments to mdsfeedback-doc@cisco.com.



Warning

IMPORTANT SAFETY INSTRUCTIONS

This warning symbol means danger. You are in a situation that could cause bodily injury. Before you work on any equipment, be aware of the hazards involved with electrical circuitry and be familiar with standard practices for preventing accidents. Use the statement number provided at the end of each warning to locate its translation in the translated safety warnings that accompanied this device.
Statement 1071

SAVE THESE INSTRUCTIONS



Warning

This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.
Statement 1017



Warning

Only trained and qualified personnel should be allowed to install, replace, or service this equipment.
Statement 1030



Warning

A readily accessible two-poled disconnect device must be incorporated in the fixed wiring. Statement 1022



Note

Each new switch requires a license; refer to the following website for the latest Cisco MDS 9000 Family configuration guides containing information on this feature:
<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

Pre-Installation

This section includes the following information:

- Installation Options, page 2-2
- Installation Guidelines, page 2-3
- Required Equipment, page 2-4
- Unpacking and Inspecting the Switch, page 2-4

Installation Options

The Cisco MDS 9200 Series can be installed using the following methods:

- In an open EIA rack, using:
 - The rack-mount kit shipped with the switch
 - The Telco and EIA Shelf Bracket Kit (an optional kit, purchased separately) in addition to the rack-mount kit shipped with the switch

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- In a perforated or solid-walled EIA cabinet, using:
 - The rack-mount kit shipped with the switch
 - The Telco and EIA Shelf Bracket Kit (an optional kit, purchased separately) in addition to the rack-mount kit shipped with the switch
- In a two-post Telco rack, using:
 - The Telco and EIA Shelf Bracket Kit (an optional kit, purchased separately) in addition to the front brackets shipped with the switch

For instructions on installing the switch using the rack-mount kit shipped with the switch, see the “Installing the Chassis in a Cabinet or Rack” section on page 2-5.

For instructions on installing the switch using the optional, separately purchased Telco and EIA Shelf Bracket Kit, see the “Cisco MDS 9000 Family Telco and EIA Shelf Bracket” section on page A-4.

**Note**

The optional Telco and EIA Shelf Bracket Kit is not provided with the switch. To order the kit, contact your switch provider.

Installation Guidelines

Follow these guidelines when installing the Cisco MDS 9200 Series:

- Plan your site configuration and prepare the site before installing the chassis. Appendix E, “Site Planning and Maintenance Records,” lists the recommended site planning tasks.
- Record the information listed in Appendix E, “Site Planning and Maintenance Records,” as you install and configure the switch.
- Ensure there is adequate space around the switch to allow for servicing the switch and for adequate airflow (Appendix C, “Technical Specifications,” lists airflow requirements).
- Ensure the air-conditioning meets the heat dissipation requirements listed in Appendix C, “Technical Specifications.”
- Ensure the cabinet or rack meets the requirements listed in Appendix A, “Cabinet and Rack Installation.”

**Note**

Jumper power cords are available for use in a cabinet. See the “Jumper Power Cord” section on page C-8.

- Ensure the chassis is adequately grounded. If the switch is not mounted in a grounded rack, we recommend connecting both the system ground on the chassis and the power supply ground to an earth ground.
- Ensure the site power meets the power requirements listed in Appendix C, “Technical Specifications.” If available, you can use an uninterruptible power supply (UPS) to protect against power failures.

**Caution**

Avoid UPS types that use ferroresonant technology. These UPS types can become unstable with systems like the Cisco MDS 9000 Family, which can have substantial current draw fluctuations because of fluctuating data traffic patterns.

Send documentation comments to mdsfeedback-doc@cisco.com.

- Ensure that circuits are sized according to local and national codes. For North America, the 845-W power supply requires a 15-A or 20-A circuit.

If you are using a 200- or 240-VAC power source in North America, the circuit must be protected by a two-pole circuit breaker.


Caution

To prevent loss of input power, ensure the total maximum loads on the circuits supplying power to the switch are within the current ratings for the wiring and breakers.

- Use the following screw torques when installing the switch:
 - Captive screws: 4 in-lb
 - M3 screws: 4 in-lb
 - M4 screws: 12 in-lb
 - 10-32 screws: 20 in-lb
 - 12-24 screws: 30 in-lb

Required Equipment

Gather the following items before beginning the installation:

- Number 1 and number 2 Phillips screwdrivers with torque capability
- 3/16-in. flat-blade screwdriver
- Tape measure and level
- ESD wrist strap or other grounding device
- Antistatic mat or antistatic foam

The following additional items (not found in the accessory kit) are required to ground the chassis:

- Grounding cable (6 AWG recommended), sized according to local and national installation requirements; the required length depends on the proximity of the Cisco MDS 9200 Series to proper grounding facilities
- Crimping tool large enough to accommodate girth of lug
- Wire-stripping tool

Unpacking and Inspecting the Switch


Caution

When handling switch components, wear an ESD strap and handle modules by the carrier edges only. An ESD socket is provided on the chassis. For the ESD socket to be effective, the chassis must be grounded through the power cable, the chassis ground, or the metal-to-metal contact with a grounded rack.


Tip

Keep the shipping container in case the chassis requires shipping in the future.

Send documentation comments to mdsfeedback-doc@cisco.com.

**Note**

If you purchased Cisco support through a Cisco reseller, contact the reseller directly. If you purchased support directly from Cisco, contact Cisco Technical Support at this URL:
<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

**Note**

The switch is thoroughly inspected before shipment. If any damage occurred during transportation or any items are missing, contact your customer representative immediately.

To inspect the shipment, follow these steps:

- Step 1** Compare the shipment to the equipment list provided by your customer service representative and verify that you have received all items, including the following:
- Print documentation and CD-ROMs
 - Grounding lug kit
 - Rack-mount kit
 - ESD wrist strap
 - Cables and connectors
 - Any optional items ordered
- Step 2** Check for damage and report any discrepancies or damage to your customer service representative. Have the following information ready:
- Invoice number of shipper (see packing slip)
 - Model and serial number of the damaged unit
 - Description of damage
 - Effect of damage on the installation

Installing the Chassis in a Cabinet or Rack

This section describes how to use the rack-mount kit provided with the switch to install the Cisco MDS 9200 Series into a cabinet or rack that meets the requirements described in Appendix A, “Cabinet and Rack Installation.” All Cisco MDS 9200 Series switches use the same installation procedure.

**Caution**

If the rack is on wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized.

The rack-mount kit provided with the switch contains the items listed in Table 2-1. If you do not find all the parts listed in Table 2-1, you may have an older version of the rack-mount kit, which only included the front rack-mount brackets. If this is the case, you can either install the switch in the rack with just the front rack-mount brackets, or contact your customer service representative for a current version of the rack-mount kit.

Send documentation comments to mdsfeedback-doc@cisco.com.



Note

If you purchased Cisco support through a Cisco reseller, contact the reseller directly. If you purchased support directly from Cisco, contact Cisco Technical Support at this URL:
<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

Table 2-1 Contents of Cisco MDS 9200 Series Rack-Mount Kit

Quantity	Part Description
Front rack-mount bracket kit	
2	Front rack-mount brackets
12	M4 x 6-mm Phillips countersunk screws
Cable management bracket kit	
2	Cable guide
6	12-24 x 3/4-inch Phillips binder-head screws
6	10-32 x 3/4-inch Phillips binder-head screws
Rear rack-mount bracket kit	
2	Long slider rails
2	Short slider rails
2	C brackets
6	12-24 x 3/4-inch Phillips binder-head screws
6	10-32 x 3/4-inch Phillips binder-head screws
4	M4 x 6-mm, Phillips countersunk screws

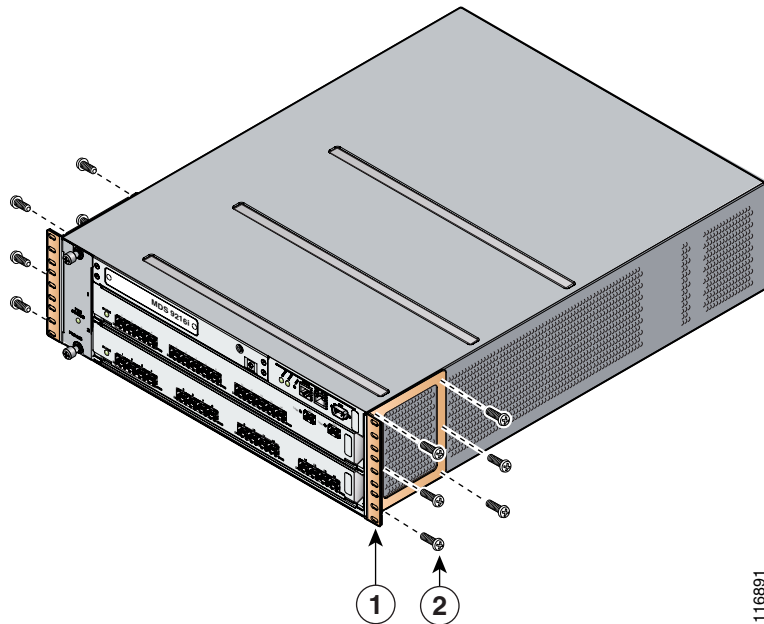
Send documentation comments to mdsfeedback-doc@cisco.com.

To install the switch in a cabinet or rack using the rack-mount kit provided with the switch, follow these steps:

Step 1 Install the front rack-mount brackets as follows:

- a. Position a front rack-mount bracket against the chassis and align the screw holes as shown in Figure 2-1. Then attach the front rack-mount bracket to the chassis with six of the M4 screws.
- b. Repeat with the other front rack-mount bracket on the other side of the switch.

Figure 2-1 Attaching Front Rack-Mount Bracket to the Cisco MDS 9200 Series



1	Front rack-mount bracket	2	Screws, M4
---	--------------------------	---	------------

Step 2 Install the C brackets on the switch as follows:

- a. Position one of the C brackets against the side of the switch and align the screw holes as shown in Figure 2-2 and Figure 2-3. Then attach the bracket to the switch with two of the flat-head M4 screws.



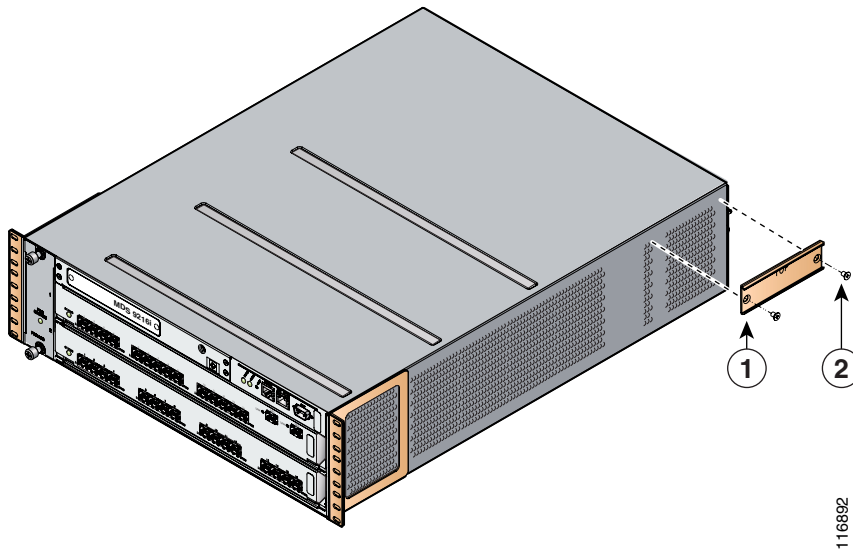
Note

Ensure the C bracket is oriented so that it blocks the fewest airflow holes on the chassis; the holes should be slightly closer to the bottom of the brackets and the text on the back of the bracket should be right side up.

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- b. Repeat with the other C bracket on the other side of the switch.

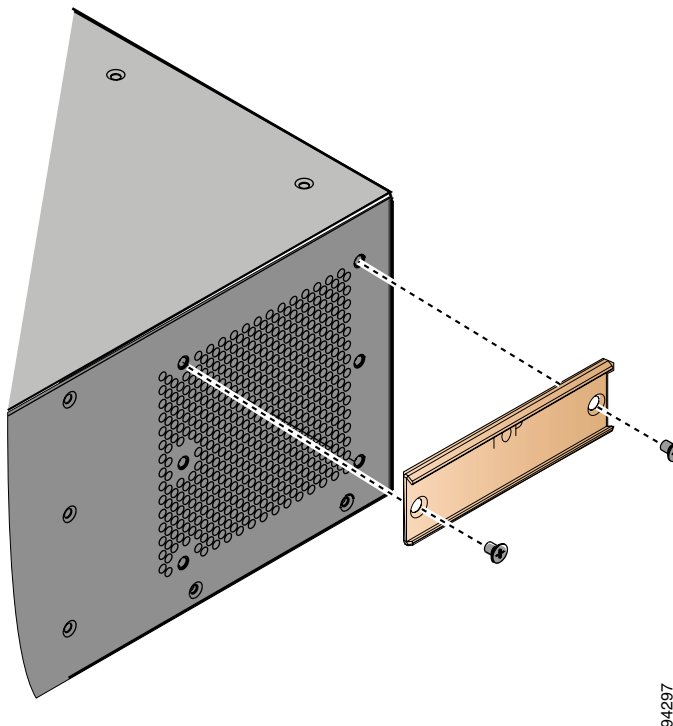
Figure 2-2 Installing C Brackets onto the Cisco MDS 9200 Series



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1	C bracket	2	Screws, M4
---	-----------	---	------------

Figure 2-3 C Brackets for the Cisco MDS 9200 Series (Close-Up View)



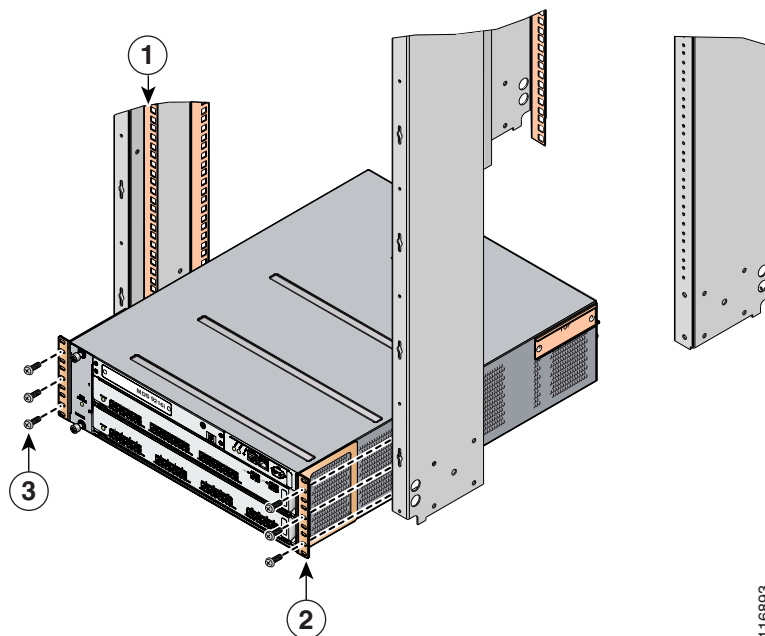
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Step 3 Position the chassis in the rack, inserting the rear of the chassis between the front mounting rails (see Figure 2-4). Use the 12-24 x 3/4-in. or 10-32 x 3/4-in. screws (depending on the type of rack) to attach the front rack-mount brackets to the mounting rails (three per side).

If you are installing the optional cable guides, place the cable guides in front of the front rack-mount brackets, and then pass the screws through the cable guides, front rack-mount brackets, and mounting rail. You can install one or both cable guides; if installing a single cable guide, it can be installed on either side.

Figure 2-4 Installing the Cisco MDS 9200 Series in the Rack



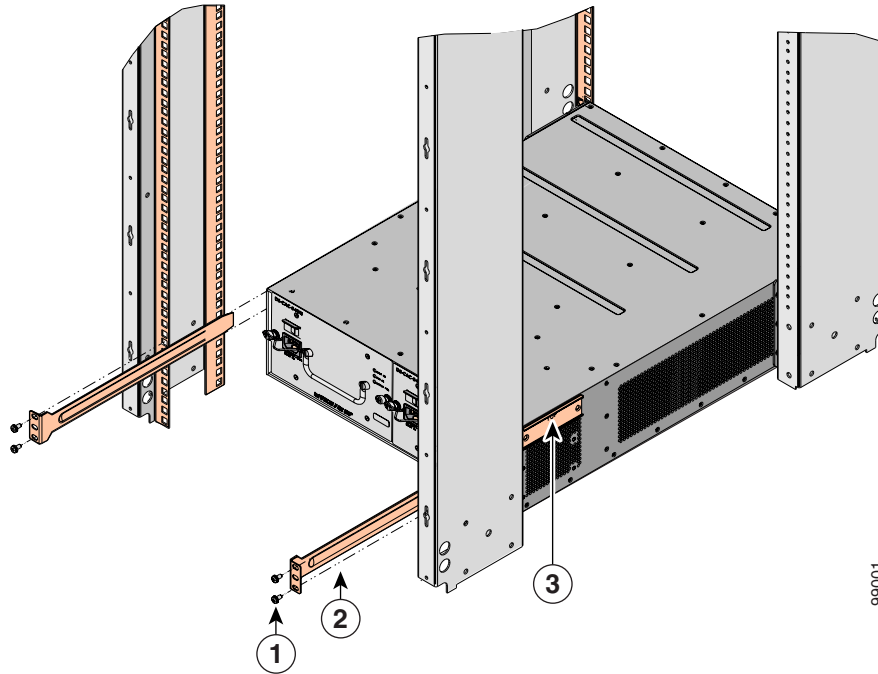
1	Mounting rail	3	Screws, 12-24 or 10-32
2	Front rack-mount bracket		

Step 4 From the back of the rack, position the longer slider rails with the ears away from the chassis and slide them into the C brackets previously installed on the sides of the chassis (see Figure 2-5).

Step 5 Level the chassis (it may sag slightly towards the back) and attach the slider rails to the mounting rails with the 12-24 x 3/4-in. or 10-32 x 3/4-in. screws, three per side.

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Figure 2-5 Inserting and Installing Slider Rails (Back View)

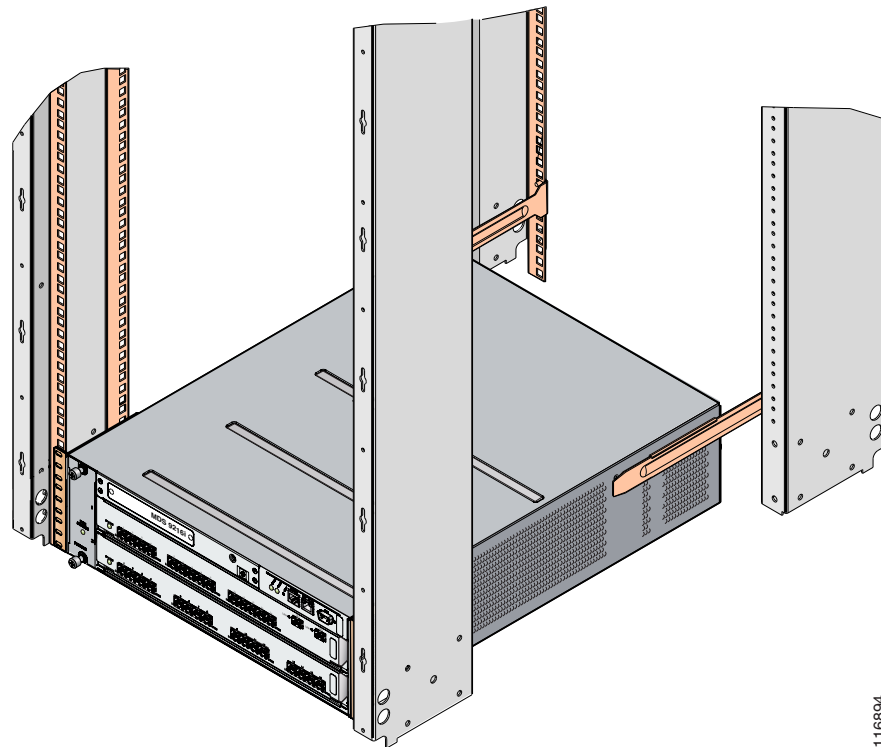


1	Screws, 12-24 or 10-32	3	C bracket
2	Slider rail		

Send documentation comments to mdsfeedback-doc@cisco.com.

Figure 2-6 shows the Cisco MDS 9200 Series completely installed in a rack.

Figure 2-6 Cisco MDS 9200 Series Chassis Installed in the Rack



Installing the Switch in a Cabinet with Insufficient Front Clearance

This section describes how to use the rack-mount kit provided with the switch to install the Cisco MDS 9200 Series into a cabinet with insufficient front-facing clearance. The Cisco MDS 9200 Series is installed rear-facing to provide adequate clearance for the fiber optic cables. This cabinet meets the requirements described in Appendix A, “Cabinet and Rack Installation,” except the cabinet has less than three inches of clearance between the inside of the front door or bezel panel and the front cabinet mounting rails. This rear-facing installation is necessary to ensure that the minimum bend radius for the fiber optic cables is maintained. In these cabinets, the Cisco MDS 9200 Series is mounted backwards, with the fiber optic cables facing toward the rear of the cabinet and the power supplies facing the front of the cabinet.



Caution

If the rack is on wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized.

Send documentation comments to mdsfeedback-doc@cisco.com.

The rack-mount kit provided with the switch contains the items listed in Table 2-1. If you do not find all of the parts listed in Table 2-1, you may have an older version of the rack-mount kit, which only included the front rack-mount brackets. If this is the case, you can either install the switch in the rack with just the front rack-mount brackets, or contact your customer service representative for a current version of the rack-mount kit.

**Note**

If you purchased Cisco support through a Cisco reseller, contact the reseller directly. If you purchased support directly from Cisco, contact Cisco Technical Support at this URL:
<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

Installing Front Rack-mount Brackets for Cabinets with 26 Inches or Greater of Rail Spacings

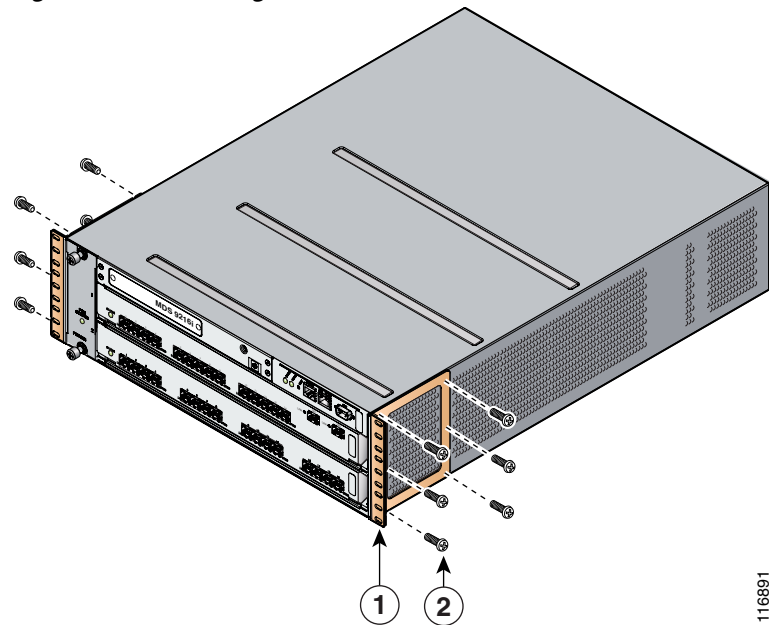
The front rack-mount brackets for the Cisco MDS 9200 Series must be installed onto the switch prior to installing the switch into the cabinet. Follow these steps for cabinets with front-mounting rail to rear-mounting rail spacings greater or equal to 26 inches.

Step 1 Install the front rack-mount brackets as follows:

- a. Position a front rack-mount bracket against the chassis and align the screw holes as shown in Figure 2-7. Then attach the front rack-mount bracket to the chassis with six of the M4 screws.
- b. Repeat with the other front rack-mount bracket on the other side of the switch.

Send documentation comments to mdsfeedback-doc@cisco.com.

Figure 2-7 Attaching Front Rack-Mount Bracket to the Cisco MDS 9200 Series

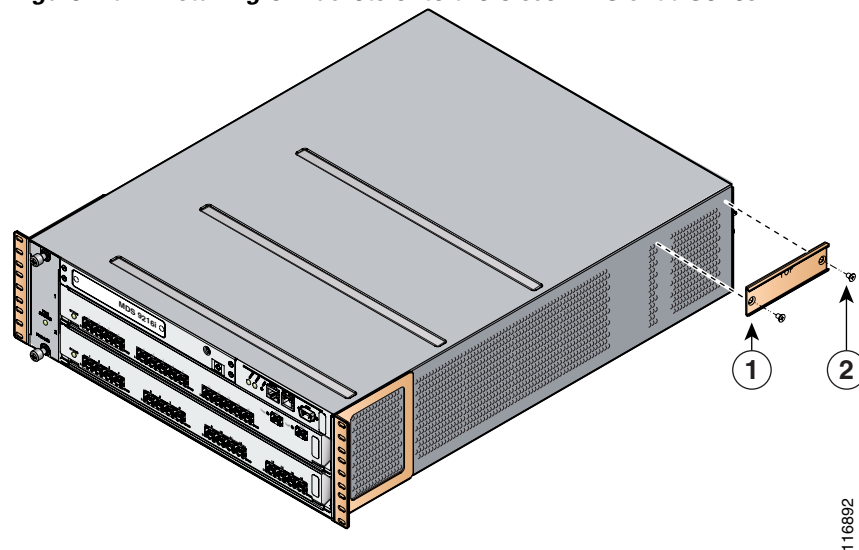


1	Front rack-mount bracket	2	Screws, M4
---	--------------------------	---	------------

Step 2 Install the C brackets on the switch as follows:

- a. Position one of the C brackets against the side of the switch and align the screw holes as shown in Figure 2-8 and Figure 2-9. Then attach the bracket to the switch with two of the flat-head M4 screws.

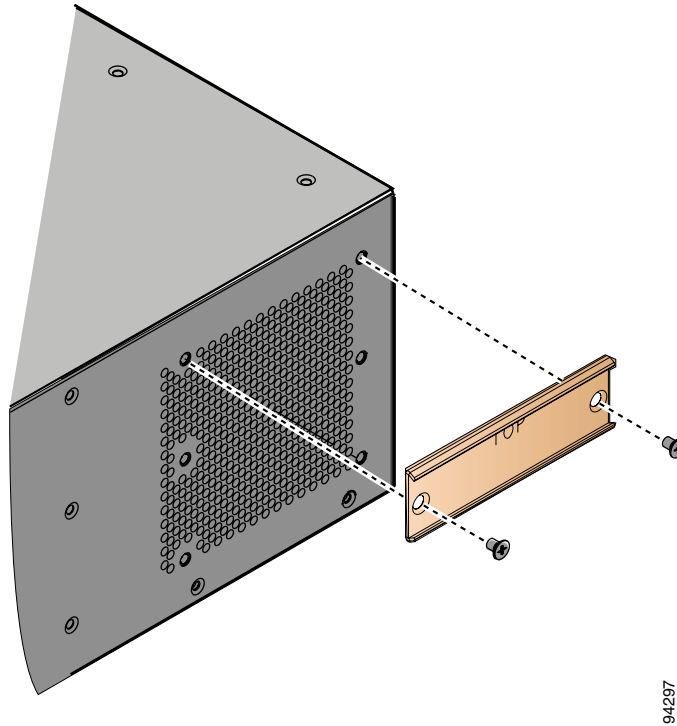
Figure 2-8 Installing C Brackets onto the Cisco MDS 9200 Series



1	C bracket	2	Screws, M4
---	-----------	---	------------

Send documentation comments to mdsfeedback-doc@cisco.com.

Figure 2-9 C Brackets for the Cisco MDS 9200 Series (Close-Up View)



Note

Ensure the C bracket is oriented so that it blocks the fewest airflow holes on the chassis; the holes should be slightly closer to the bottom of the brackets and the text on the back of the bracket should be right side up.

- b. Repeat with the other C bracket on the other side of the switch.

Installing Front Rack-mount Brackets for Cabinets with Less Than 26 Inches of Rail Spacings

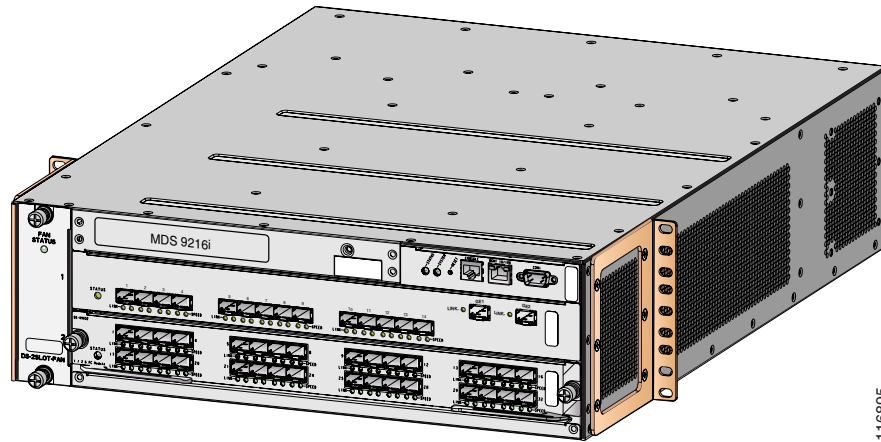
The front rack-mount brackets for the Cisco MDS 9200 Series switch must be installed onto the switch prior to installing the switch into the cabinet. For cabinets with less than 26 inches of rail-to-rail spacing, the front rack-mount bracket must be installed 180 degrees from normal. Follow these steps for cabinets with front-mounting rail to rear-mounting rail spacings less than 26 inches that need to be mounted backwards to maintain adequate fiber optic clearances.

Step 1 Install the front rack-mount brackets as follows:

- a. Position one of the front rack-mount brackets against the side of the switch and align the screw holes as shown in Figure 2-10. Then attach the bracket to the switch with the six M4 screws originally provided with the bracket.

Send documentation comments to mdsfeedback-doc@cisco.com.

Figure 2-10 Front rack-mount Brackets (Rotated) Installed on the Cisco MDS 9200 Series

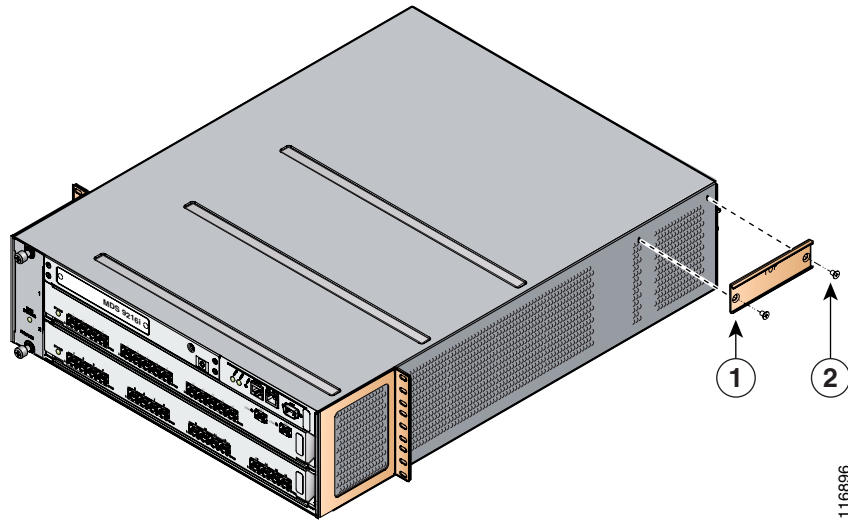


- b. Repeat with the other front rack-mount bracket on the other side of the switch.

Step 2 Install the C brackets on the switch as follows:

- a. Position one of the C brackets against the side of the switch and align the screw holes as shown in Figure 2-11 and Figure 2-12. Then attach the bracket to the switch with two of the flat-head M4 screws.

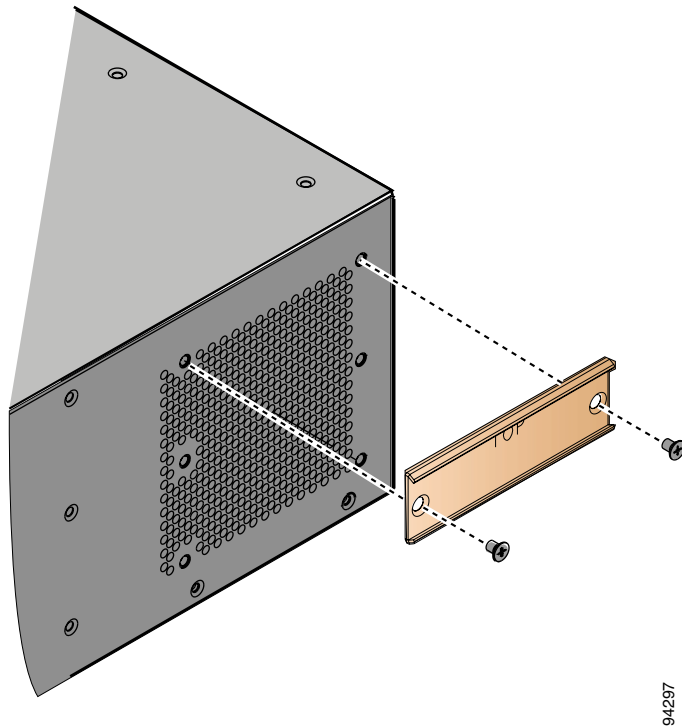
Figure 2-11 Installing C Brackets onto the Cisco MDS 9200 Series



1	C bracket	2	Screws, M4
---	-----------	---	------------

Send documentation comments to mdsfeedback-doc@cisco.com.

Figure 2-12 C Brackets for the Cisco MDS 9200 Series (Close-Up View)



Note

Ensure the C bracket is oriented so that it blocks the fewest airflow holes on the chassis; the holes should be slightly closer to the bottom of the brackets and the text on the back of the bracket should be right side up.

- b. Repeat with the other C bracket on the other side of the switch.

Installing the Cisco MDS 9200 Series Rear-Facing into Cabinet

To install the switch rear-facing in a cabinet using the rack-mount kit provided with the switch, for cabinets with insufficient front-facing clearance, follow these steps:

- Step 1** Position the chassis in the rack, inserting the back of the chassis between the rear mounting rails (see Figure 2-13). Use the 12-24 x 3/4-in. or 10-32 x 3/4-in. screws (depending on the type of rack) to attach the front rack-mount brackets to the mounting rails (three per side).

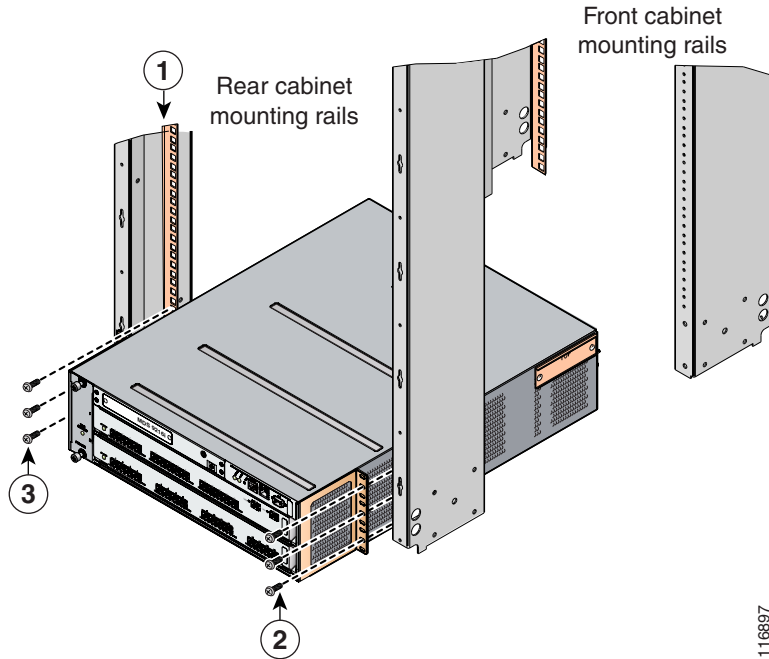
If you are installing the optional cable guides, place the cable guides in front of the front rack-mount brackets, and then pass the screws through the cable guides, front rack-mount brackets, and mounting rail. You can install one or both cable guides; if installing a single cable guide, it can be installed on either side.

Send documentation comments to mdsfeedback-doc@cisco.com.

**Note**

Figure 2-13 shows the front rack-mount brackets as rotated. Your chassis may have these brackets installed in the normal position.

Figure 2-13 Installing the Cisco MDS 9200 Series (Rear-Facing) in the Rack

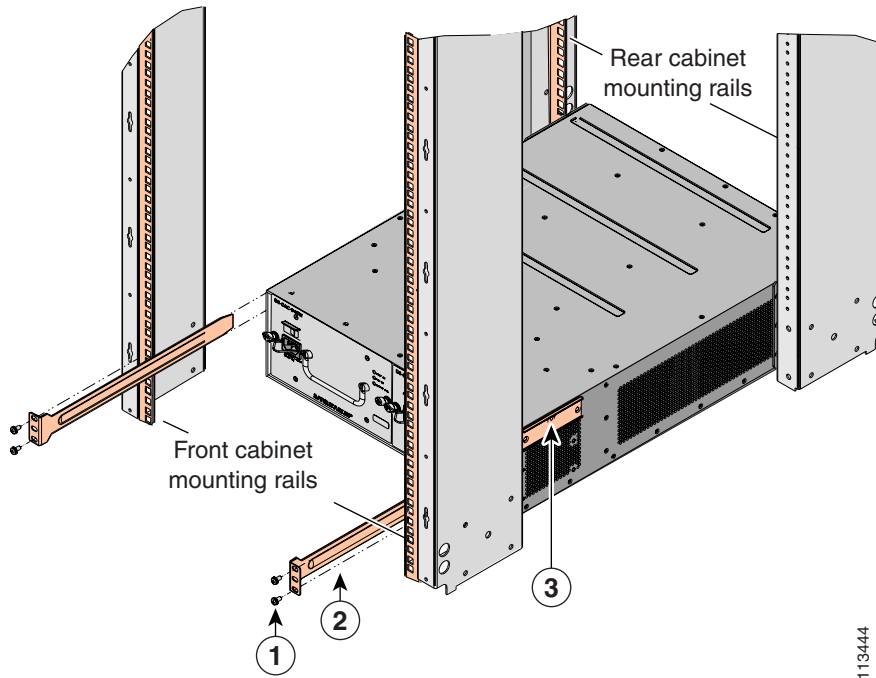


1	Mounting rail	3	Screws, 12-24 or 10-32
2	Front rack-mount bracket		

- Step 2** From the front of the rack, position the longer slider rails with the ears away from the chassis and slide them into the C brackets previously installed on the sides of the chassis (see Figure 2-14).
- Step 3** Level the chassis (it may sag slightly towards the back) and attach the slider rails to the mounting rails with the 12-24 x 3/4-in. or 10-32 x 3/4-in. screws, three per side.

Send documentation comments to mdsfeedback-doc@cisco.com.

Figure 2-14 Inserting and Installing Slider Rails (Front View)



1	Screws, 12-24 or 10-32	3	C bracket
2	Slider rail		

Figure 2-15 shows the Cisco MDS 9200 Series completely installed in a rack.

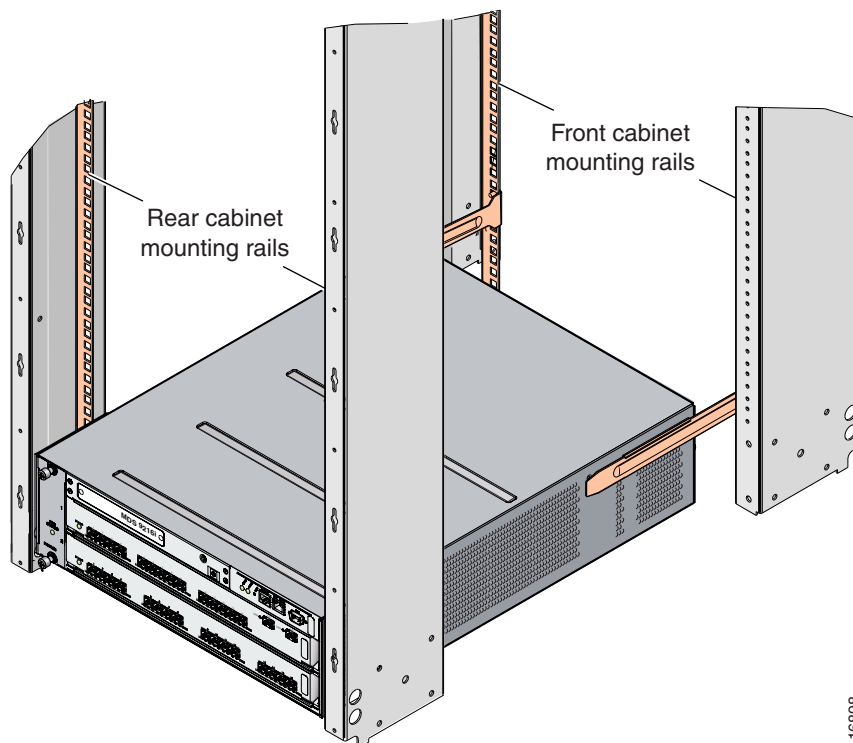


Note

Figure 2-15 shows the front rack-mount brackets as rotated. Your chassis may have these brackets installed in the normal position.

Send documentation comments to mdsfeedback-doc@cisco.com.

Figure 2-15 Cisco MDS 9200 Series Installed in the Rack (Back View)



Grounding the Chassis

The chassis has a grounding pad with two threaded M4 holes for attaching a grounding lug. Figure 2-16 shows the system ground location on the Cisco MDS 9200 Series.



Warning

When installing or replacing the unit, the ground connection must always be made first and disconnected last. Statement 1046



Caution

We recommend grounding the chassis, even if the rack is already grounded.

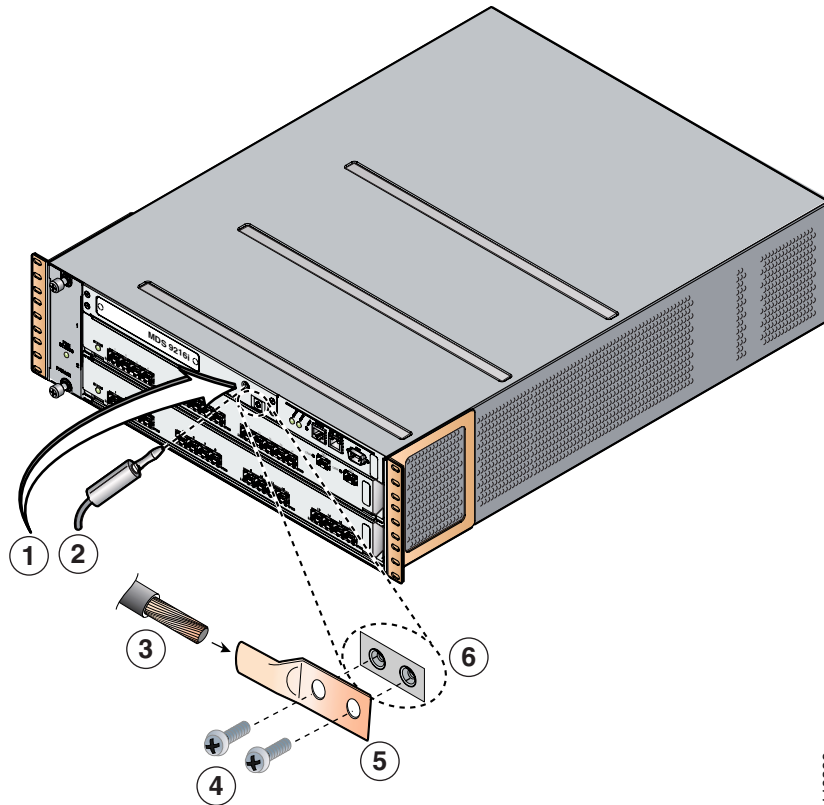


Caution

All power supplies must be grounded. The receptacles of the AC power cables used to provide power to the chassis must be the grounding type, and the grounding conductors should connect to protective earth ground at the service equipment.

Send documentation comments to mdsfeedback-doc@cisco.com.

Figure 2-16 Location of System Ground on the Cisco MDS 9200 Series



1	ESD socket (on switch)	4	Screws, M4, with square cone washers
2	ESD plug	5	Grounding lug
3	Grounding cable	6	Close-up of grounding pad on switch

To attach the grounding lug and cable to the chassis, follow these steps:

-
- Step 1** Use a wire-stripping tool to remove approximately 0.75 in. (19 mm) of the covering from the end of the grounding cable.
- Step 2** Insert the stripped end of the grounding cable into the open end of the grounding lug.
- Step 3** Use the crimping tool to secure the grounding cable in the grounding lug.
- Step 4** Remove the adhesive label from the grounding pad on the chassis.
- Step 5** Place the grounding lug against the grounding pad so that there is solid metal-to-metal contact, and insert the two M4 screws with washers through the holes in the grounding lug and into the grounding pad.
- Step 6** Ensure that the lug and cable do not interfere with other equipment.

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- Step 7** Prepare the other end of the grounding cable and connect it to an appropriate grounding point in your site to ensure adequate earth ground.
-

Starting Up the Switch

This section provides instructions for powering up the switch and verifying component installation.



Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing. Statement 1034



Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place. Statement 1029



During this procedure, wear grounding wrist straps to avoid ESD damage to the switch.

**Note**

Do not connect the MGMT 10/100 Ethernet port to the LAN until the initial switch configuration has been performed. For instructions on configuring the switch, refer to <http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm> for the latest Cisco MDS 9000 Family configuration guides. For instructions on connecting to the console port, see the “Connecting to the Console Port” section on page 3-2.

To power up the switch and verify hardware operation, follow these steps:

- Step 1** Verify that empty module slots have filler panels installed, the faceplates of all modules are flush with the front of the chassis, the ejector levers are fully closed and approximately parallel to the front of the module, and the captive screws of the power supplies, fan module, and all supervisor, switching, or services modules are tight.
- Step 2** Verify that both power supplies and the fan module are installed.
- Step 3** Verify that the power switches on both power supplies are off, and then plug the power cables into the power supplies and tighten the screws on the power cable retainers to ensure the cables cannot be pulled out.

**Note**

Depending on the outlet receptacle on your power distribution unit, you may need the optional jumper power cord to connect the Cisco MDS 9200 Series to your outlet receptacle. See the “Jumper Power Cord” section on page C-8.

- Step 4** Connect the other end of the power cables to an AC power source.

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- Step 5** Ensure that the switch is adequately grounded as described in the “Installing the Switch in a Cabinet with Insufficient Front Clearance” section on page 2-11, and that the power cables are connected to outlets that have the required AC power voltages (see the “Weight of Modules” section on page C-4).
- Step 6** Flip the power switches on the power supplies to the on (I) position. The switch boots automatically.
- Step 7** Listen for the fans; they should begin operating when the switch is powered on.

**Caution**

Do not operate the switch without a functioning fan module except for during the brief fan module replacement procedure. The Cisco MDS 9000 Family switches can operate for only a few minutes without any functioning fan modules before they begin to overheat.

- Step 8** After the switch boots, verify that the LED behavior is as follows:
- Fan module: Status LED is green
 - Power supplies:
 - Input Ok LED is green.
 - Fan Ok LED is green.
 - Output Fail LED is off.
 - Supervisor, switching, or services modules:
 - During initialization, the status LED on the module flashes orange once, remains orange during diagnostic boot tests, then turns green when the module is operational (online). If the system software is unable to start up, this LED remains orange or turns red.
 - After initialization, the status LED is green, indicating that all chassis environmental monitors are reporting that the system is operational. If this LED is orange or red, then one or more environmental monitor is reporting a problem.
 - Ethernet port Link LEDs should not be on unless the cable is connected.

**Note**

The link LEDs for the Fibre Channel ports remain yellow until the ports are enabled, and the LED for the MGMT 10/100 Ethernet port remains off until the port is connected.

If any LEDs are orange (except on the CSM) or red after the initial boot processes are complete, see Appendix B, “Troubleshooting.”

- Step 9** Try removing and re-installing a component that is not operating correctly. If it still does not operate correctly, contact your customer service representative for a replacement.

**Note**

If you purchased this product through a Cisco reseller, contact the reseller directly for technical support. If you purchased this product directly from Cisco, contact Cisco Technical Support at this URL: <http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>.

- Step 10** Verify that the system software has booted and the switch has initialized without error messages. If any problems occur, refer to the following website for the latest *Cisco MDS 9000 Family Troubleshooting Guide* or the *Cisco MDS 9000 Family System Messages Guide*:
<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm> . If you cannot resolve an issue, contact your customer service representative.
- Step 11** Complete the worksheets provided in Appendix E, “Site Planning and Maintenance Records” for future reference.

Send documentation comments to mdsfeedback-doc@cisco.com.

**Note**

A setup utility automatically launches the first time you access the switch and guides you through the basic configuration. For instructions on how to configure the switch and check module connectivity, refer to the following website for the latest Cisco MDS 9000 Family configuration guides :<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

Removing and Installing Components

This section provides the following information:

- Removing and Installing Switching and Services Modules, page 2-23
- Maintaining a Caching Services Module, page 2-29
- Removing and Installing Power Supplies, page 2-30
- Removing and Installing the Fan Module, page 2-32

**Warning**

Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing. Statement 1034

**Caution**

To prevent ESD damage, wear grounding wrist straps during these procedures and handle modules by the carrier edges only.

Removing and Installing Switching and Services Modules

Slot 1 is reserved for the supervisor module with its integrated multiport switching or IP services module. Slot 2 can contain an optional module. See Figure 1-1 for slot locations.

**Warning**

Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

**Warning**

Use of controls, adjustments, or performing procedures other than those specified may result in hazardous radiation exposure. Statement 1057

**Warning**

Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing. Statement 1034

**Caution**

To prevent ESD damage, wear grounding wrist straps during these procedures and handle modules by the carrier edges only.

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Note

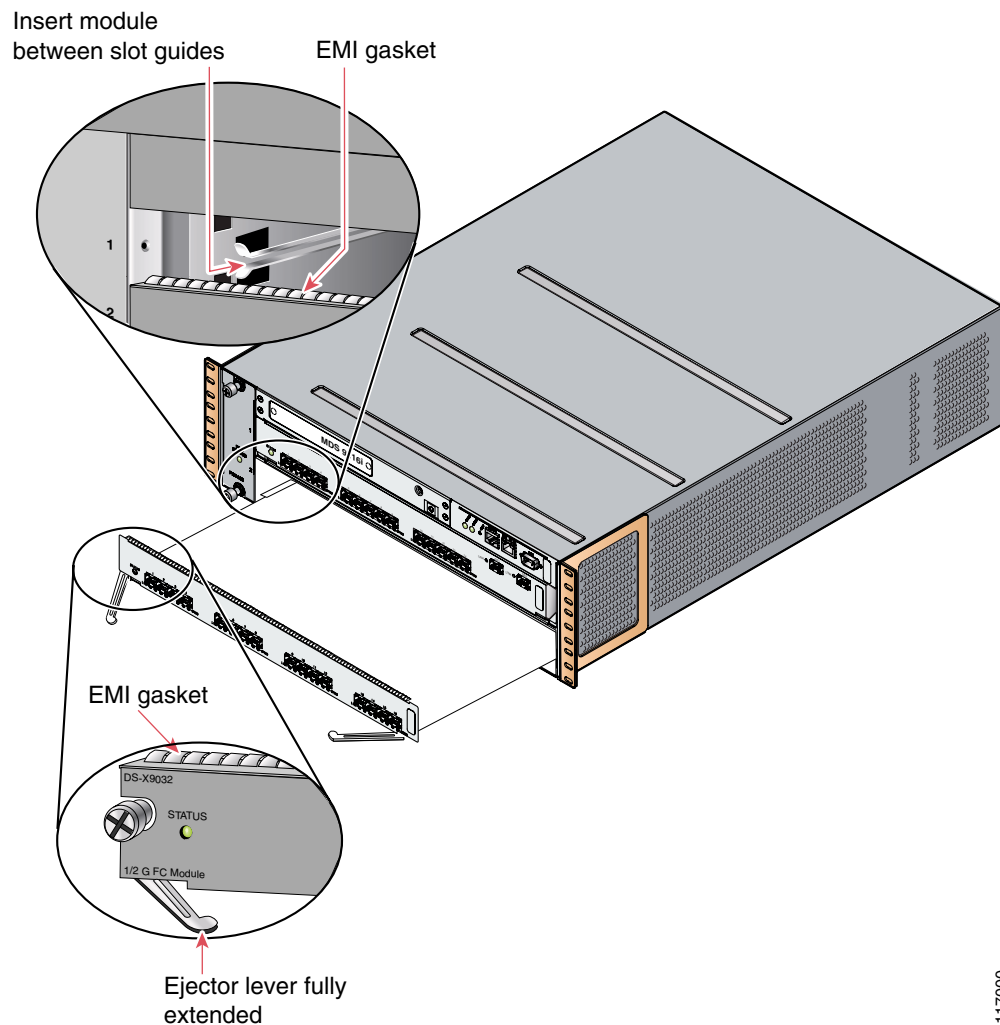
Install the Cisco MDS 9200 Series in the rack before installing modules. For information about installing the chassis, see the “Installing the Chassis in a Cabinet or Rack” section on page 2-5.

This section includes the following information:

- Removing a Caching Services Module, page 2-25
- Removing Other Switching or Services Modules, page 2-26
- Installing a Switching or Services Module, Including Caching Services Modules, page 2-27
- Verifying Installation of a Switching or Services Module, page 2-28

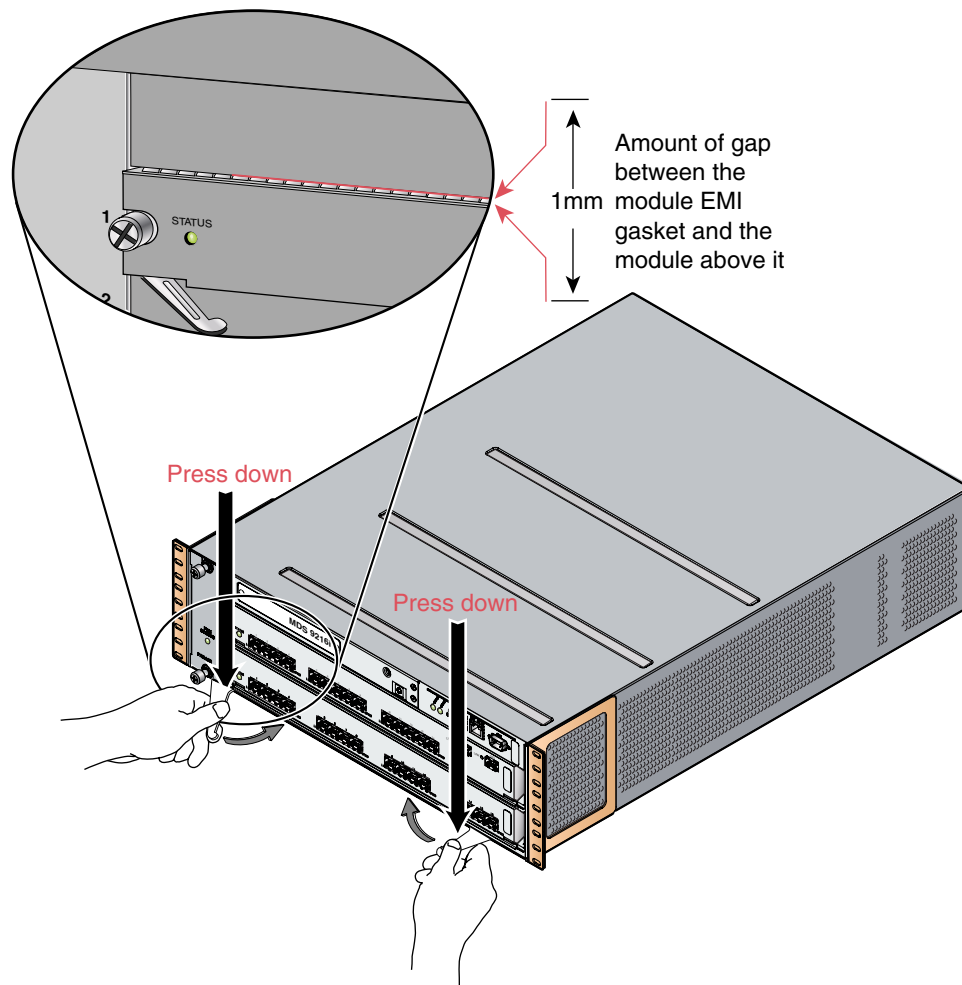
Figure 2-17 and Figure 2-18 show the positioning of a module in the chassis.

Figure 2-17 Positioning the Module in the Chassis



Send documentation comments to mdsfeedback-doc@cisco.com.

Figure 2-18 Clearing the EMI Gasket



Removing a Caching Services Module



Note

A minimum of two CSMs in each fabric are required for redundancy and data backup.



Warning

Do not touch or bridge the metal contacts on the battery. Unintentional discharge of the batteries can cause serious burns. Statement 341



Warning

Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040



Caution

Wait for all LEDs to turn off before removing the module from the chassis. If the LEDs are on, the module still has power.

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To remove a CSM module from the chassis, follow these steps

-
- Step 1** Power off the module from the CLI. For information about the correct command to use, refer to the <http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm> for the latest Cisco MDS 9000 Family configuration guides.
- Step 2** Ensure that the backup process has completed by verifying that all LEDs on the module have turned off. This requires up to 10 minutes.
- Step 3** Loosen the two captive screws on the module.
- Step 4** Remove the module from the chassis as follows:
- Place your thumbs on the left and right ejector levers (shown in Figure 2-17 on page 2-24) and simultaneously rotate the levers outward to unseat the module from the backplane connector.
 - Grasp the front edge of the module and slide the module part of the way out of the slot. Place your other hand under the module to support the weight of the module. Do not touch the module circuitry.
- Step 5** Place the module on an antistatic mat or antistatic foam if not immediately reinstalling it in another slot.
- Step 6** Install a filler panel to keep dust out of the chassis and maintain consistent airflow if the slot will remain empty.



Warning Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place. Statement 1029

Removing Other Switching or Services Modules

To remove a switching or services module from the chassis, follow these steps:

-
- Step 1** Disconnect any network interface cables attached to the module.
- Step 2** Loosen the two captive screws on the module.
- Step 3** Remove the module from the chassis as follows:
- Place your thumbs on the left and right ejector levers (shown in Figure 2-17 on page 2-24) and simultaneously rotate the levers outward to unseat the module from the backplane connector.
 - Grasp the front edge of the module and slide the module part of the way out of the slot. Place your other hand under the module to support the weight of the module. Do not touch the module circuitry.
- Step 4** Place the module on an antistatic mat or antistatic foam if not immediately reinstalling it in another slot.
- Step 5** Install a filler panel to keep dust out of the chassis and maintain consistent airflow if the slot will remain empty.

Send documentation comments to mdsfeedback-doc@cisco.com.

**Warning**

Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place. Statement 1029

Installing a Switching or Services Module, Including Caching Services Modules

The following warning applies only to the Caching Services Module:

**Warning**

Do not touch or bridge the metal contacts on the battery. Unintentional discharge of the batteries can cause serious burns. Statement 341

**Note**

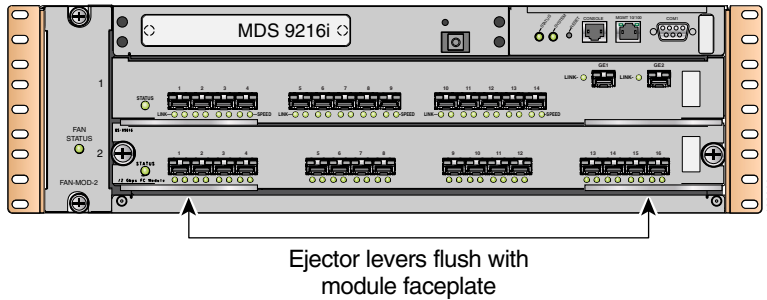
Before installing any modules in the chassis, we recommend installing the chassis in the rack. See the “Installing the Chassis in a Cabinet or Rack” section on page 2-5.

To install a module in slot 2 of the chassis, follow these steps:

- Step 1** Verify that there is enough clearance to accommodate any interface equipment that you connect directly to the nearby components.
- Step 2** If a filler panel is installed, remove the two Phillips pan-head screws from the filler panel and remove the panel. To remove a currently installed module, see the “Removing and Installing Switching and Services Modules” section on page 2-23.
- Step 3** Open fully both ejector levers on the new or replacement module (see Figure 2-17 on page 2-24).
- Step 4** Position the module in the chassis as follows:
 - a. Position the module in the slot, aligning the sides of the module carrier with the slot guides on each side of the slot.
 - b. Slide the module carefully into the slot until the EMI gasket along the top edge of the module makes contact with the supervisor module above it and both ejector levers have closed to approximately 45 degrees with respect to the module faceplate (see Figure 2-18 on page 2-25).
 - c. Grasp the two ejector levers using the thumb and forefinger of each hand and press down to create a small 0.040-in. (1 mm) gap between the module's EMI gasket and the module above it (see Figure 2-19).

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Figure 2-19 Closing the Ejector Levers



Caution

Do not press down too forcefully on the levers because they can bend.

- d. Press down and simultaneously close the left and right ejector levers to fully seat the module in the backplane connector. The ejector levers are fully closed when they are flush with the module faceplate.



Note

Ensure that the ejector levers are fully closed before tightening the captive screws. Failure to fully seat the module in the backplane connector can result in error messages.

- e. Tighten the two captive screws on the module.

Verifying Installation of a Switching or Services Module

To verify the module installation in slot 2, follow these steps:

- Step 1** Verify that the ejector levers of the module are fully closed (parallel to the faceplate) to ensure that the module is fully seated in the backplane connectors.
- Step 2** Check the captive screws of the module, the power supply, and the fan module, and tighten any loose captive screws.
- Step 3** Verify that a filler panel is installed and that the screws holding the panel in place are tightened if the slot is to remain empty.
- Step 4** Turn on the power supply switches to power up the system and check the LEDs on the module.



Note

For information about how to check connectivity of the module, refer to the following website for the latest Cisco MDS 9000 Family configuration guides:
<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

Send documentation comments to mdsfeedback-doc@cisco.com.

Maintaining a Caching Services Module

**Caution**

Maintenance should only be performed by qualified service personnel.

**Note**

A minimum of two CSMs in each fabric are required for redundancy and data backup.

This section provides the following information:

- Maintaining the Batteries on the Caching Services Module, page 2-29
- Maintaining the Disk Drives on the Caching Services Module, page 2-29

Maintaining the Batteries on the Caching Services Module

The CSM batteries last approximately three years. The following message displays in the system log when a battery fails:

```
Dec 5 17:14:36 sw-90.21 %SVC_BATTERY-SLOT8-4-BATTERY_CAPACITY_LOW:  
Battery capacity is below the required threshold.
```

A message also appears in the output of the **show interface** command.

If you see this message, contact your support provider for assistance. If a battery fails, the CSM must be replaced.

**Caution**

The CSM batteries are shipped fully charged and should be handled accordingly.

**Warning**

Do not touch or bridge the metal contacts on the battery. Unintentional discharge of the batteries can cause serious burns. Statement 341

**Warning**

Ultimate disposal of this product should be handled according to all national laws and regulations. Statement 1040

The batteries are automatically charged on a periodic basis with an SMBus compliant Level III smart charger located on the CSM. The smart charger measures the charge and recharges the battery to full if it is less than 90% of capacity.

The batteries are also automatically reconditioned on a periodic basis, one battery at a time. During reconditioning all power is drained from the battery and the battery is completely recharged, requiring approximately six hours. The Battery Status LED flashes green during the reconditioning.

Maintaining the Disk Drives on the Caching Services Module

A message displays in the system log when a disk drive requires replacement. If you see this message, contact your support provider for assistance.

If a disk drive fails, the CSM must be replaced. The other CSM(s) in the fabric contain the same data, and they can continue to provide caching services during the replacement period.

Send documentation comments to mdsfeedback-doc@cisco.com.

Removing and Installing Power Supplies

The Cisco MDS 9200 Series supports dual 845-W AC power supplies that monitor output voltage and provide status to the supervisor module.

This section provides the following information:

- Removing a Power Supply, page 2-30
- Installing a Power Supply, page 2-30

A flat-blade or Phillips screwdriver is required to perform these procedures.



Warning

Voltage is present on the backplane when the system is operating. To reduce risk of an electric shock, keep hands and fingers out of the power supply bays and backplane areas. Statement 166



Warning

Power supply captive installation screws must be tight to ensure protective grounding continuity. Statement 289



Note

You can replace a faulty power supply while the system is operating provided the other power supply is functioning.

Removing a Power Supply

To remove a power supply, follow these steps:

- Step 1** Turn the power switch to the off (0) position.
- Step 2** Loosen the screw on the power cable retainer and disconnect the power cable from the power supply being removed.
- Step 3** Loosen the captive screw on the power supply.
- Step 4** Grasp the power supply handle with one hand and slide it out of the chassis.
- Step 5** Install a blank filler panel if the power supply bay is to remain empty.

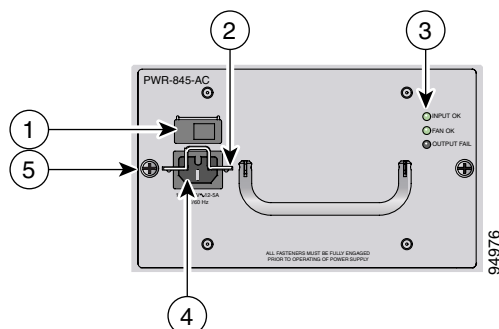
Installing a Power Supply

To install a power supply, follow these steps:

- Step 1** Ensure that the system (earth) ground connection has been made. For ground connection instructions, see the “Installing the Switch in a Cabinet with Insufficient Front Clearance” section on page 2-11.
- Step 2** If the power supply bay has a filler panel, loosen the screws holding the panel and remove the panel.
- Step 3** Verify that the power switch is in the off (0) position on the power supply you are installing. See Figure 2-20 for the location of the power switch.

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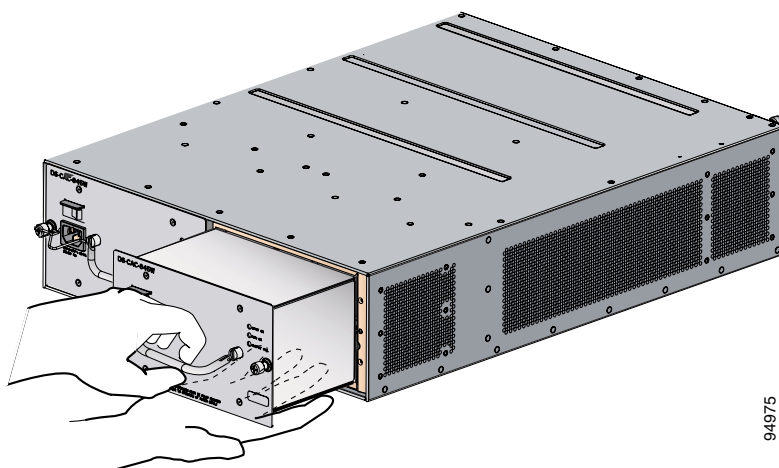
Figure 2-20 845-W AC Power Supply Front Panel



1	Power switch	4	AC power connection
2	Power cable retainer	5	Captive screw
3	Power supply LEDs		

Step 4 Hold the power supply by the handle and orient it as shown in Figure 2-21, and then slide it into the power supply bay, ensuring that it is fully seated in the bay.

Figure 2-21 Handling an 845-W AC Power Supply



Step 5 Tighten the power supply captive screws.

Step 6 Plug the power cable into the power supply, and tighten the screw on the power cable retainer to ensure the cable cannot be pulled out.



Note Depending on the outlet receptacle on your power distribution unit, you may need the optional jumper power cord to connect the Cisco MDS 9200 Series to your outlet receptacle. See the “Jumper Power Cord” section on page C-8

Step 7 Connect the other end of the power cable to an AC power source.

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Caution

In a system with dual power supplies, connect each power supply to a separate power source. In case of a power source failure, the second source will most likely still be available.

- Step 8** Turn the power switch to the on (I) position on the power supply.
- Step 9** Verify power supply operation by checking that the power supply LEDs are in the following states:
- Input Ok LED is green.
 - Fan Ok LED is green.
 - Output Fail LED is off.

If the LEDs indicate a power problem, see the “Troubleshooting the Power Supplies” section on page B-3.

Removing and Installing the Fan Module

The fan module is designed to be removed and replaced while the system is operating without presenting an electrical hazard or damage to the system, provided the replacement is performed promptly.

This section provides the following information:

- Removing a Fan Module, page 2-33
- Installing a Fan Module, page 2-33

You will need a flat-blade or number 2 Phillips screwdriver to perform these procedures.

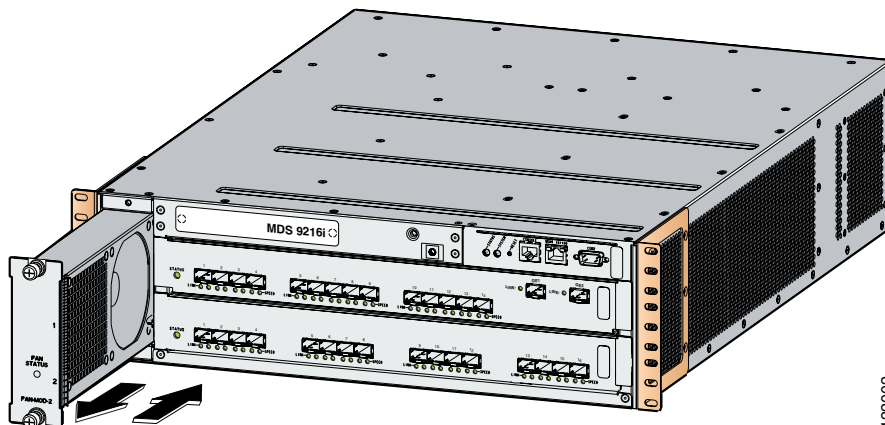


Caution

The Cisco MDS 9200 Series can operate for up to five minutes without a fan module installed. You should have the replacement fan module available before hot-swapping an existing operational fan module.

Figure 2-22 shows a fan module partially installed in the Cisco MDS 9200 Series.

Figure 2-22 Fan Module



122002

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Removing a Fan Module



Warning

When removing the fan tray, keep your hands and fingers away from the spinning fan blades. Let the fan blades completely stop before you remove the fan tray. Statement 258

To remove a fan module, follow these steps:

- Step 1** Loosen the two captive screws on the fan module by turning them counterclockwise, using a flat-blade or number 2 Phillips screwdriver if required.
- Step 2** Grasp the fan module with both hands and pull it outward; rock it gently, if necessary, to unseat the power connector from the backplane.
- Step 3** Pull the fan module clear of the chassis.



Caution

If the switch is powered on, you must hot-swap another fan module into this switch within five minutes.

Installing a Fan Module

To install a fan module, follow these steps:

- Step 1** Hold the fan module with the Fan Status LED at the top (see Figure 2-22).
- Step 2** Place the fan module into the front chassis cavity so it rests on the chassis, lift the fan module up slightly to align the top and bottom chassis guides, then push the fan module into the chassis until it seats in the backplane and the captive screws make contact with the chassis, and tighten the captive screws.
- Step 3** Listen for the fans if the switch is powered on. You should immediately hear them operating. If you do not hear them, ensure that the fan module is inserted completely in the chassis and the faceplate is flush with the outside surface of the chassis.
- Step 4** Verify that the Fan Status LED is green. If the LED is not green, one or more fans are faulty. If this happens, contact your customer service representative for a replacement part.



Note

If you purchased this product through a Cisco reseller, contact the reseller directly for technical support. If you purchased this product directly from Cisco, contact Cisco Technical Support at this URL:
<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>.

Removing the Cisco MDS 9200 Series

When removing the Cisco MDS 9200 Series from the rack, remove the slider brackets first, and then the front screws fastening the front rack-mount brackets to the rack.

Send documentation comments to mdsfeedback-doc@cisco.com.

**Note**

The slider rail and C brackets do not have a stop mechanism when sliding in and out. If the front of the chassis is unfastened from the rack and the chassis slides forward on the slider rails, it may slip off the end of the rails and fall out of the rack.

To remove the Cisco MDS 9200 Series from the rack, follow these steps:

-
- Step 1** Remove the screws fastening the slider bracket to the mounting rails.
 - Step 2** Slide the slider brackets out of the C brackets on the sides of the Cisco MDS 9200 Series.
 - Step 3** Make sure the weight of the Cisco MDS 9200 Series is supported; for example, being held by another person.
 - Step 4** Remove the screws fastening the front rack-mount brackets on the Cisco MDS 9200 Series to the mounting rails, and remove the Cisco MDS 9200 Series from the rack.
-



Connecting the Cisco MDS 9200 Series

The Cisco MDS 9200 Series provides the following types of ports:

- Console port (Interface Module)—An RS-232 port that you can use to create a local management connection.
- COM1 port (Interface Module)—An RS-232 port that you can use to connect to an external serial communication device such as a modem.
- MGMT 10/100 Ethernet port (Interface Module)—An Ethernet port that you can use to access and manage the switch by IP address, such as through the CLI or Cisco Fabric Manager.
- Fibre Channel ports (Supervisor and Switching Modules)—Fibre Channel ports that you can use to connect to the SAN, or for in-band management.
- Other port types provided by the optional module, if installed, such as the iSCSI and/or FCIP over Gigabit Ethernet ports on the 4-port or 8-port IPS modules.



Caution

When running power and data cables in overhead or sub-floor cable trays, we strongly recommend that power cables and other potential noise sources be located as far away as practical from network cabling that terminates on Cisco equipment. In situations where long parallel cable runs cannot be separated by at least 3.3 ft (1 m), we recommend shielding any potential noise sources by housing them in a grounded metallic conduit.

This chapter includes the following information:

- Preparing for Network Connections, page 3-1
- Connecting to the Console Port, page 3-2
- Connecting to the COM1 Port, page 3-3
- Connecting to the MGMT 10/100 Ethernet Port, page 3-4
- Connecting to a Fibre Channel Port, page 3-5

Preparing for Network Connections

When preparing your site for network connections to the Cisco MDS 9200 Series, consider the following for each type of interface, and gather all the required equipment before connecting the ports:

- Cabling required for each interface type

Send documentation comments to mdsfeedback-doc@cisco.com.

- Distance limitations for each signal type
- Additional interface equipment required

Connecting to the Console Port

The console port, labeled “Console,” is an RS-232 port with an RJ-45 interface (see Figure 3-1). The console port is an asynchronous (async) serial port; any device connected to this port must be capable of asynchronous transmission.

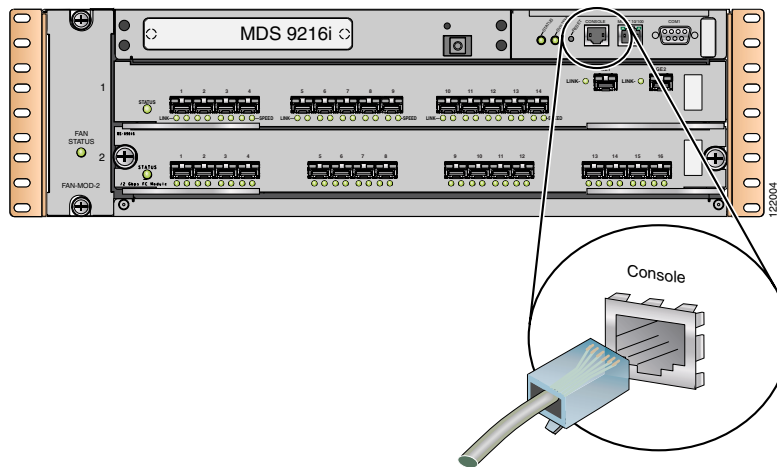
We recommend using this port to create a local management connection to set the IP address and other initial configuration settings before connecting the switch to the network for the first time.



Caution

The console port can be used to connect to a modem, but we recommend using the COM1 port for this purpose. If you decide to connect the console port to a modem, do not connect it while the switch is booting; connect either before powering the switch on or after the switch has completed the boot process.

Figure 3-1 Connecting to the Console Port on the Cisco MDS 9200 Series



You can use the console port to perform the following functions:

- Configure the Cisco MDS 9200 Series from the CLI.
- Monitor network statistics and errors.
- Configure SNMP agent parameters.
- Download software updates.



Note

To connect the console port to a computer terminal, the computer must support VT100 terminal emulation. The terminal emulation software—frequently an application such as HyperTerminal or Procomm Plus—makes communication between the Cisco MDS 9200 Series and computer possible during setup and configuration.

Send documentation comments to mdsfeedback-doc@cisco.com.

To connect the console port to a computer terminal, follow these steps:

- Step 1** Configure the terminal emulator program to match the following default port characteristics: 9600 baud, 8 data bits, 1 stop bit, no parity.
- Step 2** Connect the supplied RJ-45 to DB-9 female adapter or RJ-45 to DB-25 female adapter (depending on your computer serial port) to the computer serial port. We recommend using the adapter and cable provided with the switch.
- Step 3** Connect the console cable (a rollover RJ-45 to RJ-45 cable) to the console port (see Figure 3-1) and to the RJ-45 to DB-9 adapter or RJ-45 to DB-25 adapter at the computer serial port.



Note For configuration instructions, refer to the following website for the latest Cisco MDS 9000 Family configuration guides:
<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

Connecting to the COM1 Port

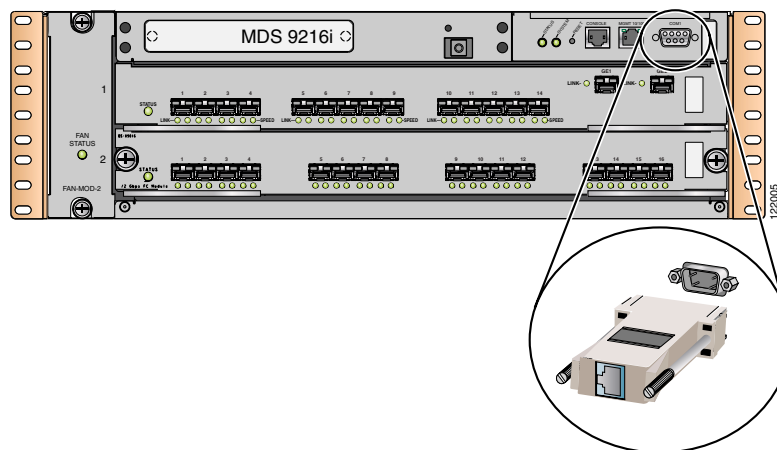


Note The COM1 port is not supported for connection to a console.

The COM1 port (labeled “COM1”) is an RS-232 port with a DB-9 interface (see Figure 3-2). You can use this port to connect to an external serial communication device such as a modem. For information about how to turn off hardware flow control, refer to the following website for the latest Cisco MDS 9000 Family configuration guides:

<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

Figure 3-2 Connecting to the COM1 Port on the Cisco MDS 9200 Series



Send documentation comments to mdsfeedback-doc@cisco.com.

To connect the COM1 port to a modem, follow these steps:

Step 1 Connect the DB-9 serial adapter to the COM1 port.



Note Connect the modem to the COM1 port using the adapters and cables provided with the accessory kit.:

Step 2 Connect the RJ-45 to DB-25 modem adapter to the modem.

Step 3 Connect these two adapters using the RJ-45 to RJ-45 rollover cable (or equivalent crossover cable).

Step 4 If the default settings for the COM1 port were modified, refer to the following website for the latest Cisco MDS 9000 Family configuration guides containing information on this feature:
<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

The default COM1 settings are as follows:

```
line Aux:
Speed: 9600 bauds
Databits: 8 bits per byte
Stopbits: 1 bit(s)
Parity: none
Modem In: Enable
Modem Init-String -
default : ATE0Q1&D2&C1S0=1\015
Statistics: tx:17 rx:0 Register Bits:RTS|DTR
```

Connecting to the MGMT 10/100 Ethernet Port



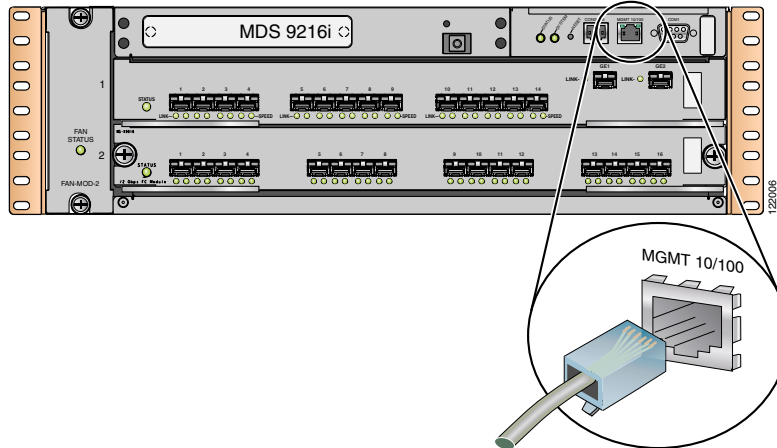
Caution

To prevent an IP address conflict, do not connect the MGMT 10/100 Ethernet port to the network until the initial configuration is complete. For configuration instructions, refer to the following website for the latest Cisco MDS 9000 Family configuration guides:
<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

The MGMT 10/100 Ethernet port is autosensing and has an RJ-45 interface (see Figure 3-3). You can use this port to access and manage the switch by its IP address, such as through the Cisco Fabric Manager.

Send documentation comments to mdsfeedback-doc@cisco.com.

Figure 3-3 Connecting to the MGMT 10/100 Ethernet Port on the Cisco MDS 9200 Series



To connect the MGMT 10/100 Ethernet port to an external hub, switch, or router, follow these steps:

-
- Step 1** Connect the appropriate modular cable to the MGMT 10/100 Ethernet port:
- Use modular, RJ-45, straight-through UTP cables to connect the 10/100 management port to an Ethernet switch port or hub.
 - Use a cross-over cable to connect to a router interface.
- Step 2** Connect the other end of the cable to the device.
-

Connecting to a Fibre Channel Port

The Fibre Channel ports on the switch modules are compatible with LC-type fiber-optic SFP transceivers and cables (see the “Connecting to a Fibre Channel Port” section on page 3-5). You can use the Fibre Channel ports to connect to the SAN or for in-band management. For information about configuring the switch for in-band management, refer to the following website for the latest Cisco MDS 9000 Family configuration guides:

<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm> .

The Cisco MDS 9000 Family supports both Fibre Channel and Gigabit Ethernet protocols for SFP transceivers. Each transceiver must match the transceiver on the other end of the cable, and the cable must not exceed the stipulated cable length for reliable communications. Refer to the following website for the *Cisco MDS 9000 Family Release Notes for Cisco MDS SAN-OS* for your software release to get the list of supported SFP transceivers:

<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

SFP transceivers can be ordered separately or with the Cisco MDS 9200 Series.



Class 1 laser product. Statement 1008



Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051

Send documentation comments to mdsfeedback-doc@cisco.com.



Caution

Wear an ESD wrist strap connected to the chassis when handling transceivers. Keep optical connectors covered when not in use, and do not touch connector ends. The fiber-optic connectors must be free of dust, oil, and other contaminants.

This section includes the following information:

- Removing and Installing SFP Transceivers, page 3-6
- Removing and Installing Cables into SFP Transceivers, page 3-8
- Maintaining SFP Transceivers and Fiber Optic Cables, page 3-10

Removing and Installing SFP Transceivers



Caution

Removing and installing an SFP transceiver can shorten its useful life. Do not remove and insert SFP transceivers more often than is absolutely necessary.

We recommend disconnecting cables before installing or removing SFP transceivers to prevent damage to the cable or transceiver.



Note

Use only Cisco SFP transceivers on the Cisco MDS 9200 Series. Each Cisco SFP transceiver is encoded with model information that enables the switch to verify that the SFP transceiver meets the requirements for the switch.

The Cisco MDS 9000 Family supports SFP transceivers with the following two types of latching devices:

- Mylar tab latch (see Figure 3-4)
- Bale-clasp latch (see Figure 3-5)

Figure 3-4 SFP Transceiver with Mylar Tab Latch

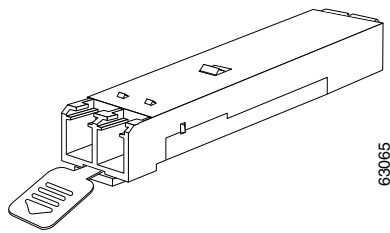
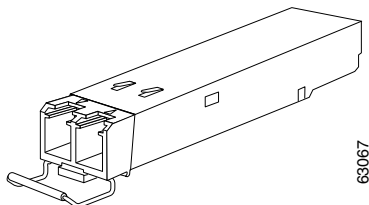


Figure 3-5 SFP Transceiver with Bale-Clasp Latch



Send documentation comments to mdsfeedback-doc@cisco.com.

Installing an SFP Transceiver

To install an SFP transceiver, follow these steps:

-
- Step 1** Attach an ESD-preventive wrist strap and follow its instructions for use.
- Step 2** Remove the dust cover from the port cage.
- Step 3** Remove the dust cover from the port end of the transceiver.
- Step 4** Insert the transceiver into the port:
- If the transceiver has a Mylar tab, orient the transceiver with the tab on the bottom, then gently insert transceiver into the port until it clicks into place.
 - If the transceiver has a bale clasp, orient the transceiver with the clasp on the bottom, close the clasp by pushing it up over the transceiver, and then gently insert the transceiver into the port until it clicks into place.



Caution

If the transceiver does not install easily, ensure it is correctly oriented and the tab or clasp are in the correct position before continuing.

- Step 5** If a cable will not be installed in the transceiver, insert or leave the dust plug in the cable end of the transceiver.
-

Removing an SFP Transceiver

To remove an SFP transceiver, follow these steps:

-
- Step 1** Attach an ESD-preventive wrist strap and follow its instructions for use.
- Step 2** If a cable is installed in the transceiver:
- a. Record the cable and port connections for later reference.
 - b. Press the release latch on the cable, grasp the connector near the connection point, and gently pull the connector from the transceiver.
 - c. Insert a dust plug into the connector on the cable.
 - d. Insert a dust plug into the cable end of the transceiver.



Caution

If the transceiver does not remove easily in the next step, push the transceiver all the way back in, and then ensure that the latch is in the correct position before continuing.

- Step 3** Remove the transceiver from the port:
- If the transceiver has a Mylar tab latch, gently pull the tab straight out (do not twist), and then pull the transceiver out of the port.
 - If the transceiver has a bale clasp latch, open the clasp by pressing it downwards, and then pull the transceiver out of the port.

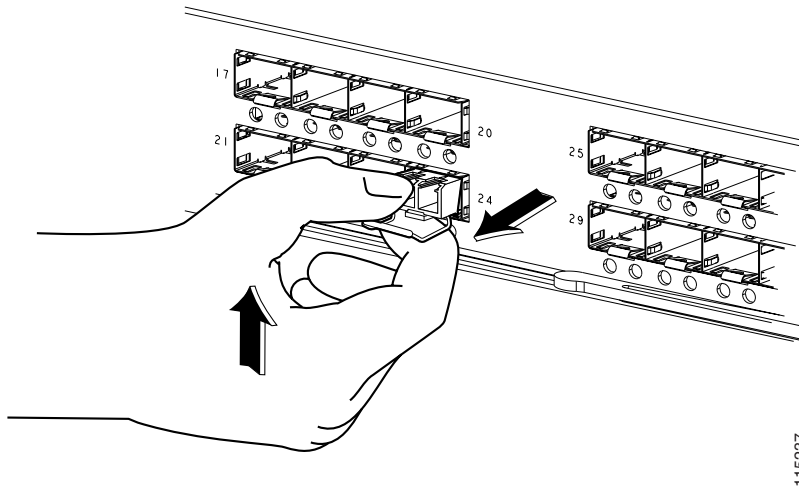
Send documentation comments to mdsfeedback-doc@cisco.com.



Note

If you have difficulty removing a bale clasp SFP transceiver, you should re-seat the SFP by returning the bale clasp to the up position, and then pressing the SFP inward and upward into the cage. Next, lower the bale clasp and pull the SFP straight out with a slight upward lifting force. (See Figure 3-6.) Be careful not to damage the port cage during this process.

Figure 3-6 Alternate Removal Method for Bale-Clasp SFP Transceivers



- Step 4** Insert a dust cover into the port end of the transceiver and place the transceiver on an antistatic mat or into a static shielding bag if you plan to return it to the factory.
- Step 5** Protect the optical cage by inserting a clean cover if another transceiver is not being installed.

Removing and Installing Cables into SFP Transceivers



Caution

To prevent damage to the fiber optic cables, do not place more tension on them than the rated limit and do not bend to a radius of less than 1 inch (25.4 mm) if there is no tension in the cable, or 2 inches (50.8 mm) if there is tension in the cable.

Installing a Cable into an SFP Transceiver



Caution

To prevent possible damage to the cable or transceiver, install the transceiver in the port before installing the cable in the transceiver.

To install a cable into a transceiver, follow these steps:

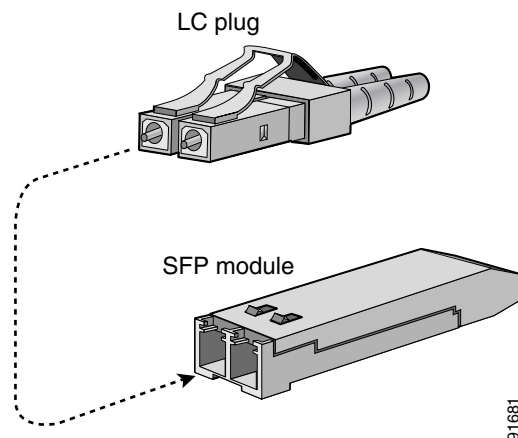
- Step 1** Attach an ESD-preventive wrist strap and follow its instructions for use.
- Step 2** Remove the dust cover from the connector on the cable.

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Step 3 Remove the dust cover from the cable end of the transceiver.

Align the cable connector with the transceiver and insert the connector into the transceiver until it clicks into place. (See Figure 3-7).

Figure 3-7 Connecting the LC-Type Cable to a Fibre Channel Port



Caution

If the cable does not install easily, ensure that it is correctly oriented before continuing.

For instructions on verifying connectivity, refer to the following website for the latest Cisco MDS 9000 Family configuration guides:
<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

Removing a Cable from an SFP Transceiver



Caution

When pulling a cable from a transceiver, grip the body of the connector. Do not pull on the jacket sleeve, because this can compromise the fiber-optic termination in the connector.



Caution

If the cable does not remove easily, ensure that any latch present on the cable has been released before continuing.

To remove the cable, follow these steps:

Step 1 Attach an ESD-preventive wrist strap and follow its instructions for use.

Step 2 Press the release latch on the cable, grasp the connector near the connection point, and gently pull the connector from the transceiver.

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Step 3 Insert a dust plug into the cable end of the transceiver.

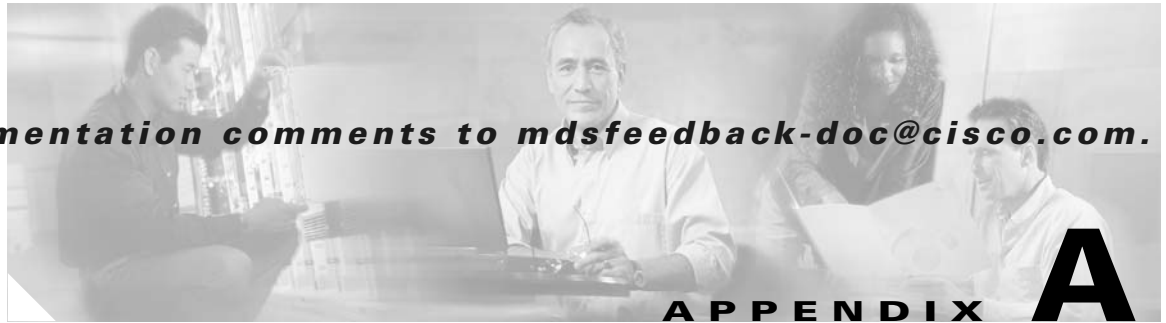
Step 4 Insert a dust plug onto the end of the cable.

Maintaining SFP Transceivers and Fiber Optic Cables

SFP transceivers and fiber optic cables must be kept clean and dust-free to maintain high signal accuracy and prevent damage to the connectors. Attenuation (loss of light) is increased by contamination, and it should be below 0.35 dB.

Follow these maintenance guidelines:

- SFP transceivers are static sensitive. To prevent ESD damage, wear an ESD-preventive wrist strap that is connected to the chassis.
- Do not remove and insert a transceiver more often than necessary. Repeated removals and insertions can shorten its useful life.
- Keep all optical connections covered when not in use. If they become dusty, clean before using to prevent dust from scratching the fiber optic cable ends.
- Do not touch ends of connectors to prevent fingerprints and other contamination.
- Clean regularly; the required frequency of cleaning depends upon the environment. In addition, clean connectors if they are exposed to dust or accidentally touched. Both wet and dry cleaning techniques can be effective; refer to your site's fibre optic connection cleaning procedures.
- Inspect routinely for dust and damage. If damage is suspected, clean and then inspect fiber ends under a microscope to determine if damage has occurred.



Cabinet and Rack Installation

This appendix includes the following information:

- Cabinet and Rack Requirements, page A-1
- Cisco MDS 9000 Family Telco and EIA Shelf Bracket, page A-4

Cabinet and Rack Requirements

This section provides the Cisco MDS 9000 Family requirements for the following types of cabinets and racks, assuming an external ambient air temperature range of 0 to 40 °C:

- Standard perforated cabinets
- Solid-walled cabinets with a roof fan tray (bottom to top cooling)
- Standard open racks
- Telco racks



Note

If you are selecting an enclosed cabinet, we recommend one of the thermally validated types: standard perforated or solid-walled with a fan tray.



Note

Do not use racks that have obstructions (such as power strips), because the obstructions could impair access to field-replaceable units (FRUs).

General Requirements for Cabinets and Racks

The cabinet or rack must be one of the following types:

- Standard 19-in. four-post EIA cabinet or rack, with mounting rails that conform to English universal hole spacing per section 1 of ANSI/EIA-310-D-1992. See the “Requirements Specific to Perforated Cabinets” section on page A-2 and the “Requirements Specific to Solid-Walled Cabinets” section on page A-3.
- Standard two-post Telco rack, with mounting rails that conform to English universal hole spacing per section 1 of ANSI/EIA-310-D-1992. See the “Requirements Specific to Telco Racks” section on page A-3.

The cabinet or rack must also meet the following requirements:

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- The minimum vertical rack space per chassis must be three RU (rack units), equal to 5.25 in. (13.3 cm).
- The width between the rack-mounting rails must be at least 17.75 in. (45.1 cm) if the rear of the switch is not attached to the rack. For four-post EIA racks, this is the distance between the two front rails.
- For four-post EIA cabinets (perforated or solid-walled):
 - The minimum spacing for the bend radius for fiber optic cables should have the front mounting rails of the cabinet offset from the front door by a minimum of 3 in. (7.6 cm), and a minimum of 5 in. (12.7 cm) if cable management brackets are installed on the front of the chassis.
 - The distance between the outside face of the front mounting rail and the outside face of the back mounting rail should be 23.5 to 34.0 in. (59.7 to 86.4 cm) to allow for rear bracket installation.
 - A minimum of 2.5 in. (6.4 cm) of clear space should exist between the side edge of the chassis and the side wall of the cabinet. No sizeable flow obstructions should be immediately in the way of chassis air intake or exhaust vents.



Note

Optional jumper power cords are available for use in a cabinet. See the “Jumper Power Cord” section on page C-8.

Requirements Specific to Perforated Cabinets

A perforated cabinet is defined here as a cabinet with perforated front and rear doors and solid side walls. In addition to the requirements listed in the “General Requirements for Cabinets and Racks” section on page A-1, perforated cabinets must meet the following requirements:

- The front and rear doors must have at least a 60% open area perforation pattern, with at least 15 square inches of open area per rack unit of door height.
- We recommend that the roof be perforated with at least a 20% open area.
- We recommend an open or perforated cabinet floor to enhance cooling.

A perforated cabinet that conforms to these requirements is available from Rittal Corporation:

Rittal Corporation

One Rittal Place

Springfield, OH 45504

Contact: (800) 477-4220

Cabinet P/N: Rittal 9969427

Cabinet description: PS-DK/OEM Cabinet Assembly, 1998 mm (78.7 in.) X 600 mm (23.6 in.) X 1000 mm (39.4 in.) (H x W x D) (42U)

Send documentation comments to mdsfeedback-doc@cisco.com.

Requirements Specific to Solid-Walled Cabinets

A solid-walled cabinet is defined here as a cabinet with solid front and rear doors and solid side walls. In addition to the requirements listed in the “General Requirements for Cabinets and Racks” section on page A-1, solid-walled cabinets must meet the following requirements:

- A roof mounted fan tray and an air cooling scheme in which the fan tray pulls air in at the bottom of the cabinet and exhausts it out the top, with a minimum of 500 cfm of airflow exiting the cabinet roof through the fan tray.
- Non-perforated (solid and sealed) front and back doors and side panels so that air travels predictably from bottom to top.
- A recommended cabinet depth of 36 to 42 in. (91.4 to 106.7 cm) to allow the doors to close and for adequate airflow.
- A minimum of 150 sq. in. (968 sq. cm) of open area at the floor air intake of the cabinet.
- The lowest piece of equipment should be installed a minimum of 1.75 in. (4.4 cm) above the floor openings to prevent blocking the floor intake.

Requirements Specific to Standard Open Racks

In addition to the requirements listed in the “General Requirements for Cabinets and Racks” section on page A-1, if mounting the chassis in an open rack (no side panels or doors), ensure that the rack meets the following requirements:

- The minimum width between two front mounting rails must be 17.75 in. (45.1 cm).
- The minimum vertical rack space per chassis must be three RU (rack unit), equal to 5.25 in. (13.3 cm).
- The distance between the outside face of the front mounting rail and the outside face of the back mounting rail should be 23.5 to 34.0 in. (59.7 to 86.4 cm) allow for rear bracket installation.
- The horizontal distance between the chassis and any adjacent chassis should be 6 in. (15.2 cm), and the distance between the chassis air vents and any walls should be 2.5 in. (6.4 cm).

Requirements Specific to Telco Racks

In addition to the requirements listed in the “General Requirements for Cabinets and Racks” section on page A-1, Telco racks should meet the following requirements:

- The width of the rack between the two rack-mounting rails should be at least 17.75 in. (45.1 cm).
- The distance between the chassis air vents and any walls should be 2.5 in. (6.4 cm).

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Cisco MDS 9000 Family Telco and EIA Shelf Bracket

The optional Telco and EIA Shelf Bracket Kit (part number DS-SHELF=) can temporarily or permanently support the Cisco MDS 9200 Series during installation. Once the front rack-mount brackets are securely attached to the rack-mounting rails, the shelf bracket can be removed. This kit supports the following configurations:

- A Cisco MDS 9200 Series in a two-post Telco rack
- A Cisco MDS 9200 Series in a four-post EIA rack

This section describes the procedure for installing a Cisco MDS 9000 Family switch in a rack or cabinet using the optional Telco and EIA Shelf Bracket Kit. It includes the following information:

- Rack-Mounting Guidelinesr, page A-4
- Before Installing the Shelf Brackets, page A-5
- Installing the Shelf Bracket Kit into a Two-Post Telco Rack, page A-6
- Installing the Shelf Bracket Kit into a Four-Post EIA Rack, page A-7
- Installing the Switch on the Shelf Brackets, page A-8
- Removing the Shelf Bracket Kit (Optional), page A-9



Note

This optional kit is not provided with the switch; to order the kit, contact your switch supplier.



Note

For additional support after removing the shelf brackets, ensure that the C brackets on the Cisco MDS 9200 Series are attached to the rear rack-mounting rails.

Rack-Mounting Guidelinesr



Caution

If the rack is on wheels, ensure that the brakes are engaged or the rack is otherwise stabilized.



Caution

If installing this kit in an EIA rack, attach the switch to all four rack-mounting rails; the EIA rails may not be thick enough to prevent flexing of the shelf brackets if only two rails are used.

Before rack-mounting the chassis, ensure that the cabinet or rack meets the following requirements:

- The specifications listed in the “Cabinet and Rack Requirements” section on page A-1.
- The depth of the rack between the front and rear mounting rails is at least 18 in. (45.7 cm) but less than or equal to 30 in. (76.2 cm). This is specific to four-post EIA cabinets or racks.
- The airflow and cooling are adequate and there is sufficient clearance around the air vents on the switch, as described in Appendix C, “Technical Specifications.” This is particularly important to verify if you are installing the switch in an enclosed cabinet.

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- The rack has sufficient vertical clearance for the chassis plus 2 RU for the shelf brackets, and any desired clearance for the installation process.
- The rack meets the minimum rack load ratings per rack unit listed in the following table:

Rack Type	MDS 9509	MDS 9506	MDS 9216i MDS 9216A	MDS 9100
EIA (4-Post)	45 lb	30 lb	15 lb	7.5 lb
Telco (2-Post)	Do not use.	60 lb	30 lb	15 lb

Before Installing the Shelf Brackets

Before installing the shelf brackets, check the contents of your kit. Table A-1 lists the contents of the optional shelf bracket kit.

Table A-1 Contents of Shelf Bracket Kit

Quantity	Part Description
2	Slider brackets
2	Shelf brackets
1	Crossbar
2	10-32 x 3/8-inch Phillips pan-head screws
16	12-24 x 3/4-inch Phillips screws
16	10-24 x 3/4-inch Phillips screws

Required Equipment

You need the following equipment for this installation:

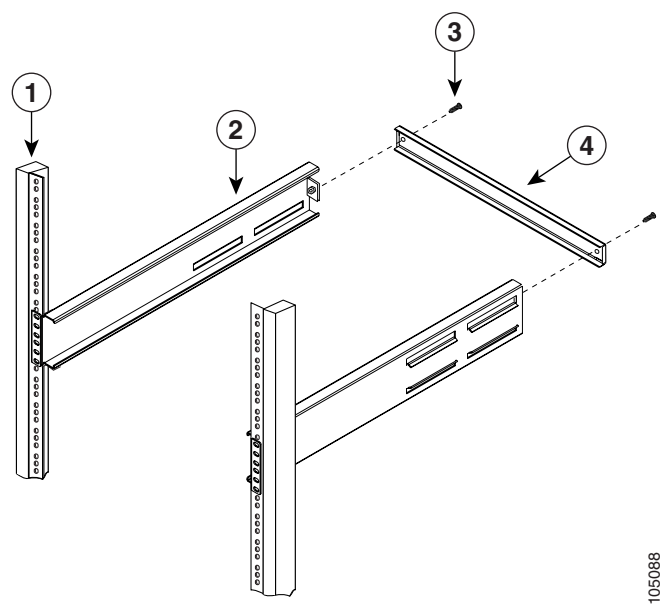
- Number 2 Phillips screwdriver
- Tape measure and level (to ensure shelf brackets are level)

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Installing the Shelf Bracket Kit into a Two-Post Telco Rack

Figure A-1 shows the installation of the shelf bracket kit into a two-post Telco rack.


Figure A-1 Installing the Shelf Bracket Kit into a Telco Rack



1	Rack-mounting rail (2x)	3	10-32 screws (2x)
2	Shelf bracket (2x)	4	Crossbar

To install the shelf brackets in a Telco rack, follow these steps:

- Step 1

Position a shelf bracket inside a rack-mounting rail as shown in Figure A-1. Align the screw holes at the front of the shelf bracket with the holes in the rack-mounting rail. Then attach the shelf bracket to the rack-mounting rail using a minimum of four 12-24 or 10-24 screws.
- 

Note The bottom hole of the shelf bracket should align with the bottom hole of a rack unit on the rack-mounting rail (the hole immediately above the 1/2-in. spacing).
- Step 2

Repeat with the other shelf bracket.
- Step 3

Verify that the shelf brackets are at the same height (using the level or tape measure as desired).
- Step 4

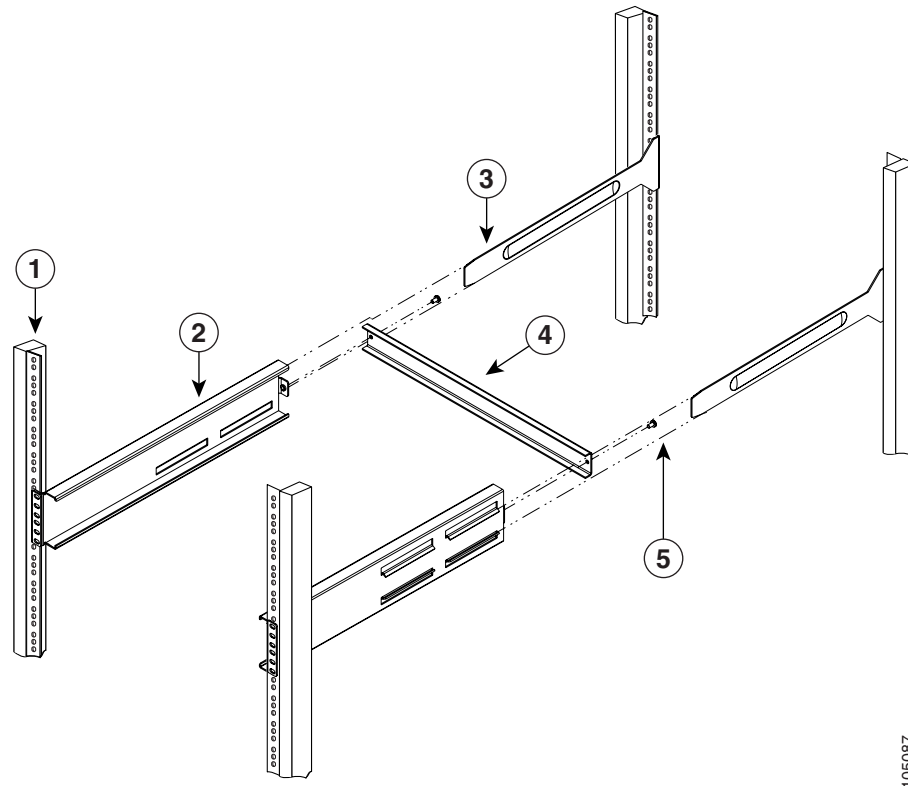
Attach the crossbar to the rear of the shelf brackets as shown in Figure A-1, using the 10-32 screws.

Send documentation comments to mdsfeedback-doc@cisco.com.

Installing the Shelf Bracket Kit into a Four-Post EIA Rack

Figure A-2 shows the installation of the shelf bracket kit into a four-post EIA rack.

Figure A-2 Installing the Shelf Bracket Kit into an EIA Rack



105087

1	Rack-mounting rail (4x)	4	Crossbar
2	Shelf bracket (2x)	5	10-32 screws (2x)
3	Slider rail (2)		

To install the shelf brackets in an EIA rack, follow these steps:

- Step 1** Position a shelf bracket inside the rack-mounting rails as shown in Figure A-2. Align the screw holes at the front of the shelf bracket with the holes in the front rack-mounting rail. Then attach the shelf bracket to the front rack-mounting rail using a minimum of four 12-24 or 10-24 screws.



Note The bottom hole of the shelf bracket should align with the bottom hole of a rack unit on the rack-mounting rail (the hole immediately above the 1/2-in. spacing).

- Step 2** Repeat with the other shelf bracket.
- Step 3** Verify that the shelf brackets are at the same height (using the level or tape measure as desired).

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- Step 4** Attach the crossbar to the shelf brackets as shown in Figure A-2, using the 10-32 screws.
- Step 5** Insert the slider rails into the shelf brackets as shown in Figure A-2. Then attach them to the rear rack-mounting rails using a minimum of four 12-24 or 10-24 screws.
-

Installing the Switch on the Shelf Brackets

This section provides general instructions for installing the switch on top of the shelf brackets. For detailed installation instructions, see the “Installing the Chassis in a Cabinet or Rack” section on page 2-5.



Warning

This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.

Statement 1017



Warning

Only trained and qualified personnel should be allowed to install, replace, or service this equipment.

Statement 1030



Note

Before you install, operate, or service the system, refer to the following website for the latest *Regulatory Compliance and Safety Information for the Cisco MDS 9000 Family* for important safety information: <http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

To install the switch on top of the shelf brackets, follow these steps:

- Step 1** Verify that the shelf brackets are level and securely attached to the rack-mounting rails, the crossbar is securely attached to the shelf brackets, and the rack is stabilized.
- Step 2** Slide the switch onto the shelf brackets, ensuring it is squarely positioned.
- Step 3** Attach the switch to the rack-mounting rails. See the “Installing the Chassis in a Cabinet or Rack” section on page 2-5.



Caution

We recommend grounding the chassis, even if the rack is already grounded. There is a grounding pad with two threaded M4 holes on the chassis for attaching a grounding lug.

Send documentation comments to mdsfeedback-doc@cisco.com.

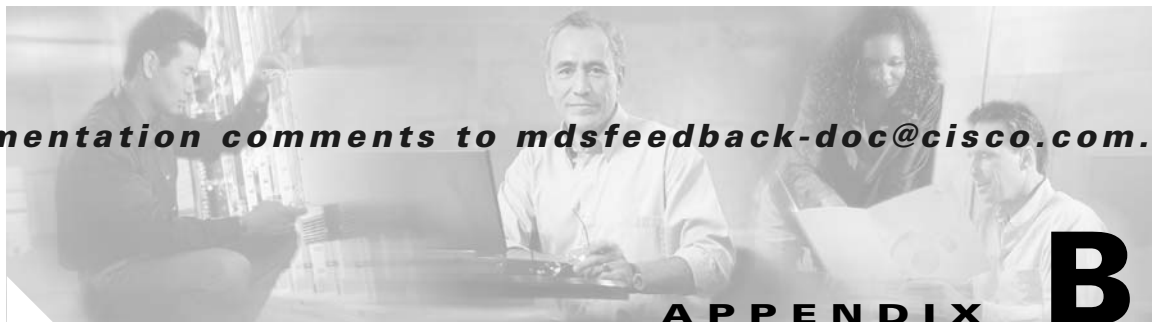
Removing the Shelf Bracket Kit (Optional)

The shelf bracket kit can be removed once the Cisco MDS 9200 Series has been installed in a two-post Telco or four-post EIA rack, and the front rack-mount brackets are securely attached to the rack-mounting rails. For additional support in an EIA rack, ensure the C brackets on the Cisco MDS 9200 Series are attached to the rear rack-mounting rails.

To remove the shelf bracket kit, follow these steps:

-
- | | |
|---------------|--|
| Step 1 | Remove the screws fastening the slider brackets to the rear rack-mounting rails. Then slide the slider brackets out of the shelf brackets. |
| Step 2 | Remove the screws fastening the crossbar to the shelf brackets and remove the crossbar. |
| Step 3 | Remove the screws fastening the shelf brackets to the front rack-mounting rails. Then remove the shelf brackets from the rack. |
-

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Troubleshooting

This appendix describes how to troubleshoot the Cisco MDS 9200 Series installation, and it includes the following information:

- Getting Started, page B-1
- Solving Problems at the Component Level, page B-2
- Identifying Startup Problems, page B-2
- Troubleshooting the Power Supplies, page B-3
- Troubleshooting the Fan Module, page B-4
- Troubleshooting Switching and Services Modules, page B-4
- Contacting Customer Service, page B-5

Getting Started

Problems with the initial power up are often caused by a module that is not firmly connected to the backplane or a power supply that has been disconnected from the power cord connector.

Overheating can also cause problems with the system, though typically only after the system has been operating for an extended period of time. The most common cause of overheating is the failure of a fan module.

When the initial system boot is complete, verify the following:

- Power supplies are supplying power to the system. See the “Removing and Installing Power Supplies” section on page 2-30.
- The system fan module is operating. See the “Removing and Installing the Fan Module” section on page 2-32.
- The system software boots successfully. Refer to the following website for the latest Cisco MDS 9000 Family configuration guides containing information on booting the system and initial configuration tasks:
<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.
- Verify that the system software is Cisco MDS SAN-OS Release 2.0(x) or later.
- The supervisor module and the switching or services module are installed correctly and each one initialized without problems. See the “Removing and Installing Switching and Services Modules” section on page 2-23 and the “Verifying Installation of a Switching or Services Module” section on page 2-28.

Send documentation comments to mdsfeedback-doc@cisco.com.

If each of these conditions is met and the hardware installation is complete, refer to the following website for the latest Cisco MDS 9000 Family configuration guides containing information on troubleshooting the software:
<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

However, if any of these conditions are not met, use the procedures in this appendix to isolate and, if possible, resolve the problem.

Solving Problems at the Component Level

The key to success when troubleshooting the system is to isolate the problem to a specific system component. The first step is to compare what the system is doing to what it should be doing. Because a startup problem can usually be attributed to a single component, it is more efficient to isolate the problem to a subsystem rather than troubleshoot each separate component in the system.

The Cisco MDS 9200 Series includes the following subsystems:

- Power supply—The power supply includes the power supply fans.
- Fan module—The fan module should operate whenever system power is on. You should see the Fan LED turn green and should hear the fan module to determine whether or not it is operating. If the Fan LED is red, this indicates that one or more fans in the fan module is not operating. You should immediately contact your customer service representative (see the “Contacting Customer Service” section on page B-5). There are no installation adjustments that you can make if the fan module does not function properly at initial startup.



Note If you purchased this product through a Cisco reseller, contact the reseller directly for technical support. If you purchased this product directly from Cisco, contact Cisco Technical Support at this URL: <http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

- Supervisor module—The supervisor module contains the system operating software, so check your supervisor module if you have trouble with the system software. A Status LED indicates whether the supervisor module can initialize the module in slot 2, if present.
- Switching or services module—A Status LED on the module indicates if it was initialized by the supervisor module. A module that is partially installed in the backplane can cause the system to halt.

Identifying Startup Problems

LEDs indicate all system states in the startup sequence. By checking the LEDs, you can determine when and where the system failed in the startup sequence.

To identify startup problems, follow these steps:

- Step 1** Turn on the power supply by pressing the switch on (I). You should immediately hear the system fan module begin to operate. If you do not, see the “Troubleshooting the Power Supplies” section on page B-3. If you determine that the power supplies are functioning normally and the fan module is faulty, contact your customer service representative. If the system fan module does not function properly at initial startup, there are no installation adjustments that you can make. To replace the fan module, see the “Removing and Installing the Fan Module” section on page 2-32.

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Step 2 Verify that the LEDs on the interface module are on as follows:

- The Status LED flashes orange once and stays orange during diagnostic boot tests. It turns green when the module is operational (online). If the system software cannot start up, this LED stays orange.
- The System LED turns green, indicating that all chassis environmental monitors are reporting that the system is operational. If one (or more) environmental monitors reports a problem, the System LED is orange or red.

If any LEDs on the supervisor module or interface module front panel are red or orange, contact your customer service representative (see the “Contacting Customer Service” section on page B-5).

For a complete description of the supervisor module and interface module LEDs, see the “LEDs on the Cisco MDS 9200 Series Integrated Supervisor Modules” section on page 1-6 and the “LEDs on the Interface Module” section on page 1-8.

Step 3 Verify that the Status LEDs on the supervisor module and on the switching or services module are green after the supervisor module completes initialization. This LED indicates that the modules are receiving power. It also indicates that the module is recognized by the supervisor module, and that it contains a valid Flash code version. This LED does not indicate the state of the individual interfaces on the switching module. If a Status LED is red or orange, contact your customer service representative (see the “Contacting Customer Service” section on page B-5).

Step 4 Verify that the terminal is set correctly and that it is connected properly to the supervisor module console port if the boot information and system banner are not displayed.

Troubleshooting the Power Supplies

To isolate a power supply problem, follow these steps:

Step 1 Verify that the Input Ok LED on the power supply is green.

- a. If the Input Ok LED is green, the AC source is good and the power supply is functional.
- b. If the Input Ok LED is off, first ensure that the power supply is flush with the back of the chassis. Press the power switch off (O), tighten the captive installation screw(s), and then press the power switch on (I).
- c. If the Input Ok LED remains off, there might be a problem with the AC source, or the power cable.
- d. Turn off the power to the switch by pressing both power switches to O, connect the power cord to another power source if one is available, and press the power switch back on (I).
- e. If the Input Ok LED is now green, the problem was the first power source.
- f. If the Input Ok LED fails to light after you connect the power supply to a new power source, replace the power cord and press the switch on (I).
- g. If the Input Ok LED lights at this point, return the first power cord for replacement.

If the Input Ok LED still fails to light when the switch is connected to a different power source with a new power cord, the power supply is probably faulty.

If a second power supply is available, install it in the second power supply bay and contact your customer service representative for further instructions.

Step 2 Repeat Step 1 if you have a second (redundant) power supply.

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If you cannot resolve the problem or if you determine that either a power supply or backplane connector is faulty, contact your customer service representative (see the “Contacting Customer Service” section on page B-5).

Troubleshooting the Fan Module

To isolate a fan module problem, follow these steps:

-
- Step 1** Verify that the Fan LED on the fan module is green.
- If the Fan LED is not on, see the “Solving Problems at the Component Level” section on page B-2 to determine whether the power supply is functioning properly.
- Step 2** Verify that the fan module is not seated in the backplane or has malfunctioned if the Fan LED is red.
- a. Loosen the captive installation screws, remove the fan module, and reinstall it to ensure that the fan module is seated properly.
 - b. Tighten all captive installation screws and then restart the system.

If the Fan LED is still red, the system detects a fan module failure. Contact your customer service representative for instructions. (See “Contacting Customer Service” section on page B-5)

Troubleshooting Switching and Services Modules

To isolate a problem with a module in slot 2, follow these steps:

-
- Step 1** Verify that all Status LEDs are on. If the Status LEDs on the interface module or the slot 2 module are red or off, the module might have shifted out of its slot.
- Step 2** Reseat the module until both ejector levers are at 90 degrees to the rear of the chassis.
- Step 3** Tighten the captive installation screws at the left and right of the module front panel.
- Step 4** Restart the system.

If the Status LED on a module is orange, the module might be busy or disabled. Refer to the following website for the latest Cisco MDS 9000 Family configuration guides containing information on configuring or enabling the interfaces:

<http://www.cisco.com/univercd/cc/td/doc/product/sn5000/mds9000/index.htm>.

After the system reinitializes the interfaces, the Status LED on the module should be green.

If you cannot resolve a problem with the startup, gather the information listed under the “Contacting Customer Service” section, and contact your customer support representative for assistance as directed under the “Obtaining Technical Assistance” section on page xiv.

Send documentation comments to mdsfeedback-doc@cisco.com.

**Note**

If you purchased this product through a Cisco reseller, contact the reseller directly for technical support. If you purchased this product directly from Cisco, contact Cisco Technical Support at this URL: <http://www.cisco.com/warp/public/687/Directory/DirTAC.shtm>

Contacting Customer Service

If you cannot solve a startup problem after using the troubleshooting suggestions in this appendix, contact your customer service representative for assistance and further instructions. Before you call, have the following information ready to help your service provider assist you as quickly as possible:

- Date you received the switch
- Chassis serial number
- Type of software and release number
- Maintenance agreement or warranty information
- Brief description of the problem
- Brief explanation of the steps you have already taken to isolate and resolve the problem

**Note**

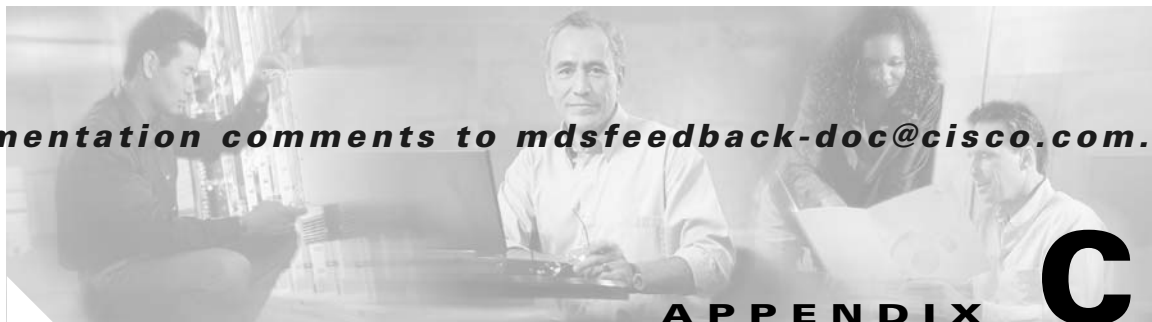
If you have CLI access, run the **show sprom backplane 1** command to display the backplane contents, including the switch serial number.

See the “Obtaining Technical Assistance” section on page xiv section in the Preface.

**Note**

If you purchased this product through a Cisco reseller, contact the reseller directly for technical support. If you purchased this product directly from Cisco, contact Cisco Technical Support at this URL: <http://www.cisco.com/warp/public/687/Directory/DirTAC.shtm>.

Send documentation comments to mdsfeedback-doc@cisco.com.



Technical Specifications

This appendix includes the following information for the Cisco MDS 9200 Series:

- Switch Specifications, page C-1
- Module Specifications, page C-3
- Weight of Modules, page C-4
- Supported Power Cords and Plugs, page C-7



Note

Specifications for cables and connectors are provided in Appendix D, “Cable and Port Specifications.”

Switch Specifications

Table C-1 lists the environmental specifications for the Cisco MDS 9200 Series.

Table C-1 Environmental Specifications for the Cisco MDS 9200 Series

Description	Specification
Temperature, ambient operating	32 to 104°F (0 to 40°C)
Temperature, ambient nonoperating and storage	-40 to 158°F (-40 to 70°C)
Humidity (RH), ambient (noncondensing) operating	10 to 90%
Humidity (RH), ambient (noncondensing) nonoperating and storage	5 to 95%
Altitude, operating	-197 to 6500 ft (-60 to 2000 m)
Noise levels	70 dB

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Table C-2 lists the physical specifications for the Cisco MDS 9200 Series.

Table C-2 Physical Specifications for the Cisco MDS 9200 Series

Description	Specification
Dimensions (HxWxD)	5.25 x 17.5 x 22.75 in. (13.3 x 44.5 x 57.8 cm) Chassis requires 3 RU ¹ . Chassis depth including cable guide is 27.75 in. (70.3 cm).
Weight	Chassis only: 31 lb (14.1 kg). Chassis configured with one supervisor module, fan module, and two power supplies: 45 lb (20.4 kg)
Power supply	845-W AC input for each power supply
Airflow	300 lfm ² through system fan module, or 80 cfm ³ per supervisor, switching, or services module. Total of 160 cfm if slot 2 is filled. Spacing requirements: <ul style="list-style-type: none"> • If installed in a cabinet, a minimum of 2.5 in. (6.4 cm) is required between the chassis air vents and the cabinet walls. • If installed in an open rack (no side panels), the horizontal distance required between the chassis and any devices that exhaust air towards the chassis is a minimum of 6 in. (15.2 cm), and the distance required between the chassis air vents and any walls is a minimum of 2.5 in. (6.4 cm).

1. RU = rack unit; 1 RU = 1.75 inches (4.45 cm)

2. lfm = linear feet per minute

3. cfm = cubic feet per minute

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Module Specifications

Table C-3 lists the specifications for the Cisco MDS 9200 Series supervisor module (which is fixed in the chassis) and the switching and services modules.

Table C-3 Cisco MDS 9200 Series Module Specifications

Description	Specification
Environmental Requirements	
Temperature, ambient operating	32 to 104°F (0 to 40°C)
Temperature, ambient nonoperating and storage	-40 to 167°F (-40 to 75°C)
Humidity (RH), ambient (noncondensing) operating	10 to 90%
Altitude operating	-197 to 6500 ft (-60 to 2000 m)
Physical Characteristics	
Dimensions	1.75 x 15.5 x 16.5 in. (4.4 x 39.4 x 41.9 cm) Note These are the maximum dimensions of faceplate and board, and include connectors on board.
Weight	8 to 11.5 lb (1.4 to 5.2 kg)

Table C-3 lists the specifications for the batteries on the Cisco MDS 9000 Family Caching Services Module.

Table C-4 Caching Services Module Battery Specifications

Attribute	Value
Nominal voltage	9.6 V
Rated capacity	Typical discharge capacity at 0.2C rate: 2100 mAh
	Minimum discharge capacity at 0.2C rate: 2000 mAh
	Minimum discharge capacity at 5C rate: 1800 mAh (1V/cell discharge cut-off)
Discharge	The battery is capable of continuous discharge from +5 to +60°C at 5C-rate
Charge	From 0 to 15°C at C/10 rate and from +15 to +40°C at C/2-rate
Storage temperature	0 to +35°C
Relative humidity range	From 5 to 90%

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Weight of Modules

Table C-5 lists the weight for each module in the Cisco MDS 9000 Family.

Table C-5 *Weight of Modules in the Cisco MDS 9000 Family*

Module	Weight
16-port FC switching module	9 lb (4.1 kg)
32-port FC switching module	9 lb (4.1 kg)
ASM	11 lb (5 kg)
SSM	11 lb (5 kg)
CSM	11.5 lb (5.2 kg)
IPS-4	9 lb (4.1 kg)
IPS-8	10 lb (4.5 kg)
MPS-14/2	10 lb (4.5 kg)
Supervisor for MDS 9500 Series	9 lb (4.1 kg)
Supervisor for MDS 9200 Series	9 lb (4.1 kg)

Power Specifications

This section includes the following information:

- Specifications for the Cisco MDS 9200 Series Power Supplies, page C-4
- Component Power Requirements and Heat Dissipation Specifications, page C-5

Specifications for the Cisco MDS 9200 Series Power Supplies

Table C-6 lists the specifications for the Cisco MDS 9200 Series power supply, which is 845 W and accepts AC input.

Table C-6 *Specifications for the Cisco MDS 9200 Series Power Supply*

Type	Autoranging input with power factor corrector
Voltage	100 to 240 VAC ($\pm 10\%$)
Current rating	12 A at 100 to 120 VAC 5 A at 200 to 240 VAC
Frequency	50/60 Hz (nominal) (± 3 Hz for full range)
Output capacity	845 W
Output voltage	+3.3 V at 10 A +50 V at 16.2 A



Note

For plug current ratings, see Figure C-1 on page C-8.

Send documentation comments to mdsfeedback-doc@cisco.com.

Component Power Requirements and Heat Dissipation Specifications

Consider heat dissipation when sizing the air-conditioning requirements for an installation. The power and heat associated with a Cisco MDS 9200 Series varies based upon the following considerations:

- Switching module type and number of switching modules installed
- Average switching traffic levels

Table C-7 lists the power requirements and heat dissipation for the components of the Cisco MDS 9200 Series.



Note

Unless noted otherwise, the data in Table C-7 is based on worst-case conditions. Typical numbers are approximately 30 percent below the numbers listed here.

Table C-7 Power Requirements and Heat Dissipation for the 845-W Power Supply

Module Type / Product Number	Power Required (watts)	Heat Dissipation (BTU/hr)	Input Current			
			90 VAC (amps)	120 VAC (amps)	180 VAC (amps)	240 VAC (amps)
Cisco MDS 9216i chassis with fan module DS-C9216i-K9	38	164	0.53	0.40	0.27	0.20
Cisco MDS 9216A chassis with fan module DS-C9216A-K9	38	164	0.53	0.40	0.27	0.20
Fixed Cisco MDS 9216i supervisor module (14-port Fibre Channel and 2-port Gigabit Ethernet module)	227	970	3.15	2.37	1.57	1.19
Fixed Cisco MDS 9216A supervisor module (16-port Fibre Channel module, 1Gbps/2Gbps)	220	940	3.05	2.29	1.53	1.15
16-port Fibre Channel module, 1Gbps/2Gbps DS-X9016	220	940	3.05	2.29	1.53	1.15
32-port Fibre Channel module, 1Gbps/2Gbps DS-X9032	200	855	2.78	2.08	1.39	1.04
MPS-14/2 DS-X9302-14K9	227	970	3.15	2.37	1.57	1.19
4-port IPS module DS-X9304- SMIP	185	789	2.57	1.93	1.28	0.96
8-port IPS module DS-X9308- SMIP	220	940	3.05	2.29	1.53	1.15

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Table C-7 Power Requirements and Heat Dissipation for the 845-W Power Supply (continued)

Module Type / Product Number	Power Required (watts)	Heat Dissipation (BTU/hr)	Input Current			
			90 VAC (amps)	120 VAC (amps)	180 VAC (amps)	240 VAC (amps)
32-port ASM, DS-X9032-SMV	295	1260	4.10	3.07	2.05	1.54
32-port SSM, DS-X9032-SMA	295	1260	4.10	3.07	2.05	1.54
CSM DS-X9560-SMC	210	907	2.95	2.22	1.48	1.11

Cisco MDS 9216i Sample Power and Heat Dissipation Calculation

Table C-8 provides a sample calculation of power and heat dissipation for the following hardware configuration at maximum wattage:

- Cisco MDS 9216i chassis, including two 845-W AC power supplies
- Fixed supervisor module, with 14 Fibre Channel ports and 2 Gigabit Ethernet ports
- One 32-port Fibre Channel switching module

Table C-8 Sample Calculation for Power and Heat Dissipation for Cisco MDS 9216i Switch

Module Type / Product Number	Qty	Power Required (watts)	Heat Dissipation (BTU/hr)	Input Current			
				90 VAC (amps)	120 VAC (amps)	180 VAC (amps)	240 VAC (amps)
Cisco MDS 9216i chassis with fan module DS-C9216i-K9	1	38	164	0.53	0.40	0.27	0.20
Fixed supervisor module (14-port Fibre Channel and 2-port Gigabit Ethernet module)	1	227	970	3.15	2.37	1.57	1.19
32-port Fibre Channel module, 1Gbps/2Gbps DS-X9032	1	200	855	2.78	2.08	1.39	1.04
Total		465	1989	6.46	4.85	3.23	2.43

Cisco MDS 9216A Sample Power and Heat Dissipation Calculation

Table C-9 provides a sample calculation of power and heat dissipation for the following hardware configuration at maximum wattage:

- Cisco MDS 9216A chassis, including two 845-W AC power supplies
- Fixed supervisor module, with 16 Fibre Channel ports
- One 32-port Fibre Channel switching module

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Table C-9 Sample Calculation for Power and Heat Dissipation for Cisco MDS 9216A

Module Type / Product Number	Qty	Power Required (watts)	Heat Dissipation (BTU/hr)	Input Current			
				90 VAC (amps)	120 VAC (amps)	180 VAC (amps)	240 VAC (amps)
Cisco MDS 9216A chassis with fan module DS-C9216A-K9	1	38	164	0.53	0.40	0.27	0.20
Fixed supervisor module (16-port Fibre Channel module, 1 Gbps/2 Gbps)	1	220	940	3.05	2.29	1.53	1.15
32-port Fibre Channel module, 1 Gbps/2 Gbps DS-X9032	1	200	855	2.78	2.08	1.39	1.04
Total		458	1959	6.36	4.77	3.19	2.39

Supported Power Cords and Plugs

A separate power cord is provided for each power supply. Standard power cords or jumper power cords are available for connection to a power distribution unit having IEC 60320 C13 outlet receptacles. The jumper power cords, for use in cabinets, are available as an option instead of the standard power cords.

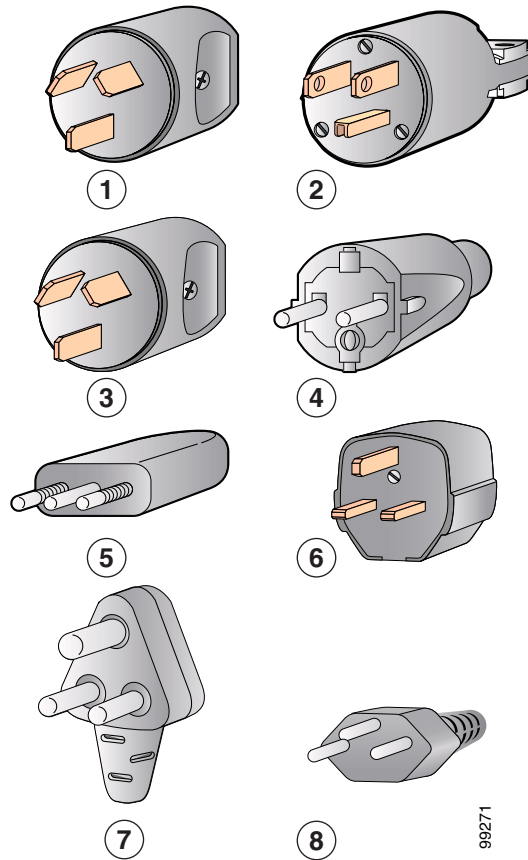
Power Cords

The standard power cords have an IEC C15 connector on the end that plugs into the switch. The optional jumper power cords have an IEC C15 connector on the end that plugs into the switch, and an IEC C14 connector on the end that plugs into an IEC C13 outlet receptacle. Only the standard power cords or jumper power cords provided with the switch are supported.

Figure C-1 shows the supported power supply plugs for the Cisco MDS 9200 Series.

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Figure C-1 845-W Power Supply Plugs



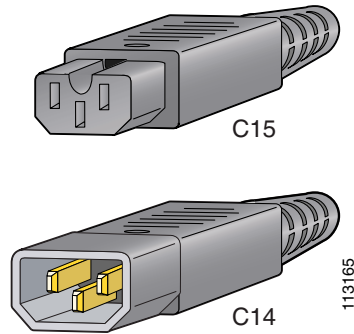
1	Argentina, IRAM 2073 plug (10 A)	5	Italy 1/3G plug, CEI 23-16 (10 A)
2	North America NEMA 5-15P plug (15 A)	6	United Kingdom BS89/13, BS 1363/A (13A; replaceable fuse)
3	Australia, New Zealand SAA/3 plug, AS/NZS 3112-1993 (10 A)	7	South Africa EL 208, SABS 164-1 (10 A)
4	Europe VIIG Plug, CEE (7) VII (16 A)	8	Switzerland 12G SEV 1011 (10 A)

Jumper Power Cord

Figure C-2 shows the C14 and C15 connectors on the optional jumper power cord for the Cisco MDS 9200 Series. The C15 connector connects into the C16 inlet on the Cisco MDS 9200 Series power supply, while the C14 connector connects into the C13 receptacle of a power distribution unit for a cabinet

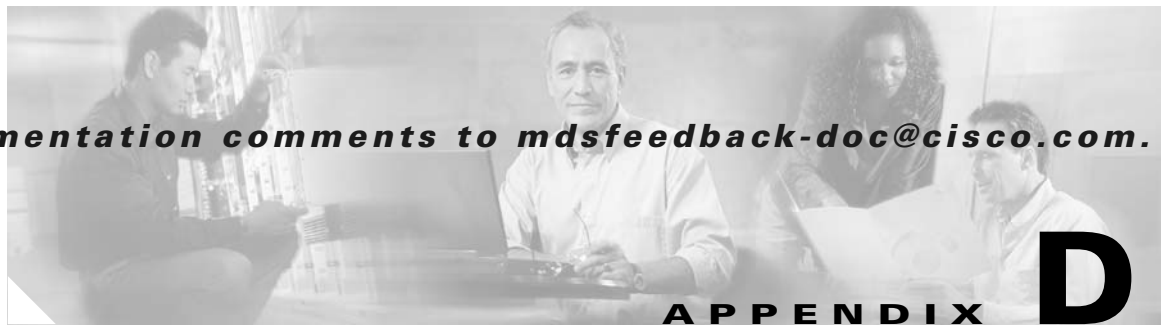
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Figure C-2 End of C14 and C15 Connectors on Jumper Power Cord for Cisco MDS 9200 Series



- | | |
|---|---|
| 1 | C14 and C15 connectors on jumper power cord for Cisco MDS 9200 Series
Power cord product ID: CAB-C15-CBN
250 VAC 13 A, C14-C15 connectors |
|---|---|

Send documentation comments to mdsfeedback-doc@cisco.com.



Cable and Port Specifications

This appendix includes the following information:

- Cables and Adapters Provided, page D-1
- Console Port, page D-2
- COM1 Port, page D-3
- MGMT 10/100 Ethernet Port, page D-5
- SFP Transceiver Specifications, page D-6

Cables and Adapters Provided

The Cisco MDS 9200 Series accessory kit includes the following items:

- RJ-45 to RJ-45 rollover cable
- RJ-45 to DB-9 female DTE adapter (labeled “Terminal”)
- RJ-45 to DB-25 female DTE adapter (labeled “Terminal”)
- RJ-45 to DB-25 male DCE adapter (labeled “Modem”)
- RJ-45 to DB-9 female DTE adapter (color-coded green and labeled "FOR DS-C9216-K9 ONLY")



Note

The green RJ-45 to DB-9 DTE adapter is not used for the Cisco MDS 9216A or Cisco MDS 9216i switches.



Note

Additional cables and adapters can be ordered from your customer service representative.



Note

If you purchased this product through a Cisco reseller, contact the reseller directly for technical support. If you purchased this product directly from Cisco, contact Cisco Technical Support at this URL: <http://www.cisco.com/warp/public/687/Directory/DirTAC.shtm>

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Console Port

The console port is an asynchronous RS-232 serial port with an RJ-45 connector. You can use the RJ-45 to RJ-45 rollover cable and the RJ-45 to DB-25 female DTE adapter or the RJ-45 to DB-9 female DTE adapter to connect the console port to a computer running terminal emulation software.

Console Port Pinouts

Table D-1 lists the pinouts for the console port on the Cisco MDS 9200 Series.

Table D-1 Console Port Pinouts

Pin	Signal
1 ¹	RTS
2	DTR
3	TxD
4	GND
5	GND
6	RxD
7	DSR
8	CTS

1. Pin 1 is connected internally to pin 8.

Connecting the Console Port to a Computer Using the DB-25 Adapter

You can use the RJ-45 to RJ-45 rollover cable and RJ-45 to DB-25 female DTE adapter (labeled “Terminal”) to connect the console port to a computer running terminal emulation software. Table D-2 lists the pinouts for the console port, the RJ-45 to RJ-45 rollover cable, and the RJ-45 to DB-25 female DTE adapter.

Table D-2 Port Mode Signaling and Pinouts with DB-25 Adapter

Console Port	RJ-45 to RJ-45 Rollover Cable		RJ-45 to DB-25 Terminal Adapter	Console Device
Signal	RJ-45 Pin	RJ-45 Pin	DB-25 Pin	Signal
RTS	1	8	5	CTS
DTR	2	7	6	DSR
TxD	3	6	3	RxD
GND	4	5	7	GND
GND	5	4	7	GND
RxD	6	3	2	TxD
DSR	7	2	20	DTR
CTS	8	1	4	RTS

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Connecting the Console Port to a Computer Using the DB-9 Adapter

You can use the RJ-45 to RJ-45 rollover cable and RJ-45 to DB-9 female DTE adapter (labeled “Terminal”) to connect the console port to a computer running terminal emulation software. Table D-3 lists the pinouts for the console port, the RJ-45 to RJ-45 rollover cable, and the RJ-45 to DB-9 female DTE adapter.

Table D-3 Port Mode Signaling and Pinouts with DB-9 Adapter

Console Port	RJ-45 to RJ-45 Rollover Cable		RJ-45 to DB-9 Terminal Adapter	Console Device
Signal	RJ-45 Pin	RJ-45 Pin	DB-9 Pin	Signal
RTS	1	8	8	CTS
DTR	2	7	6	DSR
TxD	3	6	2	RxD
GND	4	5	5	GND
GND	5	4	5	GND
RxD	6	3	3	TxD
DSR	7	2	4	DTR
CTS	8	1	7	RTS

COM1 Port

The COM1 port is a serial port with a DB-9 connector, and can be connected to a modem using the adapters provided in the accessory kit.



Note

The COM1 port is not supported for connection to a console.

COM1 Port Pinouts

Table D-4 lists the pinouts for the COM1 port on the Cisco MDS 9200 Series.

Table D-4 COM1 Port Pinouts

Pin	Signal
1	DCD
2	RxD
3	TxD
4	DTR
5	GND
6	DSR
7	RTS

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Table D-4 COM1 Port Pinouts (continued)

Pin	Signal
8	CTS
9	RI

Connecting the COM1 Port to a Modem

You can use the RJ-45 to DB-9 female DTE adapter (labeled “Terminal”) to connect to the COM1 port, and the RJ-45 to DB-25 male DCE adapter (labeled “Modem”) to connect to the modem, and then connect the adapters with the RJ-45 to RJ-45 rollover cable.

Table D-5 lists the pinouts for the COM1 port, the RJ-45 to DB-9 adapter, RJ-45 to RJ-45 rollover cable, and the RJ-45 to DB-25 male DCE adapter.

Table D-5 Port Mode Signaling and Pinouts for Modem with DB-25 Connection

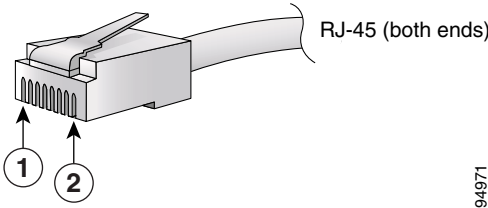
COM1 Port	RJ-45 to DB-9 Terminal Adapter	RJ-45 to RJ-45 Rollover Cable		RJ-45 to DB-25 Modem Adapter	Modem
Signal	DB-9 Pin	RJ-45 Pin	RJ-45 Pin	DB-25 Pin	Signal
CTS	8	8	1	5	CTS
DSR	6	7	2	8	DCD
RxD	2	6	3	3	RxD
GND	5	5	4	7	GND
GND	5	4	5	7	GND
TxD	3	3	6	2	TxD
DTR	4	2	7	20	DTR
RTS	7	1	8	4	RTS

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MGMT 10/100 Ethernet Port

The MGMT 10/100 Ethernet port is an Ethernet port with an RJ-45 connector. You can use a modular, RJ-45, straight-through UTP cable to connect the management port to an external hub, switch, or router (see Figure D-1).

Figure D-1 RJ-45 Interface Cable Connector



1	Pin 1	2	Pin 8
----------	-------	----------	-------

Table D-6 lists the connector pinouts and signal names for a 10/100BASE-T management port (MDI) cable.



Note

The RJ-45 interface only uses pins 1, 2, 3, and 6.

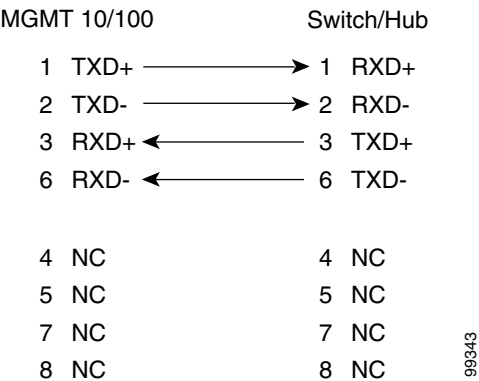
Table D-6 10/100BASE-T Management Port Cable Pinouts (MDI)

Pin	Signal
1	TD+
2	TD-
3	RD+
6	RD-
4	Not used
5	Not used
7	Not used
8	Not used

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Figure D-2 shows a schematic of the 10/100BASE-T cable required to connect the management port to a switch or hub (not provided with switch).

Figure D-2 Twisted-Pair 10/100BASE-T Cable Schematic



SFP Transceiver Specifications

The Cisco MDS 9200 Series is compatible with SFP transceivers and cables that have LC connectors. Each transceiver must match the transceiver on the other end of the cable in terms of wavelength, and the cable must not exceed the stipulated cable length for reliable communications.

Cisco SFP transceivers provide the uplink interfaces, laser transmit (TX), and laser receive (RX), and support 850- to 1610-nm nominal wavelengths, depending upon the transceiver.

Use only Cisco SFP transceivers on the Cisco MDS 9200 Series. Each Cisco SFP transceiver is encoded with model information that enables the switch to verify that the SFP transceiver meets the requirements for the switch. Refer to the *Cisco MDS 9000 Family Release Notes for Cisco MDS SAN-OS* for your software release to get the list of supported SFP transceivers.

This section provides the following information:

- Cisco Fibre Channel SFP Transceivers, page D-6
- Cisco Gigabit Ethernet/Fibre Channel Transceivers, page D-8
- Cisco CWDM SFP Transceivers, page D-9

For information about safety, regulatory, and standards compliance, refer to the *Regulatory Compliance and Safety Information for the Cisco MDS 9000 Family*.

Cisco Fibre Channel SFP Transceivers

Table D-7 lists the Fibre Channel SFP transceivers available through Cisco.

Table D-7 Cisco Fibre Channel SFP Transceivers

Description	Type
1-Gbps/2-Gbps Fibre Channel SW SFP, LC	Short wavelength
1-Gbps/2-Gbps Fibre Channel LW SFP, LC	Long wavelength

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General Specifications for Cisco Fibre Channel SFP Transceivers

Table D-8 lists general specifications for Cisco Fibre Channel SFP transceivers.



Note

The cable distances provided are for 2 Gbps.

Table D-8 General Specifications for Cisco Fibre Channel SFP Transceivers

Description	Short wavelength		Long wavelength
Connector type	LC		LC
Wavelength	850 nm		1310 nm
Fiber type	MMF		SMF
Core size	50 microns	62.5 microns	9/125 microns
Cable distance ¹	300 m	150 m	10 km
Transmit power	-10 to -1.5 dBm		-9.5 to -3 dBm

1. Approximate; actual distance may vary depending on fiber quality and other factors.

Environmental and Electrical Specifications for Cisco Fibre Channel SFP Transceivers

Table D-9 provides the maximum environmental and electrical ratings for Cisco Fibre Channel SFP transceivers.

Table D-9 Maximum Environmental and Electrical Ratings for Cisco Fibre Channel SFP Transceivers

Parameter	Symbol	Min.	Max.	Unit	Notes
Storage temperature	T _S	-40	85	°C	1
Case temperature	T _C	0	70	°C	1, 2
Relative humidity	RH	5	95	%	1
Module supply voltage	V _{CC} T,R	3.1	3.5	V	1

Notes:

1. Absolute maximum ratings are those values beyond which damage to the device may occur if these limits are exceeded for other than a short period of time.
2. Functional performance is not intended between the absolute maximum ratings and the recommended operating conditions. Device reliability is not implied and damage to the device may occur over an extended period of time.

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Cisco Gigabit Ethernet/Fibre Channel Transceivers

Table D-10 lists the combination Gigabit Ethernet/Fibre Channel SFP transceivers available through Cisco.

Table D-10 Cisco Gigabit Ethernet / Fibre Channel SFP Transceivers

Description	Type
1-Gbps Ethernet and 1-Gbps/2-Gbps Fibre Channel-SW SFP, LC	Short wavelength
1-Gbps Ethernet and 1-Gbps/2-Gbps Fibre Channel-LW SFP, LC	Long wavelength

General Specifications for Cisco Gigabit Ethernet/Fibre Channel SFP Transceivers

Table D-11 lists general specifications for Cisco combination Gigabit Ethernet/Fibre Channel SFP transceivers.



Note

The cable distances provided are for 2 Gbps.

Table D-11 General Specifications for Cisco Gigabit Ethernet/Fibre Channel SFP Transceivers

Description	Short wavelength		Long wavelength
Connector type	LC		LC
Wavelength	850 nm		1310 nm
Fiber type	MMF		SMF
Core size	50 microns	62.5 microns	9/125 microns
Cable distance ¹	300 m	150 m	10 km
Transmit power	-1.5 to -9.5 dBm		-3 to -9.5 dBm

1. Approximate; actual distance may vary depending on fiber quality and other factors.

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Environmental and Electrical Specifications for Cisco Gigabit Ethernet/Fibre Channel SFP Transceivers

Table D-12 provides the maximum environmental and electrical ratings for Cisco Gigabit Ethernet/Fibre Channel SFP transceivers.

Table D-12 Maximum Environmental and Electrical Ratings for Cisco Gigabit Ethernet/Fibre Channel SFP Transceivers

Parameter	Symbol	Min.	Max.	Unit	Notes
Storage temperature	T _S	-40	100	°C	1
Case temperature	T _C	0	85	°C	1, 2
Relative humidity	RH	5	95	%	1
Module supply voltage	V _{CC} T,R	3.1	3.5	V	1

Notes:

1. Absolute maximum ratings are those values beyond which damage to the device may occur if these limits are exceeded for other than a short period of time.
2. Functional performance is not intended between absolute maximum ratings and the recommended operating conditions. Device reliability is not implied, and damage to the device may occur over an extended period of time.

Cisco CWDM SFP Transceivers

Table D-13 lists the CWDM SFP transceivers available through Cisco.

Table D-13 Cisco CWDM SFP Transceivers

Description	Color
Cisco CWDM SFP 1470 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Gray
Cisco CWDM SFP 1490 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Violet
Cisco CWDM SFP 1510 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Blue
Cisco CWDM SFP 1530 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Green
Cisco CWDM SFP 1550 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Yellow
Cisco CWDM SFP 1570 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Orange
Cisco CWDM SFP 1590 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Red
Cisco CWDM SFP 1610 nm; Gigabit Ethernet and 1-Gbps/2-Gbps FC	Brown

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General Specifications for Cisco CWDM SFP Transceivers

Table D-14 lists general specifications for Cisco CWDM SFP transceivers.

Table D-14 General Specifications for Cisco CWDM SFP Transceivers

Description	Specification
Connector type	LC
Wavelength	1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610 nm
Fiber type	SMF
Core size	9/125 microns
Cable distance ¹	100 km
Transmit power	0 to 5 dBm
Receive sensitivity	-28 to -7 dBm

1. Approximate; actual distance may vary depending on fiber quality and other factors.

Environmental and Electrical Specifications for Cisco CWDM SFP Transceivers

Table D-15 provides the environmental specifications for CWDM SFP transceivers.

Table D-15 Environmental Specifications for Cisco CWDM SFP Transceivers

Description	Specification
Temperature, ambient operating	32 to 122°F (0 and 50°C)
Temperature, ambient nonoperating and storage	-40 to 185°F (-40 to 85°C)

Table D-16 provides the electrical specifications for CWDM SFP transceivers.

Table D-16 Electrical Specifications for Cisco CWDM SFP Transceivers

Parameter	Symbol	Minimum	Typical	Maximum	Units
Supply current	I_s		220	300	mA
Surge current	I_{surge}			+30	mA
Input voltage	Vmax	3.1	3.3	3.6	V

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Optical Specifications for Cisco CWDM SFP Transceivers

Table D-17 provides the optical specifications for CWDM SFP transceivers. CWDM SFP transceivers have an optical link budget of 28 decibels (db).


Note

The parameters are specified over temperature and at end of life unless otherwise noted.

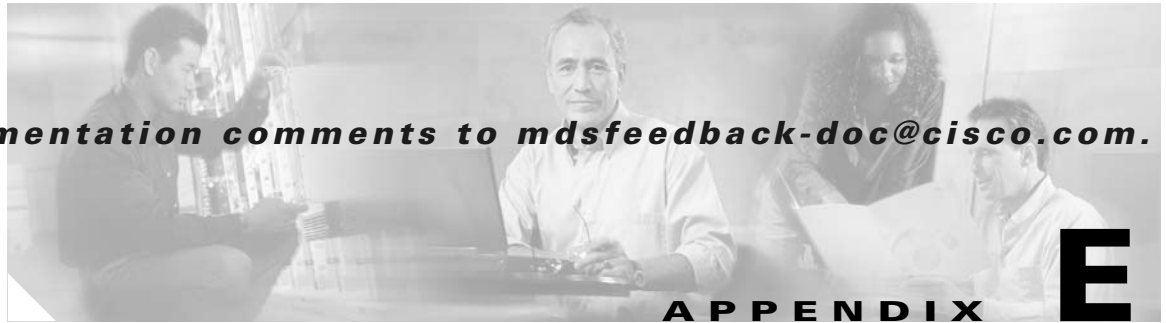

Note

When shorter distances of single-mode fiber are used, it might be necessary to insert an in-line optical attenuator in the link to avoid overloading the receiver.

Table D-17 Optical Specifications for Cisco CWDM SFP Transceivers

Parameter	Symbol	Min.	Typical	Max.	Units	Notes
Transmitter central wavelength	λ_c	(x-4)	(x+1)	(x+7)	Nm	Available center wavelengths: 1470, 1490, 1510, 1530, 1550, 1570, 1590, 1610 nm
Wavelength temperature dependence			0.08	0.1	nm/°C	
Side-mode suppression ratio	SMSR	30			dB	
Transmitter optical output power	P_{out}	0.0		5.0	dBm	Average power coupled into single-mode fiber
Receiver optical input power (BER $<10^{-12}$ with PRBS 2^7-1)	P_{in}	-28.0		-7.0	dBm	at 2.12 Gbps, 140°F (60°C) case temp.
Receiver optical input wavelength	λ_{in}	1450		1620	nm	
Transmitter extinction ratio	OMI	9			dB	
Dispersion penalty at 60 km				2	dB	
Dispersion penalty at 100 km				2	db	at 1.25 Gbps
				3	dB	at 2.12 Gbps

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Site Planning and Maintenance Records

This appendix includes the following records to use when installing the Cisco MDS 9200 Series:

- Site Preparation Checklist, page E-1
- Contact and Site Information, page E-3
- Chassis and Module Information, page E-4



Note

For information about how to query the switch for configuration information, refer to the *Cisco MDS 9000 Family Configuration Guide*.

Site Preparation Checklist

Planning the location and layout of your equipment rack or wiring closet is essential for successful switch operation, ventilation, and accessibility. Table E-1 lists the site planning tasks that we recommend completing before installing the Cisco MDS 9200 Series.

Consider heat dissipation when sizing the air-conditioning requirements for an installation. See Table C-1 on page C-1 for the environmental requirements, and the “Weight of Modules” section on page C-4 for power and heat ratings.

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Table E-1 Site Planning Checklist

Task No.	Planning Activity	Verified By	Time	Date
1	Space evaluation: <ul style="list-style-type: none"> • Space and layout • Floor covering • Impact and vibration • Lighting • Maintenance access 			
2	Environmental evaluation: <ul style="list-style-type: none"> • Ambient temperature • Humidity • Altitude • Atmospheric contamination • Air flow 			
3	Power evaluation: <ul style="list-style-type: none"> • Input power type • Power receptacles¹ • Receptacle proximity to the equipment • Dedicated circuit for power supply • Dedicated (separate) circuits for redundant power supplies • UPS² for power failures 			
4	Grounding evaluation: <ul style="list-style-type: none"> • Circuit breaker size • CO ground (AC- powered systems) 			
5	Cable and interface equipment evaluation: <ul style="list-style-type: none"> • Cable type • Connector type • Cable distance limitations • Interface equipment (transceivers) 			
6	EMI ³ evaluation: <ul style="list-style-type: none"> • Distance limitations for signaling • Site wiring • RFI⁴ levels 			

1. Verify that the power supply installed in the chassis has a dedicated AC source circuit.

2. UPS = uninterruptible power supply.

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3. EMI = electromagnetic interference.
4. RFI = radio frequency interference.

Contact and Site Information

Use the following worksheet to record contact and site information.

Table E-2 *Contact and Site Information*

Contact person	
Contact phone	
Contact e-mail	
Building/site name	
Data center location	
Floor location	
Address (line 1)	
Address (line 2)	
City	
State	
Zip code	
Country	

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Chassis and Module Information

Use the following worksheets to record information about the chassis and modules.

Contract Number _____

Chassis Serial Number _____

Product Number _____

Table E-3 Network-Related Information

Switch IP address	
Switch IP netmask	
Host name	
Domain name	
IP broadcast address	
Gateway/router address	
DNS address	
Modem telephone number	

Table E-4 Module Information

Slot	Module Type	Module Serial Number	Notes
1	Supervisor		
2			



Note

The supervisor module and the interface module are not removable.



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