



Cisco MDS 9148S Multilayer Hardware Installation Guide

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Preface

This preface describes the audience, organization, and conventions of the *Cisco MDS 9148S Multilayer Switch 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 9148S Multilayer Fabric switch and its components.
Chapter 2	Installing the Cisco MDS 9148S Switch	Describes how to install the Cisco MDS 9148S Multilayer Fabric switch, and includes how to install power supplies and fan modules.
Chapter 1	Connecting the Cisco MDS 9148S Switch	Describes how to connect the Cisco MDS 9148S Multilayer Fabric switch.
Appendix 1	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 1	Technical Specifications	Lists the Cisco MDS 9148S Multilayer Fabric switch specifications, and includes safety information, site requirements, and power connections.

Chapter	Title	Description
Appendix 1	Cable and Port Specifications	Lists cable and port specifications for the Cisco MDS 9148S Multilayer Fabric switch.
Appendix	Site Planning and Maintenance Records	Provides site planning and maintenance records.

Document Conventions

Notes use the following conventions:



Note

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

Cautions use the following conventions:



Caution

Means *reader be careful*. In this situation, you might do something that could result in equipment damage or loss of data.

Warnings use the following conventions:



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. 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

Waarschuwing

Dit waarschuwingssymbool betekent gevaar. U verkeert in een situatie die lichamelijke letsel kan veroorzaken. Voordat u aan enige apparatuur gaat werken, dient u zich bewust te zijn van de bij elektrische schakelingen betrokken risico's en dient u op de hoogte te zijn van standaard maatregelen om ongelukken te voorkomen. Voor vertalingen van de waarschuwingen die in deze publicatie verschijnen, kunt u het document *Regulatory Compliance and Safety Information* (Informatie over naleving van veiligheids- en andere voorschriften) raadplegen dat bij dit toestel is ingesloten.

Varoitus

Tämä varoitusmerkki merkitsee vaaraa. Olet tilanteessa, joka voi johtaa ruumiinvammaan. Ennen kuin työskentelet minkään laitteiston parissa, ota selvää sähkökytkentöihin liittyvistä vaaroista ja tavanomaisista onnettomuuksien ehkäisykeinoista. Tässä julkaisussa esiintyvien varoitusten käännökset löydät laitteen mukana olevasta *Regulatory Compliance and Safety Information* -kirjasesta (määräysten noudattaminen ja tietoa turvallisuudesta).

Attention	Ce symbole d'avertissement indique un danger. Vous vous trouvez dans une situation pouvant causer des blessures ou des dommages corporels. Avant de travailler sur un équipement, soyez conscient des dangers posés par les circuits électriques et familiarisez-vous avec les procédures couramment utilisées pour éviter les accidents. Pour prendre connaissance des traductions d'avertissements figurant dans cette publication, consultez le document <i>Regulatory Compliance and Safety Information</i> (Conformité aux règlements et consignes de sécurité) qui accompagne cet appareil.
Warnung	Dieses Warnsymbol bedeutet Gefahr. Sie befinden sich in einer Situation, die zu einer Körperverletzung führen könnte. Bevor Sie mit der Arbeit an irgendeinem Gerät beginnen, seien Sie sich der mit elektrischen Stromkreisen verbundenen Gefahren und der Standardpraktiken zur Vermeidung von Unfällen bewußt. Übersetzungen der in dieser Veröffentlichung enthaltenen Warnhinweise finden Sie im Dokument <i>Regulatory Compliance and Safety Information</i> (Informationen zu behördlichen Vorschriften und Sicherheit), das zusammen mit diesem Gerät geliefert wurde.
Avvertenza	Questo simbolo di avvertenza indica un pericolo. La situazione potrebbe causare infortuni alle persone. Prima di lavorare su qualsiasi apparecchiatura, occorre conoscere i pericoli relativi ai circuiti elettrici ed essere al corrente delle pratiche standard per la prevenzione di incidenti. La traduzione delle avvertenze riportate in questa pubblicazione si trova nel documento <i>Regulatory Compliance and Safety Information</i> (Conformità alle norme e informazioni sulla sicurezza) che accompagna questo dispositivo.
Advarsel	Dette varselsymbolet betyr fare. Du befinner deg i en situasjon som kan føre til personskade. Før du utfører arbeid på utstyr, må du være oppmerksom på de faremomentene som elektriske kretser innebærer, samt gjøre deg kjent med vanlig praksis når det gjelder å unngå ulykker. Hvis du vil se oversettelser av de advarslene som finnes i denne publikasjonen, kan du se i dokumentet <i>Regulatory Compliance and Safety Information</i> (Overholdelse av forskrifter og sikkerhetsinformasjon) som ble levert med denne enheten.
Aviso	Este símbolo de aviso indica perigo. Encontra-se numa situação que lhe poderá causar danos físicos. Antes de começar a trabalhar com qualquer equipamento, familiarize-se com os perigos relacionados com circuitos eléctricos, e com quaisquer práticas comuns que possam prevenir possíveis acidentes. Para ver as traduções dos avisos que constam desta publicação, consulte o documento <i>Regulatory Compliance and Safety Information</i> (Informação de Segurança e Disposições Reguladoras) que acompanha este dispositivo.
¡Advertencia!	Este símbolo de aviso significa peligro. Existe riesgo para su integridad física. Antes de manipular cualquier equipo, considerar los riesgos que entraña la corriente eléctrica y familiarizarse con los procedimientos estándar de prevención de accidentes. Para ver una traducción de las advertencias que aparecen en esta publicación, consultar el documento titulado <i>Regulatory Compliance and Safety Information</i> (Información sobre seguridad y conformidad con las disposiciones reglamentarias) que se acompaña con este dispositivo.

Varning! Denna varningssymbol signalerar fara. Du befinner dig i en situation som kan leda till personskada. Innan du utför arbete på någon utrustning måste du vara medveten om farorna med elkretsar och känna till vanligt förfarande för att förebygga skador. Se förklaringar av de varningar som förekommer i denna publikation i dokumentet *Regulatory Compliance and Safety Information* (Efterrättelse av föreskrifter och säkerhetsinformation), vilket medföljer denna anordning.

Related Documentation

The documentation set for the Cisco MDS 9000 Family includes the following documents. To find a document online, use the Cisco MDS NX-OS Documentation Locator at:

http://www.cisco.com/en/US/docs/storage/san_switches/mds9000/roadmaps/doclocator.htm

Release Notes

- *Cisco MDS 9000 Family Release Notes for Cisco MDS NX-OS Releases*
- *Cisco MDS 9000 Family Release Notes for MDS SAN-OS Releases*
- *Cisco MDS 9000 Family Release Notes for Storage Services Interface Images*
- *Cisco MDS 9000 Family Release Notes for Cisco MDS 9000 EPLD Images*
- *Release Notes for Cisco MDS 9000 Family Fabric Manager*

Regulatory Compliance and Safety Information

- *Regulatory Compliance and Safety Information for the Cisco MDS 9000 Family*

Compatibility Information

- *Cisco Data Center Interoperability Support Matrix*
- *Cisco MDS 9000 NX-OS Hardware and Software Compatibility Information and Feature Lists*
- *Cisco MDS NX-OS Release Compatibility Matrix for Storage Service Interface Images*
- *Cisco MDS 9000 Family Switch-to-Switch Interoperability Configuration Guide*
- *Cisco MDS NX-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*

Hardware Installation

- *Cisco MDS 9700 Series Hardware Installation Guide*

- *Cisco MDS 9500 Series Hardware Installation Guide*
- *Cisco MDS 9250i Multiservice Switch Installation Guide*
- *Cisco MDS 9200 Series Hardware Installation Guide*
- *Cisco MDS 9124 and Cisco MDS 9134 Multilayer Fabric Switch Quick Start Guide*
- *Cisco MDS 9148 Multilayer Fabric Switch Quick Start Guide*
- *Cisco MDS 9148S Multilayer Fabric Switch Quick Start Guide*

Software Installation and Upgrade

- *Cisco MDS 9000 NX-OS Release 6.2(x) and SAN-OS 3(x) Software Upgrade and Downgrade Guide*
- *Cisco MDS 9000 Family Storage Services Interface Image Install and Upgrade Guide*
- *Cisco MDS 9000 Family Storage Services Module Software Installation and Upgrade Guide*

Cisco NX-OS

- *Cisco MDS 9000 Family NX-OS Licensing Guide*
- *Cisco MDS 9000 Family NX-OS Fundamentals Configuration Guide*
- *Cisco MDS 9000 Family NX-OS System Management Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Interfaces Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Fabric Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Quality of Service Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Security Configuration Guide*
- *Cisco MDS 9000 Family NX-OS IP Services Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Intelligent Storage Services Configuration Guide*
- *Cisco MDS 9000 Family NX-OS High Availability and Redundancy Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Inter-VSAN Routing Configuration Guide*
- *Cisco MDS 9000 Family NX-OS Configuration Limits*

Cisco Data Center Network Manager

- *Cisco DCNM Fundamentals Guide*
- *Fabric Configuration Guide, Cisco DCNM for SAN*
- *High Availability and Redundancy Configuration Guide, Cisco DCNM for SAN*
- *Intelligent Storage Services Configuration Guide, Cisco DCNM for SAN*
- *Inter-VSAN Routing Configuration Guide, Cisco DCNM for SAN*
- *IP Services Configuration Guide, Cisco DCNM for SAN*
- *Quality of Service Configuration Guide, Cisco DCNM for SAN*
- *Security Configuration Guide, Cisco DCNM for SAN*

- *System Management Configuration Guide, Cisco DCNM for SAN*

Command-Line Interface

- *Cisco MDS 9000 Family Command Reference*

Intelligent Storage Networking Services Configuration Guides

- *Cisco MDS 9000 I/O Acceleration Configuration Guide*
- *Cisco MDS 9000 Family SANTap Deployment Guide*
- *Cisco MDS 9000 Family Data Mobility Manager Configuration Guide*
- *Cisco MDS 9000 Family Storage Media Encryption Configuration Guide*
- *Cisco MDS 9000 Family Secure Erase Configuration Guide*
- *Cisco MDS 9000 Family Cookbook for Cisco MDS SAN-OS*

Troubleshooting and Reference

- *Cisco NX-OS System Messages Reference*
- *Cisco MDS 9000 Family NX-OS Troubleshooting Guide*
- *Cisco MDS 9000 Family NX-OS MIB Quick Reference*
- *Cisco MDS 9000 Family NX-OS SMI-S Programming Reference*
- *Cisco MDS 9000 Family Fabric Manager Server Database Schema*



Product Overview

The Cisco MDS 9148S Multilayer Fabric Switch (DS-C9148S48PK9) is the next generation of the highly reliable and flexible Cisco MDS 9100 Series switches. A powerful compact one rack-unit (1RU) form factor can scale from 12 to 48 line-rate 16-Gbps Fibre Channel ports.

The Cisco MDS 9148S switch meets the requirements for a:

- Standalone storage area network (SAN) in small departmental storage environments
- Stop-of-the-rack switch in medium-sized redundant fabrics
- Edge switch in enterprise data center core-edge topologies

The Cisco MDS 9148S switch has the following major features:

- 12, 24, and 48, default licensed ports and an 12-port on-demand license
- 2-, 4-, 8- and, 16-Gbps full line rates
- Port interfaces that support field-replaceable, hot-swappable small form-factor pluggable (SFP) transceivers
- Redundant hot-swappable power supplies and fan trays, PortChannels for Inter-Switch Link (ISL) resiliency, and F-port channeling for resiliency on uplinks from a Cisco MDS 9148S operating in NPV mode
- Enterprise class features such as In-Service Software Upgrades (ISSU), Virtual SANs (VSANs), security features, and quality of service (QoS)
- PowerOn Auto Provisioning (POAP) to automate software image upgrades and configuration file installation on newly deployed switches
- Intelligent diagnostics
- Full compatibility with the Cisco MDS 9000 Family.

This chapter contains the following topics:

- [Chassis Components, page 1-7](#)
- [Power Supplies, page 1-11](#)
- [Fan Modules, page 1-12](#)
- [Cisco MDS 9148S Multilayer Switch Ports, page 1-12](#)

Chassis Components

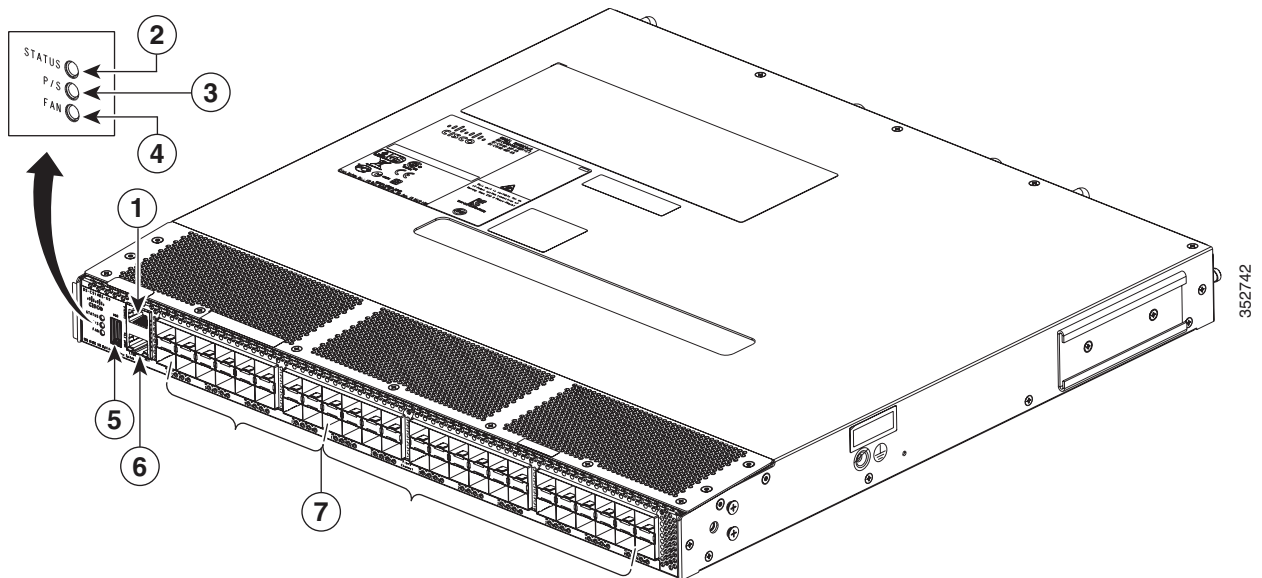
This section describes the different views of the chassis.

- [Front View, page 1-8](#)
- [Rear View, page 1-8](#)
- [Switch LEDs, page 1-10](#)

Front View

The front of the Cisco MDS 9148S switch contains the LEDs, the console and management ports, and 48 16-Gbps Fibre Channel Ports. See [Figure 1](#).

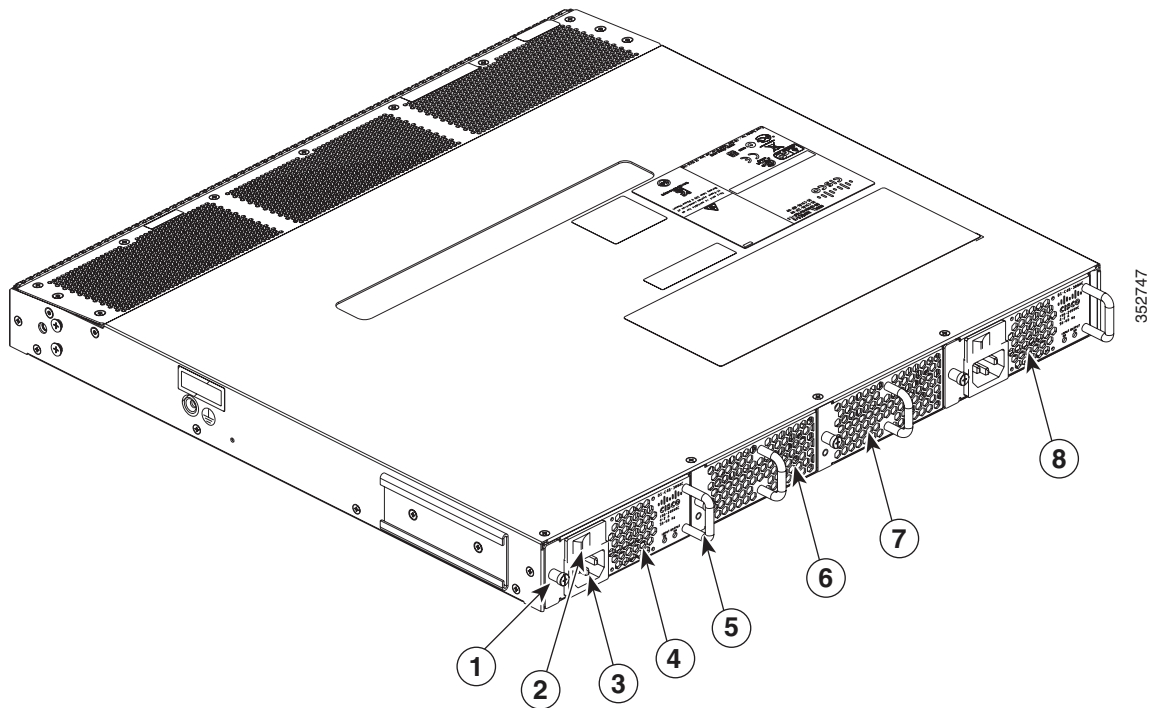
Figure 1 Front View of the Cisco MDS 9148S Multilayer Fabric Switch



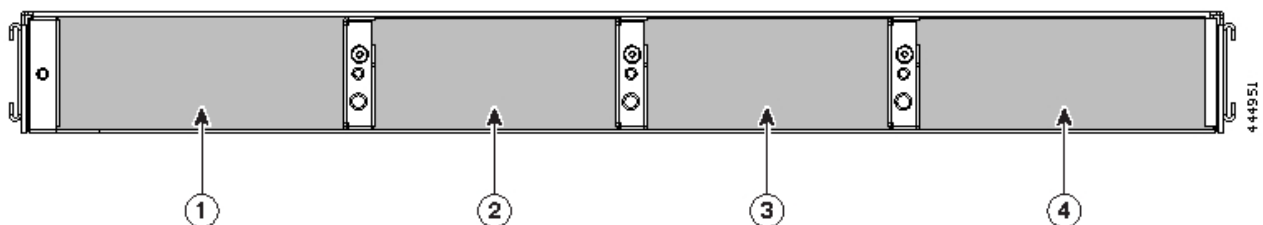
1	Console port	5	USB port
2	Status LED	6	Ethernet port
3	Power supply LED	7	Fibre Channel ports
4	FAN LED		

Rear View

The rear of the Cisco MDS 9148S switch contains the redundant power supplies, the AC power receptacle, and the fans. See [Figure 2](#).

Figure 2 Rear View of the Cisco MDS 9148S Multilayer Fabric Switch

1	Captive screw	5	Power module handle
2	On/Off switch	6	Fan module (fans 4 & 2)
3	Power receptable	7	Fan module (fans 3 & 1)
4	Power supply 2	8	Power supply 1

Figure 3 Rear Panel Slot Numbering of Cisco MDS 9148S Multilayer Fabric Switch

1	Power supply 2	3	Fan module (fans 3 and 1)
2	Fan module (fans 4 and 2)	4	Power supply 1

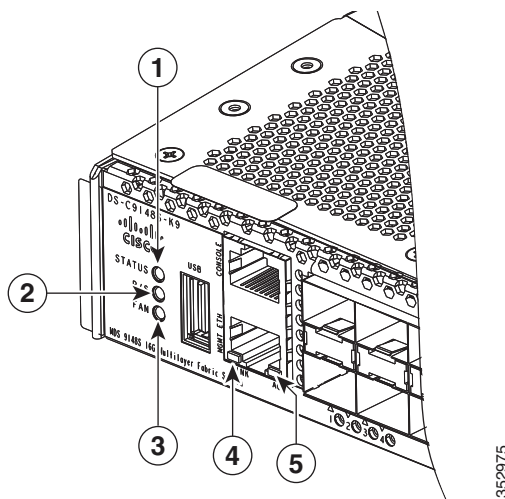
Switch LEDs

The front panel of the Cisco MDS 9148S switch includes the LEDs shown in [Figure 1-4](#). You can use the LEDs on this panel to quickly identify system status.


Note

Cisco MDS 9148S switch LEDs do not indicate the port speed.

Figure 1-4 Cisco MDS 9148S Switch LEDs



1	Switch status LED	4	10/100/1000 Ethernet management port link LED
2	Power supply LED	5	10/100/1000 Ethernet management port activity LED
3	Fan module status LED		

[Table 1-1](#) describes the front panel LEDs for the Cisco MDS 9148S switch.

Table 1-1 Switching Module LEDs

LED	Status	Description
Switch status	Green	The Ethernet port is connected other device.
	Off	The Ethernet port is not connected to other device.
	Orange Blinking	There is data transferring through this interface.
	Off	No data transferring.

Table 1-1 Switching Module LEDs (continued)

LED	Status	Description
Power supply status	Green	Both power supplies are working.
	Orange	One power supply has failed or has been removed. Note that from Cisco NX-OS Release 6.2.13 and later, the power supply status changes to Red when the power supply fails on a module.
	Red or all LEDs off	Both power supplies have failed.
Fan module status	Green	Both fan modules are working properly.
	Red	One or both fan modules have failed.
Port link	Solid green	Link is up.
	Steady flashing green	Link is up (beacon used to identify port). ¹
	Intermittent flashing green	Link is up (traffic on port).
	Solid orange	Link is disabled by software.
	Flashing orange	A fault condition exists.

1. The flashing green light turns on automatically when an external loopback is detected that causes the interfaces to be isolated. The flashing green light overrides the beacon mode configuration. The state of the LED is restored to reflect the beacon mode configuration after the external loopback is removed.

This chapter describes hardware information about the Cisco MDS 9148S switch and its components, and it includes the following sections:

- [Power Supplies, page 1-11](#)
- [Fan Modules, page 1-12](#)
- [Cisco MDS 9148S Multilayer Switch Ports, page 1-12](#)
- [Supported SFP+ Transceivers, page 1-12](#)

Power Supplies

The Cisco MDS 9148S switch supports only AC power supplies. Each power supply provides sufficient power to maintain switch operation in the event of a single power supply failure. Power supplies are hot swappable and can be individually replaced without disruption to the system.

The power supply has two LEDs, INPUT OK and OUTPUT OK. Power supply status is also indicated on a front panel LED.

Procedures for replacing and installing the power supplies are available in the [Removing and Installing AC Power Supplies](#) section.

Fan Modules

The Cisco MDS 9148S switch supports two hot-swappable fan modules that allow the switches to continue to run if a fan module is removed, provided that the preset temperature thresholds have not been exceeded. You can swap out a fan module without having to bring the system down. Each fan module on the Cisco MDS 9148S switch has two fans.

**Caution**

The Cisco MDS 9148S switch has internal temperature sensors that can shut down the system if the temperature at different points within the chassis exceed certain safety thresholds. To be effective, the temperature sensors require the presence of airflow; therefore, in the event a fan module is removed from the chassis, the Cisco MDS 9148S switch will shut down after five minutes to prevent potentially undetectable overheating. However, the switches will shut down sooner if the higher-level temperature threshold is exceeded. For normal operation, the Cisco MDS 9148S Switch requires four fans. Fan module status is also indicated on a front panel LED.

Procedures for replacing and installing the fan modules are available in the [Removing and Installing Fan Modules](#) section.

Cisco MDS 9148S Multilayer Switch Ports

The Cisco MDS 9148S switch provides host, target, and Inter-Switch Link (ISL) connectivity. It provides up to 48 autosensing and autonegotiating Fibre Channel ports capable of speeds of 2-, 4-, 8-, and 16-Gbps. The first 12 ports are licensed by default. On-Demand Port Activation Licensing allows expansion up to 48 ports, with additional ports available as an 12-port group.

Supported SFP+ Transceivers

The following types of SFP+ transceivers are available from Cisco Systems and are supported on the Cisco MDS 9148S switch:

- Cisco MDS 4/8/16-Gbps Fibre Channel SW SFP+, LC: DS-SFP-FC16G-SW
- Cisco MDS 4/8/16-Gbps Fibre Channel LW SFP+, LC: DS-SFP-FC16G-LW
- Cisco MDS 2/4/8-Gbps Fibre Channel SW SFP+, LC: DS-SFP-FC8G-SW
- Cisco MDS 2/4/8-Gbps Fibre Channel LW SFP+, LC: DS-SFP-FC8G-LW
- Cisco MDS 2/4/8-Gbps Fibre Channel Extended Reach SFP+, LC: DS-SFP-FC8G-ER
- Cisco MDS 2/4/8-Gbps CWDM Long Distance SFP, LC: DS-CWDM8Gxxxx
- Cisco MDS 4/8/16-Gbps Fibre Channel LW SFP+, DWDM, SM, DDM, 13 dB, 40 km: DS-16G-ER-Dxxx
- Cisco MDS 4/8/16-Gbps Fibre Channel LW SFP+, CWDM, SM, DDM, 13 dB, 40 km: DS-16G-ER-Cxx
- Cisco MDS 4/8/16-Gbps Fibre Channel/FICON LW SFP+, DWDM, SM, DDM, 1550nm, 13 dB, 40 km: DS-16G-ER
- Cisco MDS 2/4/8-Gbps Fibre Channel LW SFP+, DWDM, SM, DDM, 80 km: DS-8G-ZR-Dxxx
- Cisco MDS 2/4/8-Gbps Fibre Channel LW SFP+, CWDM, SM, DDM, 23dB, 70 km: DS-8G-ZR-Cxx

- Cisco MDS 2/4/8-Gbps Fibre Channel LW SFP+, SM, DDM, 80 km: DS-8G-ZR

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

For the list of supported SFP transceivers, see the *Cisco MDS 9000 Family Release Notes for Cisco MDS NX-OS Releases*. For more information about a specific Cisco SFP transceiver, see the “[SFP Transceiver Specifications](#)” section on page 1-56. SFP transceivers can be ordered separately or with the Cisco MDS 9148S Switch.

**Note**

Use only Cisco SFP transceivers on the Cisco MDS 9148S switches. 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.



Installing the Cisco MDS 9148S Switch

This chapter describes how to install the MDS 9148S switch and its components, and it includes the following information:

- [Preinstallation, page 2-16](#)
- [Front-Facing Installation, page 2-19](#)
- [Installing the Switch in a Cabinet with Insufficient Front Clearance, page 2-21](#)
- [Grounding the Switch, page 2-26](#)
- [Grounding the Switch, page 2-26](#)
- [Starting Up the Switch, page 2-27](#)
- [Removing and Installing Components, page 2-29](#)



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.



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

**Note**

Each new switch requires a license; see the *Cisco MDS 9000 Family NX-OS Licensing Guide* for instructions on installing a license.

Preinstallation

This section includes the following information:

- [Installation Options, page 2-16](#)
- [Installation Guidelines, page 2-16](#)
- [Required Equipment, page 2-18](#)
- [Unpacking and Inspecting the Switch, page 2-18](#)

Installation Options

The MDS 9148S Switch 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
- 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 [“Front-Facing Installation” section on page 2-19](#).

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 1-45](#).

**Note**

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

Installation Guidelines

Follow these guidelines when installing the Cisco MDS 9148S Switch:

- Plan your site configuration and prepare the site before installing the switch. The recommended site planning tasks are listed in [Appendix 1, “Site Planning and Maintenance Records.”](#)

- Ensure there is adequate space around the switch to allow for servicing the switch and for adequate airflow (airflow requirements are listed in [Appendix 1, “Technical Specifications”](#)).
- Ensure the air-conditioning meets the heat dissipation requirements listed in [Appendix 1, “Technical Specifications.”](#)
- Ensure the cabinet or rack meets the requirements listed in [Appendix 1, “Cabinet and Rack Installation.”](#)

**Note**

If the front cabinet mounting rails are not offset from the front door or bezel panel by a minimum of 3 inch (7.6 cm), and a minimum of 5 inch. (12.7 cm) if cable management brackets are installed on the front of the chassis, the chassis should be mounted rear-facing to ensure the minimum bend radius for fiber-optic cables. See the [“Installing the Switch in a Cabinet with Insufficient Front Clearance”](#) section on page 2-21.

**Note**

Jumper power cords are available for use in a cabinet. For more information, see the [“Jumper Power Cord”](#) section on page 1-68.

- 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 1, “Technical Specifications.”](#) If available, you can use an uninterrupted power supply (UPS) to protect against power failures.

**Caution**

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

- Ensure that circuits are sized according to local and national codes.

For North America, the 300-W power supplies require a 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 current ratings for wiring and breakers.

- As you install and configure the switch, record the information listed in the [“Site Planning and Maintenance Records”](#) section on page 1-69.
- 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 tools before beginning the installation:

- Number 1 Phillips screwdriver 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 switch 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.

**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/en/US/support/tsd_cisco_worldwide_contacts.html

**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:

- 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
-

Front-Facing Installation

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 bracket as follows:
- a. Position one of the front rack-mount brackets against the side of the switch and align the screw holes. Then attach the bracket to the switch with the three M4 screws originally provided with the bracket.
 - b. Repeat with the other front rack-mount bracket on the other side of the switch.

- Step 2** Install the C brackets as follows:



Note Two C brackets are shipped preinstalled on the switch, using three M3 screws per bracket. This installation step is only necessary if the C brackets were removed.

- a. Position one of the C brackets against the side of the switch and align the screw holes. Attach the bracket to the switch with the three M3 screws originally provided with the bracket.
 - b. Repeat with the other C bracket on the other side of the switch.
- Step 3** Install the slider rails in the rack. Position one of the slider rails against the rack mounting rails and align the screw holes as shown in [Figure 2-1](#).
- Step 4** Attach the slider rail using two 12-24 screws or two 10-32 screws, depending on the rack rail thread type. For racks with square holes, insert the 12-24 cage nuts in position behind the mounting holes in the slider rails.
- a. Repeat with the other slider rail on the other side of the rack.

- b. Use the tape measure and level to verify that the rails are horizontal and at the same height.

Figure 2-1 *Installing the Slider Rails*

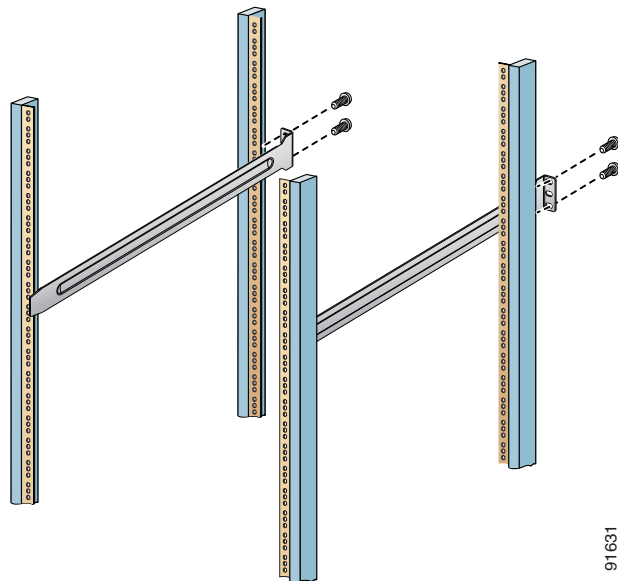
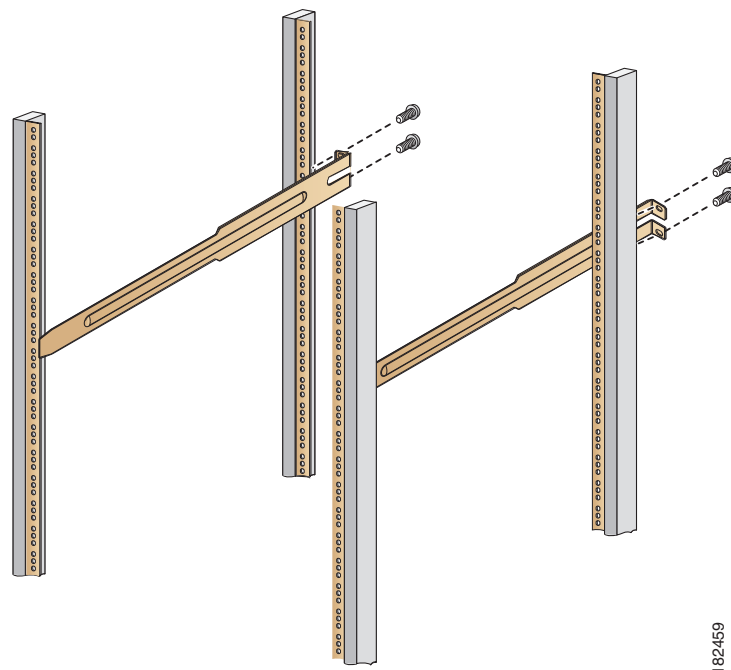


Figure 2-2 *Installing the Notched Slider Rails*



Step 5 Insert the switch into the rack:

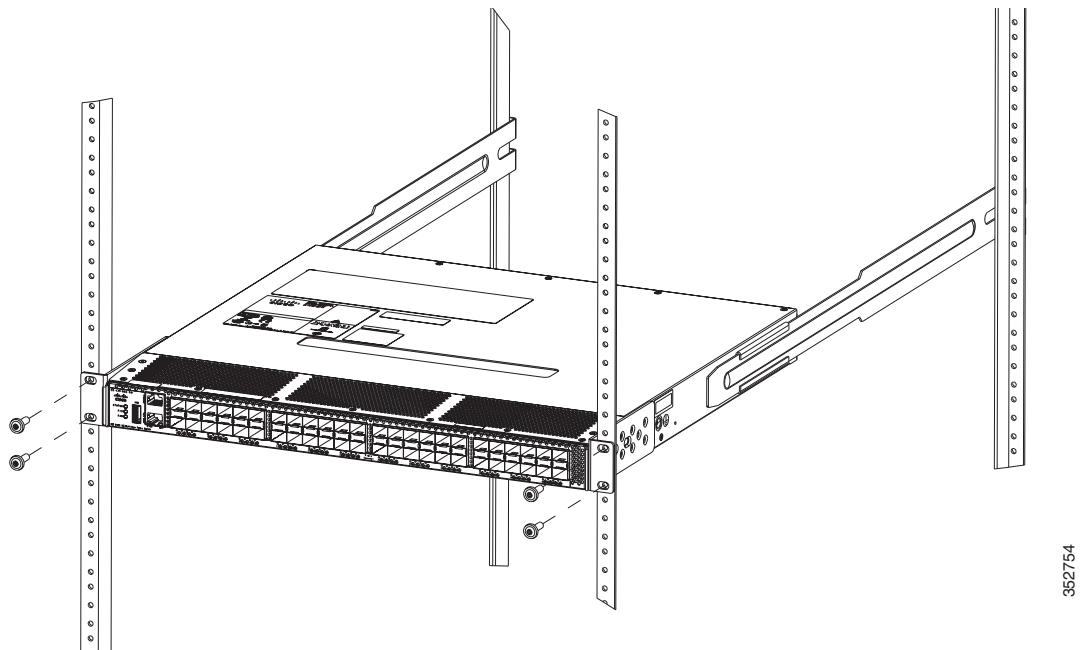
- a. By using both hands, position the switch with the back of the switch between the front rack-mounting rails as shown in [Figure 2-3](#).
- b. Align the two C brackets on either side of the switch with the slider rails installed in the rack. Slide the C brackets onto the slider rails, and then gently slide the switch all the way into the rack. If the switch does not slide easily, try realigning the C brackets on the slider rails.

Step 6 Stabilize the switch in the rack by attaching the front rack-mount brackets to the front rack-mounting rails:

- a. Insert two screws (12-24 or 10-32, depending on rack type) and through the cage nuts and the holes in one of the front rack-mount brackets and into the threaded holes in the rack-mounting rail.
- b. Repeat for the front rack-mount bracket on the other side of the switch.

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 2-3 Attaching the Switch to the Rack



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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 9148S switch into a cabinet with insufficient front-facing clearance. The Cisco MDS 9148S switch is installed rear-facing to provide adequate clearance for the fiber-optic cables. This cabinet meets the requirements described in [Appendix 1, “Cabinet and Rack Installation,”](#) except the cabinet has less than three-inch 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 9148S switch 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.

The rack-mount kit provided with the switch contains the items listed in [Table 2-1](#).

Table 2-1 *Table 2-1 Cisco MDS 9148S Fabric Switch Rack-Mount Kit*

Description	Quantity
30- to 36-inch slider rails	2 per kit
24- to 30-inch slider rails	2 per kit
18- to 24-inch slider rails	2 per kit
Front rack-mount brackets	2 per kit
12-24 x 3/4-inch Phillips binder-head screws	10 per kit
10-32 x 3/4-inch Phillips binder-head screws	10 per kit
M4 x 6-mm Phillips flat-head screws	6 per kit
12-24 cage nuts	10 per kit

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

The front rack-mount brackets for the Cisco MDS 9148S switch 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:
- Position one of the front rack-mount brackets against the side of the switch and align the screw holes as shown in [Figure 2-4](#). Then attach the bracket to the switch with the three M4 screws originally provided with the bracket.
 - Repeat with the other front-rack mount bracket on the other side of the switch.

- Step 2** Install the C brackets as follows:



Note Two C brackets are shipped preinstalled on the switch, using three M3 screws per bracket. This installation step is only necessary if the C brackets were removed.

- Position one of the C brackets against the side of the switch and align the screw holes. Attach the bracket to the switch with the three M3 screws originally provided with the bracket.
- 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 9148S switch must be installed onto the switch prior to installing the switch into the cabinet. To install brackets 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, follow these steps:

- Step 1** Install the front-rack mount brackets for cabinets with rail-to-rail spacings less than 26 inches as follows:
- Position one of the front rack-mount brackets against the side of the switch and align the screw holes. Then attach the bracket to the switch with two of the three M4 screws originally provided with the bracket.
 - Repeat with the other front rack-mount bracket on the other side of the switch.



Note The front rack-mount bracket does not align with all three holes in the Cisco MDS 9148S switch in this configuration. The two screws are adequate to hold the weight of the Cisco MDS 9148S switch.

Step 2 Install the C brackets as follows:



Note

Two C brackets are shipped preinstalled on the switch, using three M3 screws per bracket. This installation step is only necessary if the C brackets were removed.

- a. Position one of the C brackets against the side of the switch and align the screw holes. Then attach the bracket to the switch with the three M3 screws originally provided with the bracket.
- b. Repeat with the other C bracket on the other side of the switch.

Installing Cisco MDS 9148S Switch Rear-Facing into Cabinet

To install a Cisco MDS 9148S switch rear-facing into a cabinet using the rack-mount kit provided with the switch (for cabinets with insufficient front-facing clearance), follow these steps:

Step 1 Install the notched slider rails in the rack:

- a. Route the power cord through the open cutout at the end of one of the slider rails, and then let the cord dangle while you proceed with the next steps.
- b. Position one of the slider rails against the front rack-mounting rails and align the screw holes. Attach them using two 12-24 screws or two 10-32 screws, depending on the rack rail thread type. For racks with square holes, first install the 12-24 cage nuts.
- c. Repeat with the other slider rail on the other front side of the rack.
- d. Use the tape measure and level to verify that the rails are horizontal and at the same height.

Step 2 Insert the switch into the rack:

- a. Using both hands, position the switch with the back of the switch between the rear rack-mounting rails.
- b. Align the two C brackets on either side of the switch with the slider rails installed in the rack. Slide the C brackets onto the slider rails and then gently slide the switch all the way into the rack. If the switch does not slide easily, try realigning the C brackets on the slider rails.

Step 3 Connect the power cord that you previously routed through the open cutout of the slider rail to the switch. Limit the length of the power cord between the back of the chassis and the rail opening.

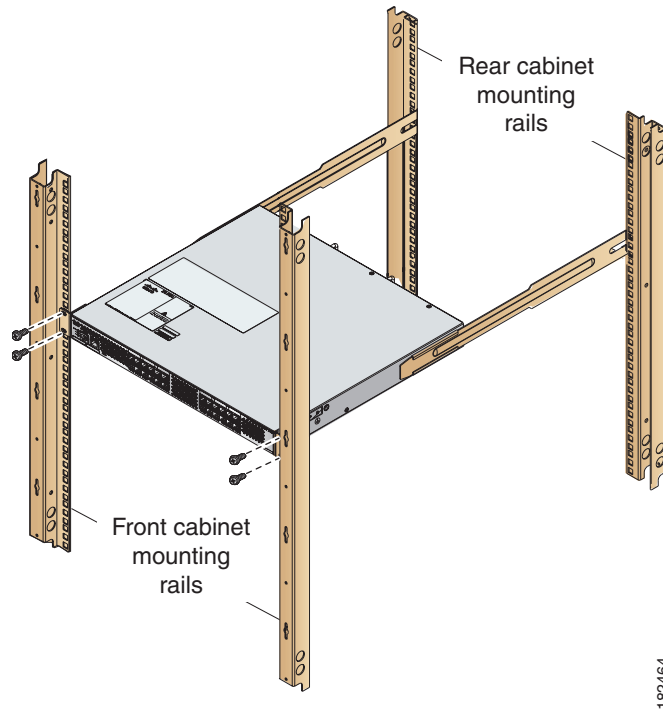


Note

If you failed to route the power cord through the open cutout of the slider rail as directed in Step 1, remove the switch and rails and remount the rails using the correct method. Do not connect the power cord by routing it over the top of the slider rail. This type of installation is hazardous.

- Step 4** Stabilize the switch in the rack by attaching the front rack-mount brackets to the rear rack-mounting rails:
- Insert two screws (12-24 or 10-32, depending on rack type) through the holes in one of the front rack-mount brackets and into the threaded holes in the back rack-mounting rail (see [Figure 2-4](#)). For racks with square holes, first install the 12-24 cage nuts.

Figure 2-4 Attaching the Cisco MDS 9148S Switch (Rear-Facing) to the Cabinet



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



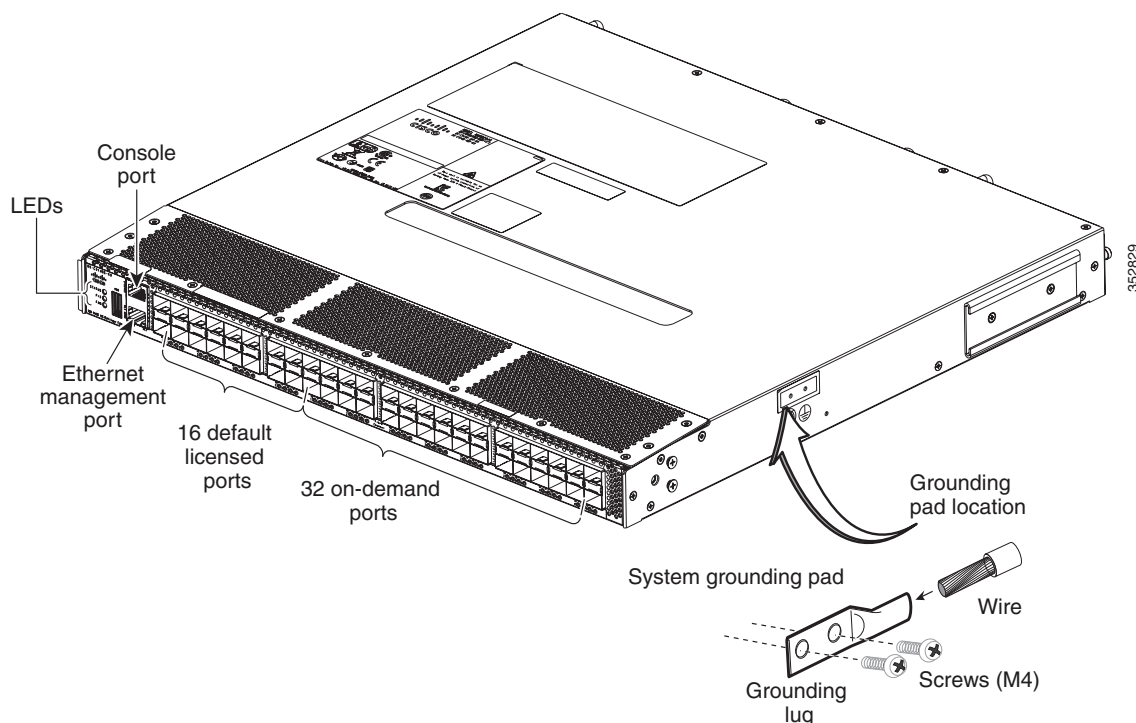
Tip

If the chassis exceeds the 1-RU space on the low side of the rack, you may have difficulty installing other equipment. In this situation, loosen the screws on the front and back rails of the chassis and raise it to the top of the RU space by pushing the chassis up until it cannot go any further. Then retighten the screws while keeping the chassis in the elevated position.

Grounding the Switch

A grounding pad with two threaded M4 holes is provided on the chassis for attaching a grounding lug. [Figure 2-5](#) shows the system ground location on the Cisco MDS 9148S switch.

Figure 2-5 Location of Switch Ground on the Cisco MDS 9148S Switch



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.

Note

If the rack is less than 25-in. (635 mm) deep, the slider rails will cover the grounding hole. Therefore, the rack must either be grounded or at least 25-in. (635 mm) deep.

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.

**Note**

The grounding lug must be NRTL listed and compatible with copper conductors. Only copper conductors (wires) must be used and the copper conductor must comply with National Electrical Code (NEC) for ampacity.

**Note**

Customers who require compliance to GR-1089-CORE bonding and grounding requirements, must use the ground conductor.

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 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.
- 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.

**Caution**

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

**Note**

Do not connect the MGMT 10/100/1000 Ethernet port to the LAN until the initial switch configuration has been performed. For instructions on connecting to this port, see the [“Connecting the Console Port” section on page 1-35](#).

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

- Step 1** Verify that both power supplies and fan modules are installed and tighten any loose captive screws.
- Step 2** Verify that the power switches on both power supplies are off. Then plug the power cables into the power supplies and arrange the cables so that they cannot be accidentally 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 9148S switch to your outlet receptacle. See the [“Jumper Power Cord” section on page 1-68](#).

- Step 3** Connect the other end of the power cables to an AC power source.
- Step 4** Ensure that the switch is adequately grounded as described in the [“Installing the Switch in a Cabinet with Insufficient Front Clearance” section on page 2-21](#), and that the power cables are connected to outlets that have the required AC power voltages (provided in the [“Installing the Switch in a Cabinet with Insufficient Front Clearance” section on page 2-21](#)).
- Step 5** Flip the power switches on the power supplies to the on (I) position. The switch boots automatically.
- Step 6** Listen for the fans; they should begin operating as soon as 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 7** Verify that the LED behavior is as follows when the switch has finished booting:
- Fan status LED is green.
 - Each power supply LED is green.
 - The Switch status LED is green. If this LED is orange or red, then one or more environmental monitors is reporting a problem.
 - The Ethernet port Link LEDs should not be on unless the cable is connected.

**Note**

The LEDs for the Fibre Channel ports remain orange until the ports are enabled, and the LED for the MGMT 10/100/1000 Ethernet port remains off until the port is connected.

If any LEDs other than the Fibre Channel port LEDs are orange or red after the initial boot processes are complete, see the *Cisco MDS 9000 Family Troubleshooting Guide*.

- Step 8** Try removing and reinstalling a component that is not operating properly. If it still does not operate correctly, contact your customer service representative for a replacement.

**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/en/US/support/tsd_cisco_worldwide_contacts.html

- Step 9** Verify that the system software has booted and the switch has initialized without error messages. If any problems occur, see the *Cisco MDS 9000 Family Troubleshooting Guide* or the *Cisco MDS 9000 Family System Messages Guide*. If you cannot resolve an issue, contact your customer service representative.
- Step 10** Complete the worksheets provided in [Appendix 1, “Site Planning and Maintenance Records”](#) for future reference.

**Note**

A setup utility automatically launches the first time you access the switch and guides you through the basic configuration. For instructions about how to configure the switch and check module connectivity, see the *Cisco Fabric Manager Fundamentals Configuration Guide*.

Removing and Installing Components

The Cisco MDS 9148S switch is shipped with two field-replaceable power supplies. Each power supply includes a fixed fan. The Cisco MDS 9148S switch has two field-replaceable fan modules.

This section provides the following information:

- [Removing and Installing AC Power Supplies, page 2-30](#)
- [Removing and Installing Fan Modules, page 2-31](#)

**Warning**

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

**Caution**

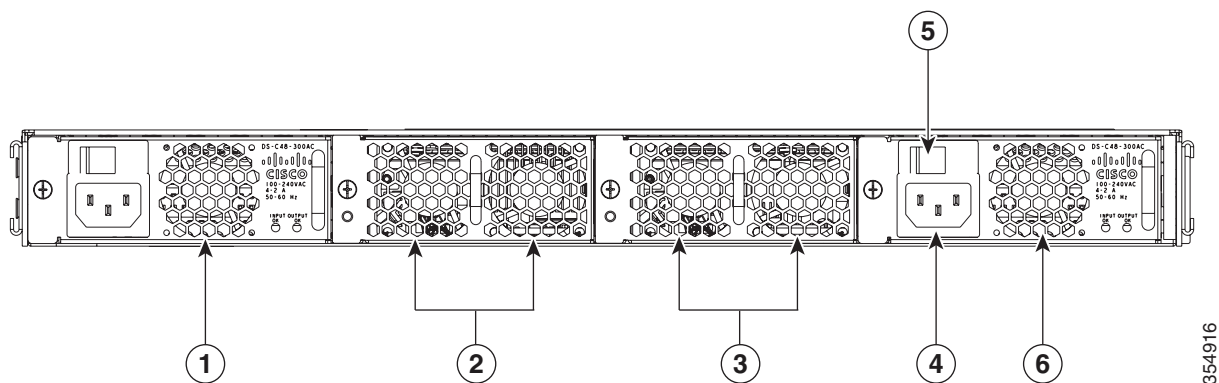
During this procedure, wear grounding wrist straps to avoid ESD damage to the switch.

**Note**

The Cisco MDS 9148S Switch is only supported for operation with both power supplies and both fan modules installed, and with all fans working.

With two power supplies installed, if one power supply fails, the system can continue to function normally on a single healthy power supply. However, the failed power supply should be replaced as soon as possible to provide redundancy.

The fan modules are required to ensure proper cooling of the switches.

Figure 2-6 Rear View of the Cisco MDS 9148S Switch

1	Power Supply 2	4	AC Power receptacle
2	Fan Module 2 (Fans 2 and 4)	5	Switch On/Off
3	Fan Module 1 (Fans 1 and 3)	6	Power Supply 1

Removing and Installing AC Power Supplies

This section provides instructions for removing and installing the AC power supplies for the Cisco MDS 9148S switch.

Removing Power Supplies

To remove a AC power supply, follow these steps:

-
- Step 1** Turn the power switch to the off (0) position on the power supply that you are removing.
 - Step 2** Disconnect the power cord from the power source.
 - Step 3** Loosen the captive screw.
 - Step 4** Grasp the power supply handle and slide the power supply out of the switch.
-

Installing Power Supplies

To install the dual 300-W AC-input power supplies, follow these steps:

-
- Step 1** Ensure that the system (earth) ground connection has been made.
-

- Step 2** Make sure the power cord is disconnected before installing the power supply.
- Step 3** Verify that the power switch is in the off (O) position on the power supply that you are installing.
- Step 4** Slide the power supply into the power supply bay. Make sure that the power supply is fully seated in the bay.
- Step 5** Tighten the power supply captive screw.
- Step 6** Plug the power cord into the power supply.
- Step 7** Connect the other end of the power cord to an AC-input power source.

**Note**

Depending on the outlet receptacle on your power distribution unit, you may need the optional jumper power cord to connect the Cisco MDS 9148S switch to your outlet receptacle. See the [“Jumper Power Cord”](#) section on page 1-68.

- 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 (P/S) LED in the front panel is green. If the LED is not green, see the *Cisco MDS 9000 Family Troubleshooting Guide*.

Removing and Installing Fan Modules

This section provides instructions for removing and installing the fan modules for the Cisco MDS 9148S switch.

Removing a Fan Module on the Cisco MDS 9148S Switch

The fan module is designed to be removed and replaced while the system is operating without presenting an electrical hazard or damaging the system.

**Caution**

The Cisco MDS 9000 Family has internal temperature sensors that can shut down the system if the temperature at different points within the chassis exceed certain safety thresholds. To be effective, the temperature sensors require the presence of airflow; therefore, in the event a fan module is removed from the chassis, the Cisco MDS 9000 Family will be shut down after five minutes to prevent potentially undetectable overheating. However, the switches will shut down sooner if the higher-level temperature threshold is exceeded.

**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 the existing fan module, follow these steps:

- Step 1** Locate the fan module in the back of the switch.
- Step 2** Slide the seating tabs toward the center of the fan module.
- Step 3** Grasp the fan module handle and pull it outward.

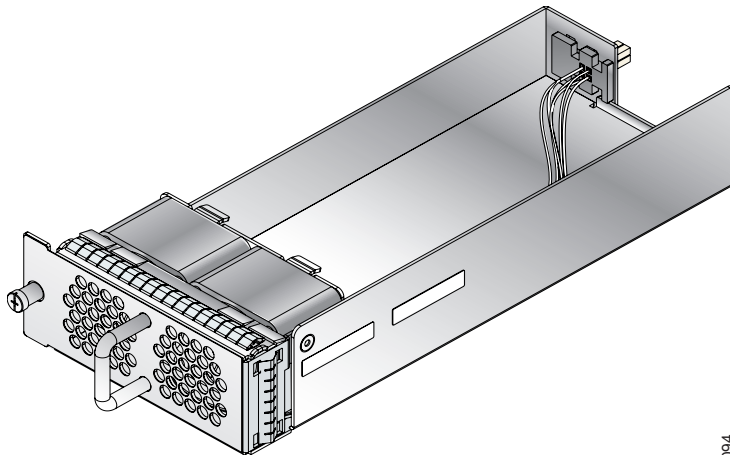
- Step 4** Pull the fan module out of the switch and put it in a safe place.
-

Installing a Fan Module

To install a new fan module, follow these steps:

- Step 1** Position the fan module with the LED oriented away from the back of the switch. [Figure 2-7](#) shows the fan module for the Cisco MDS 9148S switch.
- Step 2** Slide the fan module into the switch until it clicks into place. [Figure 2-7](#) shows the Cisco MDS 9148S fan module.

Figure 2-7 Cisco MDS 9148S Fan Module



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Verifying the Fan Module

To verify that the new fan module is installed correctly, follow these steps:

- Step 1** Listen for the fans; you should immediately hear them operating. If you do not hear them, ensure that the fan module is inserted completely in the switch and the faceplate is flush with the switch back panel.
- Step 2** Verify that the fan module LED is green. If the LED is orange, then one fan has failed in this fan module; if the LED is red, then both fans have failed in this fan module.
- Step 3** Contact your customer service representative for assistance if, after several attempts, the fans do not operate or you experience trouble with the installation.

**Note**

Verify that the transceiver and cable type both have LC connectors and are the required type for longwave or shortwave transmission and the required distances. The transceiver label generally lists the model and wavelength.

**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/en/US/support/tsd_cisco_worldwide_contacts.html



Connecting the Cisco MDS 9148S Switch

The Cisco MDS 9148S switch provides the following types of ports:

- Console port (Interface Module)—An RS-232 port that you can use to create a local management connection.
- 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 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.

This chapter describes how to connect the various components of the Cisco MDS 9148S switch, and it includes the following information:

- [Preparing for Network Connections, page 1-35](#)
- [Connecting the Console Port, page 1-35](#)
- [Connecting the 10/100/1000 Ethernet Management Port, page 1-38](#)
- [Connecting to a Fibre Channel Port, page 1-38](#)

Preparing for Network Connections

When preparing your site for network connections to the Cisco MDS 9148S switch, consider the following for each type of interface:

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

Before installing the component, have all additional external equipment and cables available.

Connecting the Console Port

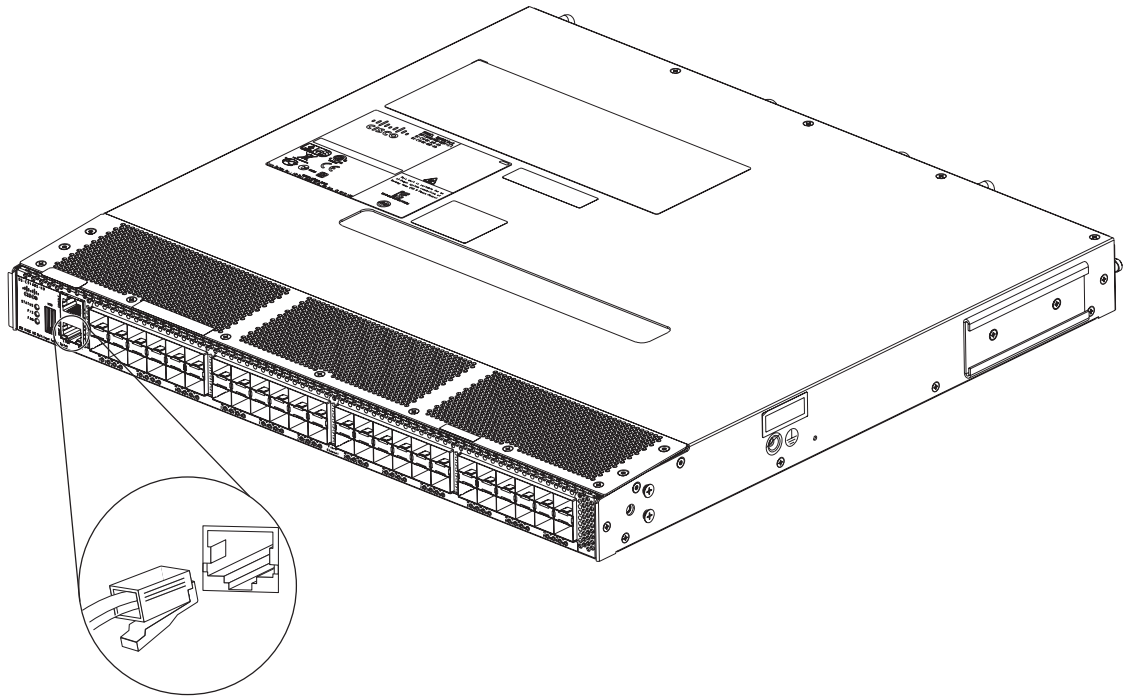
This section describes how to connect the RS-232 console port to a PC. The console port allows you to perform the following functions:

- Configure the switch from the CLI.
- Monitor network statistics and errors.
- Configure SNMP agent parameters.

- Download software updates to the switch or distribute software images residing in flash memory to attached devices.

The console port, located on the front panel, is shown in [Figure 1-1](#).

Figure 1-1 Connecting the Console Cable



Connecting the Console Port to a PC

You can connect the console port to a PC serial port for local administrative access to the Cisco MDS 9148S switch.



Note

The PC must support VT100 terminal emulation. The terminal emulation software—frequently a PC application such as HyperTerminal Plus—makes communication between the Cisco MDS 9148S switch and your PC possible during setup and configuration.

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

- Step 1** Configure the baud rate and character format of the PC terminal emulation program to match the following management port default 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 PC connection) to the PC serial port.
- Step 3** Connect one end of the supplied console cable (a rollover RJ-45 to RJ-45 cable) to the console port. (See [Figure 1-1](#).) Connect the other end to the RJ-45 to DB-9 (or RJ-45 to DB-25) adapter at the PC serial port.
-

Connecting a Modem to a Console Port

**Caution**

Do not connect the console port to a modem while the switch is booting. Connect the console port to a modem either before powering the switch on or after the switch has completed the boot process.

To connect the console port to a modem before the switch is powered on, follow these steps:

- Step 1** Connect the supplied console cable (a rollover RJ-45 to RJ-45 cable) to the console port (see [Figure 1-1](#)).
- Step 2** Connect the other end of the console cable to the supplied RJ-45 to DB-25 adapter.
- Step 3** Connect the RJ-45-to-DB-25 adapter to the DB-25 port on the modem.
- Step 4** Power on the switch. The switch boots automatically, and the following default console port characteristics are applied to the modem connection:
- 9600 baud
 - 8 data bits
 - 1 stop bit
 - No parity
 - Default initialization string (ATE0Q1&D2&C1S0=1\015) if previously configured

**Note**

For instructions on how to change these settings, see the *Cisco Fabric Manager Fundamentals Configuration Guide* for instructions on how to change these settings.

To connect the console port to a modem after the switch is powered on, follow these steps:

- Step 1** Ensure that the system has completed booting and the system image is running.
- Step 2** Connect the supplied console cable (a rollover RJ-45 to RJ-45 cable) to the console port (see [Figure 1-1](#)).
- Step 3** Connect the other end of the console cable to the supplied RJ-45 to DB-25 adapter.
- Step 4** Connect the RJ-45-to-DB-25 adapter to the DB-25 port on the modem.
- Step 5** Initialize and configure the modem as specified in the *Cisco Fabric Manager Fundamentals Configuration Guide* and the *Cisco NX-OS Fundamentals Configuration Guide*.
-

Connecting the 10/100/1000 Ethernet Management Port

The autosensing 10/100/1000 Ethernet management port is located on the left side of the front panel (labeled 10/100 MGMT), to the right of the Console port. This port is used for out-of-band management of the Cisco MDS 9148S switch.

Use a modular, RJ-45, straight-through UTP cable to connect the 10/100/1000 management Ethernet port to external hubs and switches. To connect to a router, use a crossover cable.

Connecting to a Fibre Channel Port

The Fibre Channel ports are compatible with LC-type fiber-optic SFP transceivers and cables (see [“Removing and Installing Cables into SFP Transceivers” section on page 1-40](#)). You can use these ports to connect to the SAN or for in-band management. For information about configuring the switch for in-band management, see the *Cisco Fabric Manager Fundamentals Configuration Guide* and the *Cisco NX-OS Fundamentals Configuration Guide*.

The Cisco MDS 9148S switch 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. SFP transceivers can be ordered separately or with the Cisco MDS 9148S switch.

**Warning**

Class 1 laser product. Statement 1008

**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

**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 1-38](#)
- [Removing and Installing Cables into SFP Transceivers, page 1-40](#)
- [Maintaining SFP Transceivers and Fiber-Optic Cables, page 1-42](#)

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 9148S switch. 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 9148S switch supports SFP transceivers with the following two types of latching devices:

- Mylar tab latch (Figure 1-2)
- Bale-clasp latch (Figure 1-3)

Figure 1-2 *SFP Transceiver with Mylar Tab Latch*

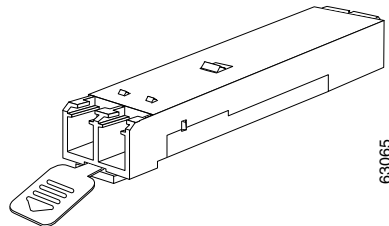
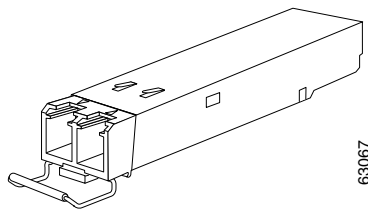


Figure 1-3 *SFP Transceiver with Bale-Clasp Latch*



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.

**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 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 latch, orient the transceiver with the tab on the bottom, and then gently insert the transceiver into the port until it clicks into place.
- If the transceiver has a bale-clasp latch, orient the transceiver with the bale clasp on the bottom, close the bale clasp by pushing it up and over the transceiver, and then gently insert the transceiver into the port until it clicks into place.

- Step 5** Insert or leave the dust plug in the cable end of the transceiver if a cable is not being installed in 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** Perform these steps if cable is installed in the transceiver:
- Record the cable and port connections for later reference.
 - Press the release latch on the cable, grasp the connector near the connection point, and gently pull the connector from the transceiver.
 - Insert a dust plug into the connector on the cable.
 - Insert a dust plug into the cable end of the transceiver.



Tip 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.
- 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 one inch if there is no tension in the cable, or two inches if there is tension in the cable.

Installing a Cable into an SFP Transceiver



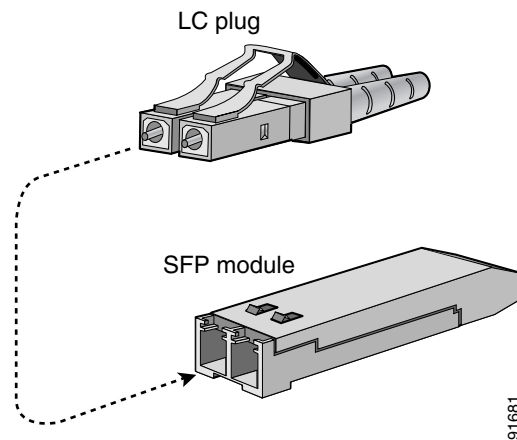
Caution

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.
 - Step 3** Remove the dust cover from the cable end of the transceiver.
 - Step 4** Align the cable connector with the transceiver and insert the connector into the transceiver until it clicks into place. (See [Figure 1-4](#)).

Figure 1-4 Connecting the LC-Type Cable to a Fibre Channel Port



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

For instructions on verifying connectivity, see the *Cisco Fabric Manager Fundamentals Configuration Guide* and the *Cisco NX-OS Fundamentals Configuration Guide*.

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.
 - 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 kept 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. This prevents fingerprints and other contamination of the connectors.
- 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 1-43](#)
- [Cisco MDS 9000 Family Telco and EIA Shelf Bracket, page 1-45](#)

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 listed above: standard perforated or solid-walled with a fan tray.

General Requirements for Cabinets and Racks

The cabinet or rack must be one of the following rack 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 1-44](#) and [“Requirements Specific to Solid-Walled Cabinets” section on page 1-45](#).
- 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 1-45](#).

The cabinet or rack must also meet the following requirements:

- The minimum vertical rack space per chassis should be 1 RU (rack unit), equal to 1.75 in. (4.4 cm).
- The width between the rack-mounting rails must be at least 17.75 in. (45.1 cm). 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 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.
 - There should be a minimum of 2.5 in. (6.4 cm) of clear space 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 the 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 1-68](#).

Requirements Specific to Perforated Cabinets

In addition to the requirements listed in the [“General Requirements for Cabinets and Racks” section on page 1-43](#), perforated cabinets must meet the following requirements:

- The front and rear doors must have at least a 60 percent open area perforation pattern, with at least 15 sq. in. of open area per rack unit of door height.
- We recommend that the roof be perforated with at least 20 percent open area, unless the cabinet only contains Cisco MDS 9148S switch, in which case the roof does not have to be perforated.
- We recommend an open or perforated cabinet floor to enhance cooling but it is not required.

Reference Perforated Cabinet

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

Rittal Corporation

One Rittal Place

Springfield, OH 45504

Phone: (800) 477-4000

Cabinet P/N: Rittal 9969427

Cabinet description: PS-DK/OEM Cabinet Assembly, 1998 x 600 x 1000 (H x W x D) (42U)

Requirements Specific to Solid-Walled Cabinets

In addition to the requirements listed in the [“General Requirements for Cabinets and Racks”](#) section on page 1-43, 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.
- Nonperforated (solid and sealed) front and back doors and side panels so that air travels predictably from bottom to top.
- The overall cabinet depth should be 36 to 42 in. (91.4 to 106.7 cm) to allow the doors to close and 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 1-43, if mounting the chassis in an open rack (no side panels or doors), ensure that the rack meets the following requirements:

- Width between two front mounting rails: minimum of 17.75 in. (45.1 cm)
- Minimum vertical rack space per chassis: 1 rack unit (RU), equal to 1.75 in. (4.4 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) to allow for rear bracket installation.
- 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 1-43, 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).

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 9148S switch 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 9148S Switch in a two-post Telco rack
- A Cisco MDS 9148S Switch in a four-post EIA rack

**Note**

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

This section describes the procedure for installing a Cisco MDS 9148S switch in a rack or cabinet using the optional Telco and EIA Shelf Bracket Kit. This section includes the following information:

- [Rack-Mounting Guidelines, page 1-46](#)
- [Before Installing the Shelf Brackets, page 1-47](#)
 - [Required Equipment, page 1-47](#)
 - [Installing the Shelf Bracket Kit into a Four-Post EIA Rack, page 1-49](#)
 - [Installing the Shelf Bracket Kit into a Two-Post Telco Rack, page 1-47](#)
 - [Installing the Switch on the Shelf Brackets, page 1-50](#)
 - [Removing the Shelf Bracket Kit \(Optional\), page 1-51](#)

Rack-Mounting Guidelines

**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 1-43](#).
- 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 1, “Technical Specifications.”](#) This is particularly important to verify if you are installing the switch in an enclosed cabinet.
- The rack has sufficient vertical clearance for the chassis plus two rack units for the shelf brackets, and any desired clearance for the installation process.
- The rack meets the minimum rack load ratings per rack unit (RU) listed in the following table.

Rack Type	MDS 9148S
EIA (4-post)	7.5 lb
Telco (2 post)	15 lb

Before Installing the Shelf Brackets

Before installing the shelf brackets, inspect the contents of your kit. [Table 1-1](#) lists the contents of the shelf bracket kit.

Table 1-1 Contents of Shelf Bracket Kit

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

Required Equipment

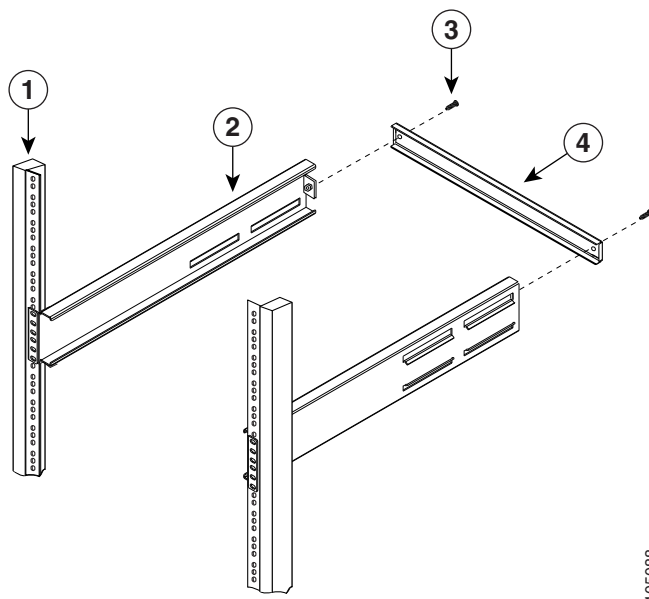
You need the following equipment for this installation:

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

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

[Figure 1-1](#) shows the installation of the shelf bracket kit into a two-post Telco rack.

Figure 1-1 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 1-1](#) and 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.



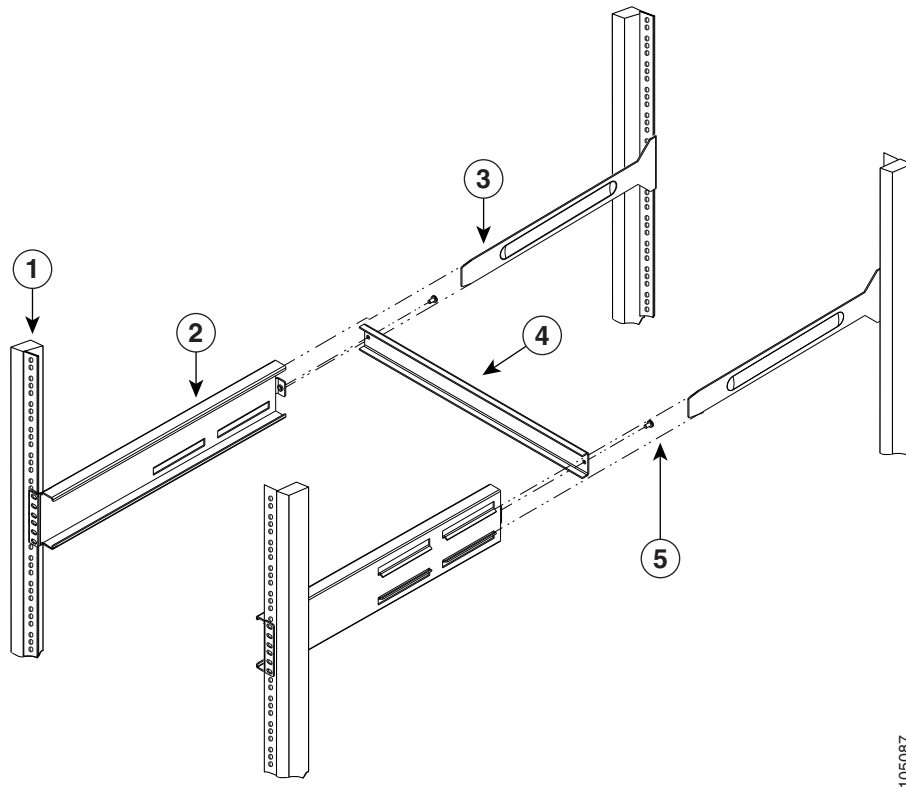
Note The bottom hole of the shelf bracket should align with the bottom hole of a rack unit on the rack-mounting rail (the hole immediately above the 1/2-in. spacing).

- 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 1-1](#), using the 10-32 screws.
-

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

Figure 1-2 shows the installation of the shelf bracket kit into a four-post EIA rack.

Figure 1-2 *Installing the Shelf Bracket Kit into an EIA Rack*



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 1-2. 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).

- Step 4** Attach the crossbar to the shelf brackets as shown in [Figure 1-2](#), using the 10-32 screws.
- Step 5** Insert the slider rails into the shelf brackets as shown in [Figure 1-2](#). 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 [“Front-Facing Installation”](#) section on page 2-19.



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 *Regulatory Compliance and Safety Information for the Cisco MDS 9000 Family* for important safety information.

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 that it is squarely positioned.
- Step 3** Attach the switch to the rack-mounting rails. See the [“Front-Facing Installation”](#) section on page 2-19.



Caution

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



Note

The grounding lug must be NRTL listed and compatible with copper conductors. Only copper conductors (wires) must be used and the copper conductor must comply with National Electrical Code (NEC) for ampacity.

Removing the Shelf Bracket Kit (Optional)

The shelf bracket kit can be removed after the Cisco MDS 9148S switch has been installed in a four-post EIA rack, and both front rack-mount brackets and both C brackets are securely attached to the 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, and then slide the slider brackets out of the shelf brackets. |
| Step 2 | Remove the screws fastening the crossbar to the shelf brackets, and then remove the crossbar. |
| Step 3 | Remove the screws fastening the shelf brackets to the front rack-mounting rails and remove the shelf brackets from the rack. |
-



Technical Specifications

This appendix includes the following technical specifications for the Cisco MDS 9148S switch:

- [Switch Specifications, page 1-53](#)
- [Power Specifications, page 1-54](#)
- [SFP Transceiver Specifications, page 1-56](#)

Switch Specifications

[Table 1-1](#) lists the environmental specifications for the Cisco MDS 9148S switch.

Table 1-1 *Environmental Specifications for the Cisco MDS 9148S switch*

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	60 dB

[Table 1-2](#) lists the physical specifications for the Cisco MDS 9148S switch.

Table 1-2 *Cisco MDS 9148S Switch Specifications*

Description	Specification
Cisco MDS 9148S Switch Dimensions	Width = 17.16 inch (43.59 centimeter)
	Height = 1.72 inch (4.37 centimeter)
	Depth = 16.34 inch (41.50 centimeter)
Rack Unit (RU)	Chassis requires 1 RU (1.75 in. or 4.45 cm)

Table 1-2 Cisco MDS 9148S Switch Specifications (continued)

Description	Specification
Weight	19.84 lb (9 kg) (with two fan modules and two power supplies installed)
Power Supply (fixed)	300-W AC for each power supply Part Number: DS-C48S-300AC Power cord: Notched C15 socket connector connecting to C16 plug on power supply 100 to 240V AC (10% range) 50 to 60 Hz (nominal)
Airflow	Back to front. 200 linear feet per minute (LFM) through the system and a maximum of 380 LMDM. Cisco recommends that you maintain a minimum air space of 2.5 in. (6.4 cm) between walls and chassis air vents and a minimum horizontal separation of 6 in. (15.2 cm) between two chassis to prevent overheating.

Power Specifications

This section includes the following information:

- [General Power Supply Specifications, page 1-54](#)
- [Power Supply Requirements Specifications, page 1-55](#)
- [Connection Guidelines for AC-Powered Systems, page 1-56](#)

General Power Supply Specifications

[Table 1-3](#) lists the specifications for the Cisco MDS 9148S switch AC input power supply.

Table 1-3 Cisco MDS 9148S Switch AC Input Power Supply Specifications

AC Input Power Supply	Specification
AC input voltage	Minimum = 90 VAC Nominal = 100 to 240 VAC Maximum = 264 VAC
AC input current rating (maximum)	4.7 A at 85 VAC 3.6 A at 110 VAC 1.8 A at 220 VAC Note For plug current rating, see the “Jumper Power Cord” section on page 1-68 .
AC input frequency	Nominal = 50 to 60 Hz

Table 1-3 Cisco MDS 9148S Switch AC Input Power Supply Specifications

AC Input Power Supply	Specification
Power supply output capacity	300 W
Power supply output voltage	12 V +/- 6% up to 25 A
Output holdup time	20ms when input > 100 VAC

Power Supply Requirements Specifications

Table 1-4 provides a sample calculation of power for the Cisco MDS 9148S switch AC input power supply.

Table 1-4 Power and Heat Dissipation for AC Input Power Supply

Cisco MDS 9148S Switch	AC Power (Volt)	AC Power (Watt)
	220	125.08
Typical Case	220	125.08
	110	127.72
50C/NV	220	144.8
	110	145.87
50C/HV	220	155.3
	110	158.48
Worst Case	220	183.11
	110	187.66



Tip

To prevent a loss of input power, ensure that the total maximum load on each circuit supplying the power supply is within the current ratings of the wiring and breakers.

Table 1-5 Power Supply Fuse Information

Part Number	PID	Type	Fuse Rated AMP	I2T	Fuse Melting Time
341-0706-02	DS-C48S-300AC	Time-Lag	6.3 A	144.869	27.7 hrs@8 A, 0.9 s@20 A

Component Power Requirements and Heat Dissipation Specifications

Consider the heat dissipation when sizing the air-conditioning requirements for an installation. The power and heat associated with a Cisco MDS 9148S switch varies based on the following considerations:

- The environment (temperature) outside the chassis
- Internal chassis temperature
- Any hardware component failure in the chassis
- Average switching traffic levels

Table 1-6 Power Requirements and Heat Dissipation for the Cisco MDS 9148S Switch

Module Type / Product Number	Power Required (watts)	Heat Dissipation (BTU/hr)	Input Current		
			85 VAC (amps)	110 VAC (amps)	220 VAC (amps)
Cisco MDS 9148S16G Multilayer Fabric Switch	140 maximum	478	1.68	1.28	0.65

Connection Guidelines for AC-Powered Systems

For connecting the Cisco MDS 9148S switch AC power supplies to the site power source, follow these basic guidelines:

- Each power supply should have its own dedicated branch circuit.
- For international, circuits should be sized according to local and national codes.
- The AC power receptacles used to plug in the chassis must be the grounding type. The grounding conductors that connect to the receptacles should connect to protective earth ground at the service equipment.

SFP Transceiver Specifications

The Cisco MDS 9148S switch 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 they support 850 to 1610 nm nominal wavelengths, depending upon the transceiver.

Use only Cisco SFP transceivers on the Cisco MDS 9148S switch. 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. For the list of supported SFP transceivers, see the release notes.

For details of SFP transceivers see the data sheet at the following location:

http://www.cisco.com/en/US/prod/collateral/ps4159/ps6409/ps4358/product_data_sheet09186a00801bc698.html

This section provides the following information:

- [Cisco Fibre Channel SFP+ Transceivers, page 1-57](#)
- [Optical Specifications for Cisco CWDM SFP Transceivers, page 1-61](#)

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

Cisco Fibre Channel SFP+ Transceivers

Table 1-7 lists the Fibre Channel SFP+ transceivers available through Cisco Systems for the Cisco MDS 9148S switch.

Table 1-7 Cisco Fibre Channel SFP + Transceivers for the Cisco MDS 9148S Switch

Part Number	Description	Type
DS-SFP-FC16G-SW	Cisco MDS 4/8/16-Gbps Fibre Channel SW SFP+, LC	Short wavelength
DS-SFP-FC16G-LW	Cisco MDS 4/8/16-Gbps Fibre Channel LW SFP+, LC	Long wavelength
DS-SFP-FC8G-SW	Cisco MDS 2/4/8-Gbps Fibre Channel SW SFP+, LC	Short wavelength
DS-SFP-FC8G-LW	Cisco MDS 2/4/8-Gbps Fibre Channel LW SFP+, LC	Long wavelength
DS-SFP-FC8G-ER	Cisco MDS 2/4/8-Gbps Fibre Channel Extended Reach SFP+, LC	Extended Reach
DS-CWDM8Gxxxx	Cisco MDS 2/4/8-Gbps CWDM Long Distance SFP, LC	Long Distance

General Specifications for Cisco Fibre Channel 16 Gbps SFP+ Transceivers

Table 1-8 summarizes cabling specifications for 16 Gbps.

Table 1-8 Cisco 16-Gbps Fibre Channel SFP+ Cabling Specifications

SFP+	Wavelength (nanometers)	Fiber Type	Core Size (microns)	Baud Rate (GBd)	Cable Distance
DS-SFP-FC16G-S W	850	MMF	62.5	14.025	15 m (49 ft) (OM1)
			50.0	14.025	35 m (115 ft) (OM2)
			50.0	14.025	100 m (328 ft)
			50.0	14.025	(OM3)
			62.5	8.5	125 m (410 ft)
			50.0	8.5	(OM4)
			50.0	8.5	21 m (69 ft) (OM1)
			50.0	8.5	50 m (164 ft) (OM2)
			50.0	8.5	150 m (492 ft)
			62.5	4.25	(OM3)
			50.0	4.25	190 m (623 ft)
			50.0	4.25	(OM4)
			50.	4.25	70 m (230 ft) (OM1)
					150 m (492 ft)
					(OM2)
DS-SFP-FC16G-L W	1310	SMF	9.0	14.025	10 km (6.2 mi)
			9.0	8.5	10 km (6.2 mi)
			9.0	4.25	10 km (6.2 mi)

Environmental Conditions and Power Requirements 16 Gbps

Table 1-9 provides the optical parameters for 16 Gbps.

Table 1-9 Optical Parameters for 16 Gbps

SFP+	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber Loss Budget (dB)		
	Max	Min	Max	Min	62.5 microns [OM1])	(50.0 microns [OM2])	(50.0 microns [OM3])
DS-SFP-FC16G-SW	-1.3	7, 8	0	-10.3	2.08 (4 Gbps)	2.08 (4 Gbps)	2.88 (4 Gbps)
					1.68 (8 Gbps)	1.68 (8 Gbps)	2.04 (8 Gbps)
					1.63 (16 Gbps)	1.63 (16 Gbps)	1.86 (16 Gbps)
DS-SFP-FC16G-LW	2.0	-5.0	2.0	10	7.8 (4 Gbps)		
					6.4 (8 Gbps)		
					6.4 (16 Gbps)		

Table 1-10 provides information on operating and storage temperature ranges

Table 1-10 Operating and Storage Temperature Ranges for 16 Gbps

SFP+	Operating		Storage	
	Max	Min	Max	Min
DS-SFP-FC16G-SW	40°C	0°C	85°C	-40°C
DS-SFP-FC16G-LW	40°C	0°C	85°C	-40°C

General Specifications for Cisco Fibre Channel 8-Gbps SFP+ Transceivers

Table 1-11 summarizes cabling specifications for 8 Gbps.

Table 1-11 Cisco 8-Gbps Fibre Channel SFP+ Cabling Specifications

SFP+	Wavelength (nanometers)	Fiber Type	Core Size (microns)	Baud Rate (GBd)	Cable Distance
DS-SFP-FC8G-SW	850	MMF	62.5	2.125	150 m (492 ft)
			62.5	4.250	70 m (230 ft)
			62.5	8.500	21 m (69 ft)
			50.0 (OM2)	2.125	300 m (984 ft)
			50.0 (OM2)	4.250	150 m (492 ft)
			50.0 (OM2)	8.500	50 m (164 ft)
			50.0 (OM3)	2.125	500 m (1640 ft)
			50.0 (OM3)	4.250	380 m (1246 ft)
			50.0 (OM3)	8.500	150 m (492 ft)
			50.0 (OM4)	2.125	520 m (1706 ft)
			50.0 (OM4)	4.250	400 m (1312 ft)
			50.0 (OM4)	8.500	190 m (623 ft)
DS-SFP-FC8G-LW	1310	SMF	9.0	2.125	10 km (6.2 mi)
			9.0	4.250	10 km (6.2 mi)
			9.0	8.500	10 km (6.2 mi)
DS-SFP-FC8G-ER	1550	SMF	9.0	2.125	40 km (24.85 mi)
			9.0	4.250	40 km (24.85 mi)
			9.0	8.500	40 km (24.85 mi)

Environmental Conditions and Power Requirements for 8 Gbps

Table 1-12 provides the optical parameters for 8 Gbps.

Table 1-12 Optical Parameters for 8 Gbps

SFP+	Average Transmit Power (dBm)		Average Receive Power (dBm)		Fiber Loss Budget (dB)		
	Max	Min	Max	Min	62.5 microns [OM1])	(50.0 microns [OM2])	(50.0 microns [OM3])
DS-SFP-FC8G-SW	-1.3	-10 (2 Gbps)	0	—	2.10 (2 Gbps)	2.08 (4 Gbps)	3.31 (2 Gbps)
		-9 (4 Gbps)			1.78 (4 Gbps)	1.68 (8 Gbps)	2.88 (4 Gbps)
		-8.2 (8 Gbps)			1.58 (8 Gbps)	1.63 (16 Gbps)	2.04 (8 Gbps)
DS-SFP-FC8 G-LW	-3 (2 Gbps)	-11.7 (2 Gbps)	-3 (2 Gbps)	—	-7.8 (2 Gbps)		
	-1 (4 Gbps)	-8.4 (4 Gbps)	-1 (4 Gbps)		7.8 (4 Gbps)		
	0.5 (8 Gbps)	-8.4 (8 Gbps)	0.5 (8 Gbps)		6.4 (8 Gbps)		
DS-SFP-FC8G-ER	4	-4.7	-1	—		10.9	

Table 1-13 provides information on operating and storage temperature ranges for 8 Gbps.

Table 1-13 Operating and Storage Temperature Ranges for 8 Gbps

SFP+	Operating		Storage	
	Max	Min	Max	Min
DS-SFP-FC16G-SW	40°C	0°C	85°C	-40°C
DS-SFP-FC16G-LW	40°C	0°C	85°C	-40°C

Optical Specifications for Cisco CWDM SFP Transceivers

Table 1-14 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 inline optical attenuator in the link to avoid overloading the receiver.

Table 1-14 *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	@ 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	@ 1.25 Gbps
				3	dB	@ 2.12 Gbps



Cable and Port Specifications

This appendix includes the cables and connectors used with the Cisco MDS 9148S Multilayer Fabric Switch, and it includes the following sections:

- [Cables and Adapters, page 1-63](#)
- [Console Port, page 1-64](#)
- [MGMT 10/100 Ethernet Port, page 1-65](#)
- [Supported Power Cords and Plugs, page 1-66](#)



Caution

We strongly recommend that power cable runs 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 exist but cannot be separated by at least 3.3 ft. (1 m), we recommend that you shield these potential noise sources. To avoid interference, the source should be shielded by housing it in a grounded metallic conduit.

Cables and Adapters

The Cisco MDS 9148S Switch accessory kit includes the following:

- 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”)



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/cisco/web/support/index.html>.

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-9 female adapter or the RJ-45 to DB-25 female DTE adapter (depending on your computer serial port) to connect the console port to a computer running terminal emulation software.

Console Port Pinouts

[Table 1-1](#) lists the pinouts for the console port on the Cisco MDS 9148S Switch.

Table 1-1 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 1-2](#) 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 1-2 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

Table 1-2 Port Mode Signaling and Pinouts with DB-25 Adapter (continued)

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
DSR	7	2	20	DTR
CTS	8	1	4	RTS

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

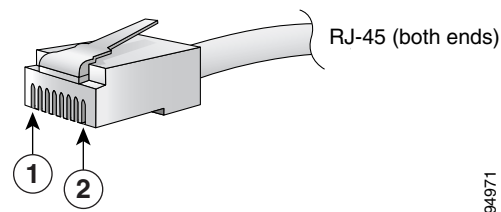
You can use the RJ-45 to RJ-45 rollover cable and RJ-45 to DB-9 female DTE adapter (labeled “Terminal”) to connect the console port to a computer running terminal emulation software. [Table 1-3](#) lists the pinouts for the console port, the RJ-45 to RJ-45 rollover cable, and the RJ-45 to DB-9 female DTE adapter.

Table 1-3 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 Pins	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

MGMT 10/100 Ethernet Port

Use a modular, RJ-45, straight-through UTP cable to connect the 10/100 management Ethernet port to external hubs and switches. To connect to a router, use a crossover cable. (See [Figure 1-1](#).)

Figure 1-1 RJ-45 Interface Cable Connector

1	Pin 1	2	Pin 8
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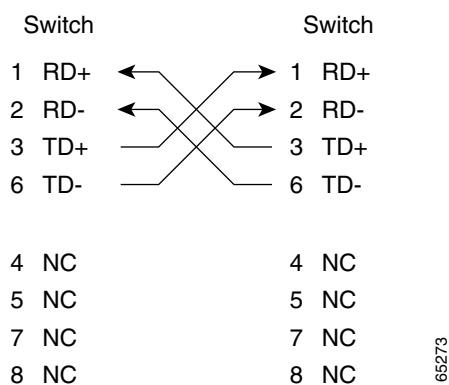
Table 1-4 lists the connector pinouts and signal names for a 10/100BASE-T management port (MDI) cable.

Table 1-4 10/100BASE-T Management Port Cable Pinout

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

Figure 1-2 shows a schematic of the 10/100BASE-T cable.

Figure 1-2 Twisted-Pair 10/100BASE-T Cable Schematic



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.



Note

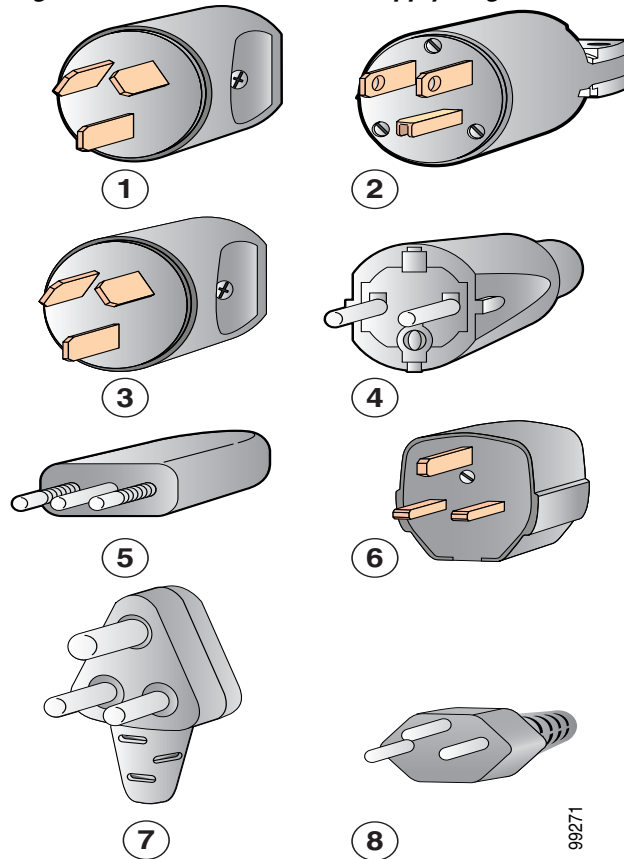
Only the standard power cords or jumper power cords provided with the switch are supported.

**Note**

If you do not order the optional power cord with the system, you are responsible for selecting the appropriate power cord for the product. Using a non-compatible power cord with this product may result in electrical safety hazard. Orders delivered to Argentina, Brazil, and Japan must have the appropriate power cord ordered with the system.

Figure 1-3 shows the supported plugs for the Cisco MDS 9100 Series power supplies.

Figure 1-3 300-W Power Supply Plugs

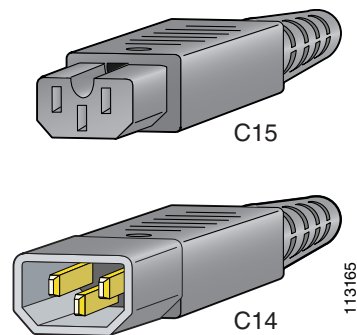


1	Argentina, IRAM 2073 plug (10 A)	5	Italy 1/3G plug, CEI 23-16 (10 A)
2	North America NEMA 5-15P plug (15 A)	6	United Kingdom BS89/13, BS 1363/A (13 A; replaceable fuse)
3	Australia, New Zealand SAA/3 plug, AS/NZS 3112-1993 (10 A)	7	South Africa EL 208, SABS 164-1 (10 A)
4	Europe VIIG Plug, CEE (7)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

Jumper Power Cord

Figure 1-4 shows the C14 and C15 connectors on the optional jumper power cord for the Cisco MDS 9148S Switch. The C15 connector connects into the C14 inlet on the Cisco MDS 9148S Switch power supply, while the C14 connector connects into the C13 receptacle of a power distribution unit for a cabinet.

Figure 1-4 Connectors on Jumper Power Cord for Cisco MDS 9148S Switch





Site Planning and Maintenance Records

This appendix includes a site planning checklist and maintenance records to use when installing the Cisco MDS 9148S Multilayer Fabric Switch, and it includes the following sections:

- [Site Preparation Checklist, page 1-69](#)
- [Contact and Site Information, page 1-71](#)
- [Chassis and Network Information, page 1-72](#)



Note

For information about how to query the switch for configuration information, see the *Cisco NX-OS Fundamentals 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 1-1](#) lists the site planning tasks that we recommend completing before installing the Cisco MDS 9148S Switch.

Consider heat dissipation when sizing the air-conditioning requirements for an installation. See [Table 1-1](#) for environmental requirements and [Table 1-4](#) for power and heat ratings.

Table 1-1 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	Electromagnetic interference (EMI) evaluation: <ul style="list-style-type: none"> • Distance limitations for signaling • Site wiring • RFI³ levels 			

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

2. UPS = uninterruptible power supply.

3. RFI = radio frequency interference.

Contact and Site Information

Use the following worksheet to record contact and site information.

Table 1-2 **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	

Chassis and Network Information

Use the following worksheets to record chassis and network information.

Contract Number _____

Chassis Serial Number _____

Product Number _____

Table 1-3 Network-Related Information

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