CHAPTER 11

Managing Modules

This chapter describes how to manage switching and services modules (also known as line cards) and provides information on monitoring module states.

This chapter includes the following sections:

About Modules

Table 11-1 describes the supervisor module options for switches in the Cisco MDS 9000 Family.

Table 11-1 Supervisor Module Options

Product	Number of Supervisor Modules	Supervisor Module Slot Number	Switching and Services Module Features
Cisco MDS 9513	Two modules	7 and 8	13-slot chassis allows any switching or services module in the other eleven slots.
Cisco MDS 9509	Two modules	5 and 6	9-slot chassis allows any switching or services module in the other seven slots.
Cisco MDS 9506	Two modules	5 and 6	6-slot chassis allows any switching or services module in the other four slots.
Cisco MDS 9216	One module	1	2-slot chassis allows one optional switching or services module in the other slot.
Cisco MDS 9216A	One module	1	2-slot chassis allows one optional switching or services module in the other slot.
Cisco MDS 9216i	One module	1	2-slot chassis allows one optional switching or services module in the other slot.

Supervisor Modules

Supervisor modules are automatically powered up and started with the switch.

- Cisco MDS 9513 Directors have two supervisor modules—one in slot 7 (sup-1) and one in slot 8 (sup-2). See Table 11-2. When the switch powers up and both supervisor modules come up together, the active module is the one that comes up first. The standby module constantly monitors the active module. If the active module fails, the standby module takes over without any impact to user traffic.
- Cisco MDS 9506 and Cisco MDS 9509 switches have two supervisor modules—one in slot 5 (sup-1) and one in slot 6 (sup-2). See Table 11-2. When the switch powers up and both supervisor modules come up together, the active module is the one that comes up first. The standby module constantly monitors the active module. If the active module fails, the standby module takes over without any impact to user traffic.
- Cisco MDS 9216i switches have one supervisor module that includes an integrated switching module with 14 Fibre Channel ports and two Gigabit Ethernet ports.
- Cisco MDS 9200 Series switches have one supervisor module that includes an integrated 16-port switching module.

Table 11-2 Supervisor Module Terms and Usage in Console Displays

Module Terms	Fixed or Relative	Usage
`module-7 and module-8`	Fixed usage for MDS 9513	module-7 always refers to the supervisor module in slot 7 and module-8 always refers to the supervisor module in slot 8.
`module-5 and module-6`	Fixed usage for MDS 9509 and MDS 9506	module-5 always refers to the supervisor module in slot 5 and module-6 always refers to the supervisor module in slot 6.
`module-1`	Fixed usage for MDS 9200 series	module-1 always refers to the supervisor module in slot 1.
`sup-1 and sup-2`	Fixed usage	On the MDS 9506 and MDS 9509 switches, sup-1 always refers to the supervisor module in slot 5 and sup-2 always refers to the supervisor module in slot 6. On the MDS 9513 Directors, sup-1 always refers to the supervisor module in slot 7 and sup-2 always refers to the supervisor module in slot 8.
`sup-active and sup-standby`	Relative usage	sup-active refers to the active supervisor module—relative to the slot that contains the active supervisor module. sup-standby refers to the standby supervisor module—relative to the slot that contains the standby supervisor module.
`sup-local and sup-remote`	Relative usage	If you are logged into the active supervisor, sup-local refers to the active supervisor module and sup-remote refers to the standby supervisor module. If you are logged into the standby supervisor, sup-local refers to the standby supervisor module (the one you are logged into.) There is no sup-remote available from the standby supervisor module (you cannot access a file system on the active sup).

Switching Modules

Cisco MDS 9000 Family switches support any switching module in any non-supervisor slot. These modules obtain their image from the supervisor module.

Services Modules

Cisco MDS 9000 Family switches support any services module in any non-supervisor slot.

Refer to the *Cisco MDS 9000 Family SAN Volume Controller Configuration Guide* for more information on CSMs.

Verifying the Status of a Module

Before you begin configuring the switch, you need to ensure that the modules in the chassis are functioning as designed. To verify the status of a module at any time issue the **show module** command(see the "Fibre Channel Interfaces" section on page 12-1). The interfaces in each module are ready to be configured when the `ok` status is displayed in the **show module** command output. A sample output of the **show module** command follows:

```
switch# show module
Mod  Ports  Module-Type                      Model              Status
---  -----  -------------------------------- ------------------ ------------
2    8      IP Storage Services Module       DS-X9308-SMIP      ok
4    0      Caching Services Module                             ok
5    0      Supervisor/Fabric-1              DS-X9530-SF1-K9    active *
6    0      Supervisor/Fabric-1              DS-X9530-SF1-K9    ha-standby
8    0      Caching Services Module          DS-X9560-SMAP      ok
9    32     1/2 Gbps FC Module               DS-X9032           ok

Mod  Sw           Hw      World-Wide-Name(s) (WWN)
---  -----------  ------  --------------------------------------------------
2    1.3(0.106a)  0.206   20:41:00:05:30:00:00:00 to 20:48:00:05:30:00:00:00
5    1.3(0.106a)  0.602   --
6    1.3(0.106a)) 0.602   -- <---------------- New running version in module 6
8    1.3(0.106a)  0.702   --
9    1.3(0.106a)  0.3     22:01:00:05:30:00:00:00 to 22:20:00:05:30:00:00:00


Mod  MAC-Address(es)                         Serial-Num
---  --------------------------------------  ----------
2    00-05-30-00-9d-d2 to 00-05-30-00-9d-de  JAB064605a2
5    00-05-30-00-64-be to 00-05-30-00-64-c2
6    00-d0-97-38-b3-f9 to 00-d0-97-38-b3-fd  JAB06350B1R
8    00-05-30-01-37-7a to 00-05-30-01-37-fe  JAB072705ja
9    00-05-30-00-2d-e2 to 00-05-30-00-2d-e6  JAB06280ae9

* this terminal session
```

The Status column in the output should display an *ok* status for switching modules and an active or standby (or HA-standby) status for supervisor modules. If the status is either ok or active, you can continue with your configuration..

Note A standby supervisor module reflects the HA-standby status if the HA switchover mechanism is enabled (see the "HA Switchover Characteristics" section on page 9-2). If the warm switchover mechanism is enabled, the standby supervisor module reflects the standby status.

The states through which a switching module progresses is discussed in the "Checking the State of a Module" section on page 11-4.

Checking the State of a Module

If your chassis has more than one switching module (also known as line card), you can check the progress by issuing the **show module** command several times and viewing the `Status` column each time.

The switching module goes through a testing and an initializing stage before displaying an `ok` status. Table 11-3 describes the possible states in which a module can exist.

Table 11-3 Module States

Module Status Output	Description
`powered up`	The hardware has electrical power. When the hardware is powered up, the software begins booting.
`testing`	The switching module has established connection with the supervisor module and the switching module is performing bootup diagnostics.
`initializing`	The diagnostics have completed successfully and the configuration is being downloaded.
`failure`	The switch detects a switching module failure upon initialization and automatically attempts to power-cycle the module three times. After the third attempt it continues to display a failed state.
`ok`	The switch is ready to be configured.
`power-denied`	The switch detects insufficient power for a switching module to power up.
`active`	This module is the active supervisor module and the switch is ready to be configured.
`HA-standby`	The HA switchover mechanism is enabled on the standby supervisor module (see the "HA Switchover Characteristics" section on page 9-2).
`standby`	The warm switchover mechanism is enabled on the standby supervisor module (see the "HA Switchover Characteristics" section on page 9-2).

Connecting to a Module

At any time, you can connect to any module using the **attach module** command. Once you are at the module prompt, you can obtain further details about the module using module-specific commands in EXEC mode.

To attach to a module, follow these steps:

	Command	Purpose
Step 1	`switch# attach module 6` `switch(standby)#`	Provides direct access to the specified module (in this example, the standby supervisor module is in slot 6).

Step 2	`switch(standby)# dir bootflash:`
	
	`root 14502912 Jan 13 12:23:52 1980 kickstart_image1`
	`admin 14424576 Jan 14 06:47:29 1980 kickstart_image2`
	`admin 14469632 Jan 14 01:29:16 1980 kickstart_image3`
	`root 14490112 Jan 08 07:25:50 1980 kickstart_image4`
	`root 12288 Jan 16 15:49:24 1980 lost+found/`
	`admin 14466048 Jan 14 02:40:16 1980 kickstart_image5`
	`admin 24206675 Jan 14 02:57:03 1980 m9500-sf1ek.bin`
	`root 19084510 Jan 13 12:23:28 1980 system_image1`
	`admin 19066505 Jan 14 06:45:16 1980 system_image2`
	`admin 18960567 Jan 14 01:25:21 1980 system_image5`
	
	`Usage for bootflash: filesystem`
	`158516224 bytes total used`
	`102400 bytes free`
	`167255040 bytes available`
		Provides the available space information for the standby supervisor module.
		Note Type **exit** to exit the module-specific prompt.
		Tip If you are not accessing the switch from a console terminal, this is the only way to access the standby supervisor module.

You can also use the **attach module** command as follows:

- To display the standby supervisor module information, although you cannot configure the standby supervisor module using this command.
- To display the switching module portion of the Cisco MDS 9200 Series supervisor module which resides in slot 1.

Reloading Modules

You can reload the entire switch, reset specific modules in the switch, or reload the image on specific modules in the switch.

This section includes the following totopics:

Reloading a Switch

To reload the switch, issue the **reload** command without any options. When you issue this command, you reboot the switch (see Chapter 7, “Software Images”).

Note If you need to issue the **reload** command, be sure to save the running configuration using the **copy running-config startup-config** command.

Power Cycling Modules

To power cycle any module, follow these steps:

Step 1 Identify the module that needs to be reset.

Step 2 Issue the **reload module** command to reset the identified module. This command merely power cycles the selected module.

```
switch# reload module number
```

Where *number* indicates the slot in which the identified module resides. For example:

```
switch# reload module 2
```

Caution Reloading a module disrupts traffic through the module.

Reloading Switching Modules

Switching modules automatically download their images from the supervisor module and do not need a forced download. This procedure is provided for reference should a need arise.

To replace the image on a switching module, follow these steps:

Step 1 Identify the switching module that requires the new image.

Step 2 Issue the **reload module** *number* **force-dnld** command to update the image on the switching module.

```
switch# reload module number force-dnld
```

Where *number* indicates the slot in which the identified module resides. In this example, the identified module resides in slot 9.

```
switch# reload module 9 force-dnld...
Jan  1 00:00:46 switch %LC-2-MSG:SLOT9 LOG_LC-2-IMG_DNLD_COMPLETE: COMPLETED
downloading of linecard image. Download successful...
```

Caution Reloading a module disrupts traffic through the module.

Preserving Module Configuration

Issue the **copy running-config startup-config** command from EXEC mode to save the new configuration into nonvolatile storage. Once this command is issued, the running and the startup copies of the configuration are identical.

Table 11-4 displays various scenarios when module configurations are preserved or lost.

Table 11-4 Switching Module Configuration Status

Scenario	Consequence
A particular switching module is removed and the **copy running-config startup-config** command is issued again.	The configured module information is lost.
A particular switching module is removed and the same switching module is replaced before the **copy running-config startup-config** command is issued again.	The configured module information is preserved.
A particular switching module is removed and replaced with the same type switching module, and a **reload module** *number* command is issued.	The configured module information is preserved.
A particular switching module is reloaded when a **reload module** *number* command is issued.	The configured module information is preserved.
A particular switching module is removed and replaced with a different type of switching module. For example, a 16-port switching module is replaced with a 32-port switching module. Sample scenario: 1. The switch currently has a 16-port switching module and the startup and running configuration files are the same. 2. You replace the 16-port switching module in the switch with a 32-port switching module. 3. Next, you remove the 32-port switching module and replace it with the same 16-port switching module referred to in Step 1. 4. You **reload** the switch.	The configured module information is lost from the running configuration. The default configuration is applied. The configured module information remains in startup configuration until a **copy running-config startup-config** command is issued again. Sample response: 1. The switch uses the 16-port switching module and the present configuration is saved in nonvolatile storage. 2. The factory default configuration is applied. 3. The factory default configuration is applied. 4. The configuration saved in nonvolatile storage referred to in Step 1 is applied.

Purging Module Configuration

Issue the **purge module** *slot* **running-config** command from EXEC mode to delete the configuration in a specific module. Once this command is issued, the running configuration is cleared for the specified slot. This command does not work on supervisor modules or on any slot that currently has a module. This command only works on an empty slot (where the specified module once resided).

The **purge module** command clears the configuration for any module that previously existed in a slot and has since been removed. While the module was in that slot, some parts of the configuration may have been stored in the running configuration and cannot be reused (for example, IP addresses), unless it is cleared from the running configuration.

For example, suppose you create an IP storage configuration with an IPS module in slot 3 in Switch A. This module uses IP address 10.1.5.500. You decide to remove this IPS module and move it to Switch B, and you no longer need the IP address10.1.5.500. If you try to configure this unused IP address, you

will receive an error message that prevents you from proceeding with the configuration. In this case, you need to issue the **purge module 3 running-config** command to clear the old configuration in Switch A before proceeding with using this IP address.

Powering Off Switching Modules

By default, all switching modules are in the power up state.

To power off a module, follow these steps:

	Command	Purpose
Step 1	`switch# config t`	Enters configuration mode.
Step 2	`switch(config)# poweroff module 1` `switch(config)#`	Powers off the specified module (switching module 1) in the switch.
	`switch(config)# no poweroff module 1` `switch(config)#`	Powers up the specified module (switching module 1) in the switch.

Identifying Module LEDs

Table 11-5 describes the LEDs for the Cisco MDS 9200 Series integrated supervisor modules.

Table 11-5 LEDs for the Cisco MDS 9200 Series Supervisor Modules

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (normal initialization sequence).
	Orange	The module is booting or running diagnostics (normal initialization sequence). or The inlet air temperature of the system has exceeded the maximum system operating temperature limit (a minor environmental warning). To ensure maximum product life, you should immediately correct the environmental temperature and restore the system to normal operation.
	Red	The diagnostic test failed. The module is not operational because a fault occurred during the initialization sequence. or The inlet air temperature of the system has exceeded the safe operating temperature limits of the card (a major environmental warning). The card has been shut down to prevent permanent damage. The system will be shut down after two minutes if this condition is not cleared.
Speed[1]	On	2-Gbps mode and beacon mode disabled.
	Off	1-Gbps mode and beacon mode disabled.
	Flashing	Beacon mode enabled. See the "Identifying the Beacon LEDs" section on page 12-16.

Table 11-5 LEDs for the Cisco MDS 9200 Series Supervisor Modules (continued)

LED	Status	Description
Link	Solid green	Link is up.
	Solid yellow	Link is disabled by software.
	Flashing yellow	A fault condition exists.
	Off	No link.

1. The speed LED is only present on the 2-Gbps Fibre Channel switching modules.

Table 11-6 describes the LEDs for the Cisco MDS 9200 Series interface module.

Table 11-6 LEDs on the Cisco MDS 9200 Series Interface Module

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (normal initialization sequence).
	Orange	The module is booting or running diagnostics (normal initialization sequence). or The inlet air temperature of the system has exceeded the maximum system operating temperature limit (a minor environmental warning). To ensure maximum product life, you should immediately correct the environmental temperature and restore the system to normal operation.
	Red	The diagnostic test failed. The module is not operational because a fault occurred during the initialization sequence. or The inlet air temperature of the system has exceeded the safe operating temperature limits of the card (a major environmental warning). The card has been shut down to prevent permanent damage.
System	Green	All chassis environmental monitors are reporting OK.
	Orange	The power supply failed or the power supply fan failed. or Incompatible power supplies are installed. or The redundant clock failed.
	Red	The temperature of the supervisor module exceeded the major threshold.
MGMT 10/100 Ethernet Link LED	Green	Link is up.
	Off	No link.
MGMT 10/100 Ethernet Activity LED	Green	Traffic is flowing through port.
	Off	No link or no traffic.

Table 11-7 describes the LEDs for the 16-port and 32-port switching modules, and the 4-port, 12-port, 24-port, and 48-port Generation 2 switching modules.

Table 11-7 LEDs for the Cisco MDS 9000 Family Fibre Channel Switching Modules

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

The LEDs on the supervisor module indicate the status of the supervisor module, power supplies, and the fan module. Table 11-8 provides more information about these LEDs.

Table 11-8 LEDs for the Cisco MDS 9500 Series Supervisor Modules

LED	Status	Description
Status	Green	All diagnostics pass. The module is operational (normal initialization sequence).
	Orange	The module is booting or running diagnostics (normal initialization sequence). or An over temperature condition has occurred (a minor threshold has been exceeded during environmental monitoring).
	Red	The diagnostic test failed. The module is not operational because a fault occurred during the initialization sequence. or An over temperature condition occurred (a major threshold was exceeded during environmental monitoring).
System[1]	Green	All chassis environmental monitors are reporting OK.
	Orange	The power supply has failed or the power supply fan has failed. or Incompatible power supplies are installed. or The redundant clock has failed.
	Red	The temperature of the supervisor module major threshold has been exceeded.
Active	Green	The supervisor module is operational and active.
	Orange	The supervisor module is in standby mode.
Pwr Mgmt[1]	Green	Sufficient power is available for all modules.
	Orange	Sufficient power is not available for all modules.
MGMT 10/100 Ethernet Link LED	Green	Link is up.
	Off	No link.
MGMT 10/100 Ethernet Activity LED	Green	Traffic is flowing through port.
	Off	No link or no traffic.
CompactFlash	Green	The external CompactFlash card is being accessed.
	Off	No activity.

1. The System and Pwr Mgmt LEDs on a redundant supervisor module are synchronized to the active supervisor module.

EPLD Configuration

Switches and directors in the Cisco MDS 9000 Family contain several electrical programmable logical devices (EPLDs) that provide hardware functionalities in all modules. EPLD image upgrades are periodically provided to include enhanced hardware functionality or to resolve known issues.

Tip Refer to the *Cisco MDS SAN-OS Release Notes* to verify if the EPLD has changed for the Cisco SAN-OS image version being used.

EPLDs can be upgraded or downgraded using CLI commands. When EPLDs are being upgraded or downgraded, the following guidelines and observations apply:

- You can individually update each module that is online. The EPLD update is only disruptive to the module being upgraded.
- If you interrupt an upgrade, the module must be upgraded again.
- The upgrade or downgrade can only be executed from the active supervisor module. While the active supervisor module cannot be updated, you can update the other modules individually.
- In Cisco MDS 9100 Series fabric switches, be sure to specify one (1) as the module number.
- Cisco MDS 9200 Series switches do not support EPLD upgrades.
- The upgrade and downgrade processes disrupt traffic.

Caution Do not insert or remove any modules while an EPLD upgrade or downgrade is in progress.

Upgrading EPLD Images

Step 1 Log into the switch through the console port, an SSH session, or a Telnet session.

Step 2 Issue the **show version** command to verify the Cisco MDS SAN-OS release running on the MDS switch.

```
switch# show version
Cisco Storage Area Networking Operating System (SAN-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2002-2006, Cisco Systems, Inc. All rights reserved.
The copyrights to certain works contained herein are owned by
other third parties and are used and distributed under license.
Some parts of this software may be covered under the GNU Public
License or the GNU Lesser General Public License. A copy of
each such license is available at
http://www.gnu.org/licenses/gpl.html and
http://www.gnu.org/licenses/lgpl.html

Software
  BIOS:      version 1.0.8
  loader:    version unavailable [last: 1.0(0.267c)]
  kickstart: version 2.1(2) [build 2.1(2.47)] [gdb]
  system:    version 2.1(2) [build 2.1(2.47)] [gdb]

...
```

Step 3 If necessary, upgrade the Cisco MDS SAN-OS software running on your switch (see the "Software Upgrade Methods" section on page 7-5).

Step 4 Issue the **dir bootflash:** or **dir slot0:** command to verify that the EPLD software image file corresponding to your Cisco MDS SAN-OS release is present on the active supervisor module. For example, if your switch is running Cisco MDS SAN-OS Release 2.1(2), you must have m9000-epld-2.1.2.img in bootflash: or slot0: on the active supervisor module.

```
switch# dir bootflash:
  12288 Jan 01 00:01:07 1980 lost+found/
```

```
2337571 May 31 13:43:02 2005 m9000-epld-2.1.2.img
...
```

You can find the EPLD images at the following URL:

http://www.cisco.com/cgi-bin/tablebuild.pl/mds-epld

Step 5 If you need to obtain the appropriate EPLD software image file, follow these steps:

a. Download the EPLD software image file from Cisco.com to your FTP server.

b. Verify that you have enough free space available on the active and standby supervisor memory devices that you plan to use, either bootflash: or slot0:. The download site on Cisco.com shows the size of the EPLD image file in bytes.

The following example shows how to display the available memory for the bootflash: devices on the active and standby supervisors.

```
switch# dir bootflash:
   12288 Jan 01 00:01:06 1980 lost+found/
14765056 Mar 21 15:35:06 2005 m9500-sf1ek9-kickstart-mz.2.1.1.bin
15944704 Apr 06 16:46:04 2005 m9500-sf1ek9-kickstart-mz.2.1.1a.bin
48063243 Mar 21 15:34:46 2005 m9500-sf1ek9-mz.2.1.1.bin
48036239 Apr 06 16:45:41 2005 m9500-sf1ek9-mz.2.1.1a.bin

Usage for bootflash://sup-local
141066240 bytes used
 43493376 bytes free
184559616 bytes total

switch# show module
Mod  Ports  Module-Type                        Model              Status
---  -----  ---------------------------------- ------------------ ------------
2    32     Storage Services Module            DS-X9032-SSM       ok
5    0      Supervisor/Fabric-1                DS-X9530-SF1-K9    active *
6    0      Supervisor/Fabric-1                DS-X9530-SF1-K9    ha-standby
...
```

The **show module** command output shows that the standby supervisor is in slot 6. Use the **attach** command to access the supervisor module.

```
switch# attach module 6
...
switch(standby)# dir bootflash:
   12288 Jan 01 00:01:06 1980 lost+found/
14765056 Mar 21 15:35:06 2005 m9500-sf1ek9-kickstart-mz.2.1.1.bin
15944704 Apr 06 16:46:04 2005 m9500-sf1ek9-kickstart-mz.2.1.1a.bin
48063243 Mar 21 15:34:46 2005 m9500-sf1ek9-mz.2.1.1.bin
48036239 Apr 06 16:45:41 2005 m9500-sf1ek9-mz.2.1.1a.bin

Usage for bootflash://sup-local
141066240 bytes used
 43493376 bytes free
184559616 bytes total

switch(standby)# exit
switch#
```

The following example shows how to display the available memory for the slot0: devices on the active and standby supervisors.

```
switch# dir slot0:
   12288 Jan 01 00:01:06 1980 lost+found/
14765056 Mar 21 15:35:06 2005 m9500-sf1ek9-kickstart-mz.2.1.1.bin
```

```
15944704 Apr 06 16:46:04 2005 m9500-sf1ek9-kickstart-mz.2.1.1a.bin
48063243 Mar 21 15:34:46 2005 m9500-sf1ek9-mz.2.1.1.bin
48036239 Apr 06 16:45:41 2005 m9500-sf1ek9-mz.2.1.1a.bin

Usage for slot:
141066240 bytes used
 43493376 bytes free
184559616 bytes total

switch# show module
Mod  Ports  Module-Type                       Model              Status
---  -----  --------------------------------- ------------------ ------------
2    32     Storage Services Module           DS-X9032-SSM       ok
5    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    active *
6    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    ha-standby
...
```

The **show module** command output shows that the standby supervisor is in slot 6. Use the **attach** command to access the supervisor module.

```
switch# attach module 6
...
switch(standby)# dir slot0:
   12288 Jan 01 00:01:06 1980 lost+found/
14765056 Mar 21 15:35:06 2005 m9500-sf1ek9-kickstart-mz.2.1.1.bin
15944704 Apr 06 16:46:04 2005 m9500-sf1ek9-kickstart-mz.2.1.1a.bin
48063243 Mar 21 15:34:46 2005 m9500-sf1ek9-mz.2.1.1.bin
48036239 Apr 06 16:45:41 2005 m9500-sf1ek9-mz.2.1.1a.bin

Usage for slot0:
141066240 bytes used
 43493376 bytes free
184559616 bytes total

switch(standby)# exit
switch#
```

c. If there is not enough space, delete unneeded files.

```
switch# delete bootflash:m9500-sf1ek9-kickstart-mz.2.1.1.bin
switch# attach module 6
switch(standby)#
```

The **show module** command output shows that the standby supervisor is in slot 6. Use the **attach** command to access the supervisor module.

```
switch(standby)# delete bootflash:m9500-sf1ek9-kickstart-mz.2.1.1.bin
switch(standby)# exit
switch#
```

d. Copy the EPLD image file from the FTP server to the bootflash: or slot0: device in the active supervisor module. The following example shows how to copy to bootflash:

```
switch# copy ftp://10.1.7.2/m9000-epld-2.1.2.img bootflash:m9000-epld-2.1.2.img
```

Note The system will automatically synchronize the ELPD image to the standby supervisor if automatic copying is enabled.

```
switch# config t
switch(config)# boot auto-copy
```

Step 6 Use the **install module** *number* **epld** *url* command on the active supervisor module to upgrade EPLD images for a module.

```
switch# install module 2 epld bootflash:m9000-epld-2.1.2.img

EPLD                                 Curr Ver    New Ver
-----------------------------------------------------
XBUS IO                              0x07        0x07
UD Flow Control                      0x05        0x05
PCI ASIC I/F                         0x05        0x05
PCI Bridge                           0x05        0x07
WARNING: Upgrade process could take upto 15 minutes.

Module 2 will be powered down now!!
Do you want to continue (y/n) ? y
\ <-----------------------------------------------------------progress twirl
Module 2 EPLD upgrade is successful
```

If you forcefully upgrade a module that is not online, all EPLDs are forcefully upgraded. If the module is not present in the switch, an error is returned. If the module is present, the command process continues. To upgrade a module that is not online but is present in the chassis, use the same command. The switch software prompts you to continue after reporting the module state. When you confirm your intention to continue, the upgrade continues.

```
switch# install module 2 epld bootflash:m9000-epld-2.1.2.img
\ <-----------------------------------------------------------progress twirl
Module 2 EPLD upgrade is successful
```

Note When you upgrade the EPLD module on Cisco MDS 9100 Series switches, you receive the following message:

```
Data traffic on the switch will stop now!!
Do you want to continue (y/n) ?
```

Note The same procedure used to upgrade the EPLD images on a module can be used to downgrade the EPLD images.

Displaying EPLD Versions

Use the **show version module** *number* **epld** command to view all current EPLD versions on a specified module (see Example 11-1).

Example 11-1 Displays Current EPLD Versions for a Specified Module

```
switch# show version module 2 epld
EPLD Device                    Version
---------------------------------------
Power Manager                  0x07
XBUS IO                        0x07
UD Flow Control                0x05
PCI ASIC I/F                   0x05
PCI Bridge                     0x07
```

Use the **show version epld** *url* command to view the available EPLD versions (see Example 11-2).

Example 11-2 Displays Available EPLD Versions

```
switch# show version epld bootflash:m9000-epld-2.1.1a.img
MDS series EPLD image, built on Wed May  4 09:52:37 2005

Module Type                          EPLD Device          Version
------------------------------------------------------------------
MDS 9500 Supervisor 1                XBUS 1 IO              0x09
                                     XBUS 2 IO              0x0c
                                     UD Flow Control        0x05
                                     PCI ASIC I/F           0x04

1/2 Gbps FC Module (16 Port)         XBUS IO                0x07
                                     UD Flow Control        0x05
                                     PCI ASIC I/F           0x05

1/2 Gbps FC Module (32 Port)         XBUS IO                0x07
                                     UD Flow Control        0x05
                                     PCI ASIC I/F           0x05

Advanced Services Module             XBUS IO                0x07
                                     UD Flow Control        0x05
                                     PCI ASIC I/F           0x05
                                     PCI Bridge             0x07

IP Storage Services Module (8 Port)  Power Manager          0x07
                                     XBUS IO                0x03
                                     UD Flow Control        0x05
                                     PCI ASIC I/F           0x05
                                     Service Module I/F     0x0a
                                     IPS DB I/F             0x1a

IP Storage Services Module (4 Port)  Power Manager          0x07
                                     XBUS IO                0x03
                                     UD Flow Control        0x05
                                     PCI ASIC I/F           0x05
                                     Service Module I/F     0x1a

Caching Services Module              Power Manager          0x08
                                     XBUS IO                0x03
                                     UD Flow Control        0x05
                                     PCI ASIC I/F           0x05
                                     Service Module I/F     0x72
                                     Memory Decoder 0       0x02
                                     Memory Decoder 1       0x02

MDS 9100 Series Fabric Switch        XBUS IO                0x03
                                     PCI ASIC I/F           0x40000003

2x1GE IPS, 14x1/2Gbps FC Module      Power Manager          0x07
                                     XBUS IO                0x05
                                     UD Flow Control        0x05
                                     PCI ASIC I/F           0x07
                                     IPS DB I/F             0x1a
```

SSM Feature Support

Table 11-9 lists the features supported on the Cisco MDS SAN-OS Release 2.x for the SSM.

Table 11-9 Cisco MDS SAN-OS Release 2.x Feature Support for SSMs.

Cisco MDS SAN-OS Release			
2.0(1b)	**2.0(2b), 2.0(3), 2.0(4), and 2.0(4a)**	**2.1(1a)**	**2.1(2)and later**
None	Fibre Channel switching Intelligent Storage Services VSFN	Fibre Channel switching Intelligent Storage Services VSFN	Fibre Channel switching Intelligent Storage Services Nondisruptive upgrade for Fibre Channel switching traffic[1]

1. Requires EPLD version 2.1(2). See "EPLD Configuration" section on page 11-12.

Installing the SSI Boot Image on an SSM

This section describes how to install the SSI boot image for the Cisco MDS 9000 Family 32-port Fibre Channel Storage Services Module (SSM). The SSM supports normal Fibre Channel switching and Intelligent Storage Services. To use Fibre Channel switching and Intelligent Storage Services, you must install an SSI boot image on the SSM.

Note A newly installed SSM initially operates in Fibre Channel switching mode by default.

To install the SSI boot image on an SSM, follow these steps:

Step 1 Log into the switch through the console port, an SSH session, or a Telnet session.

Step 2 Issue the **dir modflash://***slot***-1/** command to verify that the SSI boot image file corresponding to your Cisco MDS SAN-OS release is present on the active supervisor module. For example, if your switch is running Cisco SAN-OS Release 2.1(2), you must have m9000-ek9-ssi-mz.2.1.2.bin in modflash: on the SSM. To determine the correct SSI boot image to use, refer to the *Cisco MDS SAN-OS Release Compatibility Matrix for Storage Service Interface Images*.

You can find the SSI images at the following URL:
http://www.cisco.com/cgi-bin/tablebuild.pl/mds9000-ssi-3des

Step 3 If the file is not present in bootflash: or the modflash:, follow these steps:

a. Issue the **dir modflash://***slot***-1/** command to ensure that there is enough free space for the SSI image file. If necessary, issue the **delete modflash://***slot***-1/***filename* command to remove files.

b. Download the appropriate SSI boot image file to your FTP server and copy it from an FTP server to modflash: on the SSM:

```
switch# copy ftp://10.1.7.2/m9000-ek9-ssi-mz.2.1.2.bin
modflash://4-1/m9000-ek9-ssi-mz.2.1.2.bin
```

Step 4 Use the **install ssi** command to install the SSI boot image on the SSM.

Note As of Cisco SAN-OS Release 3.0(2), if the SSI boot image is located on bootflash: the **install ssi** command copies the SSI boot image to the modflash: on the SSM.

```
switch# install ssi modflash://4-1/m9000-ek9-ssi-mz.2.1.2.bin
```

Step 5 Issue the **show module** command to verify the status of the SSM.

```
switch# show module
Mod Ports Module-Type                       Model              Status
--- ----- ------------------------------- ------------------ ------------
4   32    Storage Services Module           DS-X9032-SSM       ok
...
Mod      Application Image Description     Application Image Version
-------- ------------------------------    -------------------------
4        SSI linecard image                2.1(2)
...
```

Upgrading the SSI Boot Image on an SSM

As of Cisco SAN-OS Release 2.0(2b), you can specify the SSI boot image for a Storage Services Module (SSM) to configure Fibre Channel switching and Intelligent Storage Services (see Chapter 48, "Configuring SCSI Flow Services and Statistics", Chapter 48, "Configuring Fibre Channel Write Acceleration", Chapter 49, "Configuring SANTap", and Chapter 50, "Configuring NASB"). Once you set the SSI image boot variable, you do not need to reset it for upgrades or downgrades to any Cisco MDS SAN-OS release that supports the SSI image.

Note If your switch is running Cisco MDS SAN-OS Release 2.1(2) or later, a newly installed SSM initially operates in Fibre Channel switching mode by default.

Note If you downgrade to a Cisco MDS SAN-OS release that does not support the SSM, you must power down the module. The boot variables for the SSM are lost.

SSI Boot Image Upgrade Considerations for the SSM

When you upgrade, or downgrade, the SSI boot image on an SSM, you might disrupt traffic through the module. Table 11-10 describes how updating the SSI boot image affects SSM traffic.

Table 11-10 SSI Boot Image Updating Affects on SSM Traffic

Cisco MDS SAN-OS Release	Traffic Type	Disrupts Traffic?
2.0(2b) through 2.1(1a)	All	Yes

Table 11-10 SSI Boot Image Updating Affects on SSM Traffic

Cisco MDS SAN-OS Release	Traffic Type	Disrupts Traffic?
2.1(2) and later	Layer 2 Fiber Channel switching only	No[1]
	Both Layer 2 Fiber Channel switching and Layer 3 Intelligent Storage Services (such as FCWA, NASB, SANTap, ISAPI virtualization)	Yes
	Layer 3 Intelligent Storage Services (such as FCWA, NASB, SANTap, ISAPI virtualization) only	Yes

1. Requires EPLD version 2.1(2). See "EPLD Configuration" section on page 11-12.

As shown in Table 11-10, layer 3 Intelligent Storage Services traffic is disrupted when you update the SSI boot image. If you have configured layer 3 Intelligent Storage Services on your SSM, we recommend that you shutdown these services before upgrading the SSI boot image. You can use dual fabric configuration to minimize the impact of shutting down layer 3 services.

To upgrade or downgrade the SSI boot image Fibre Channel switching and Intelligent Storage Services, perform the following steps:

Step 1 Verify that the correct SSI boot image is present on your switch (see the "Verifying the SSI Boot Image" section on page 11-20).

Step 2 Update the SSI boot image using one of the following methods:

a. If your switch is running Cisco MDS SAN-OS Release 2.0(1a) through Release 2.1(1a), configure the SSI boot variable to upgrade or downgrade the SSI boot image on the module (see the "Configuring the SSI Image Boot Variable" section on page 11-23).

b. Use the **install ssi** command to upgrade or downgrade the SSI boot image on the module (see the "Using the install ssi Command" section on page 11-25).

Note The SSM must be running EPLD version 2.1(2) to use the **install ssi** command. You must install the SSM on a Cisco MDS 9500 Series switch to upgrade the EPLD. See the "EPLD Configuration" section on page 11-12.

Verifying the SSI Boot Image

To verify that you have the correct Cisco MDS SAN-OS release and SSI boot image file on your switch, perform the following steps:

Step 1 Log into the switch through the console port, an SSH session, or a Telnet session.

Step 2 Issue the **show version** command to ensure that your switch is running Cisco MDS SAN-OS Release 2.1(1a) or later system and kickstart images.

```
switch# show version
Cisco Storage Area Networking Operating System (SAN-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2002-2006, Cisco Systems, Inc. All rights reserved.
The copyrights to certain works contained herein are owned by
other third parties and are used and distributed under license.
Some parts of this software may be covered under the GNU Public
License or the GNU Lesser General Public License. A copy of
each such license is available at
http://www.gnu.org/licenses/gpl.html and
http://www.gnu.org/licenses/lgpl.html

Software
  BIOS:      version 1.0.8
  loader:    version unavailable [last: 1.0(0.267c)]
  kickstart: version 2.1(2) [build 2.1(2.47)] [gdb]
  system:    version 2.1(2) [build 2.1(2.47)] [gdb]

...
```

Step 3 If necessary, upgrade the Cisco MDS SAN-OS software running on your switch (see the "Software Upgrade Methods" section on page 7-5).

Step 4 Issue the **dir bootflash:** or **dir slot0:** command to verify that the SSI software image file corresponding to your Cisco MDS SAN-OS release is present on the active supervisor module. For example, if your switch is running Cisco MDS SAN-OS Release 2.1(2), you must have m9000-ek9-ssi-mz.2.1.2.bin in bootflash: or slot0: on the active supervisor module. Refer to the *Cisco MDS SAN-OS Release Compatibility Matrix for Storage Service Interface Images*.

Note As of Cisco MDS SAN-OS Release 2.1(2), we recommend that you use modflash: on the SSM. You can check for the presence of the SSI software image using the **dir modflash://***slot***-1/** command.

```
switch# dir bootflash:
  12288 Jan 01 00:01:07 1980 lost+found/
3821032 May 10 13:43:02 2005 m9000-ek9-ssi-mz.2.1.2.bin
...
```

You can find the SSI images at the following URL:

http://www.cisco.com/cgi-bin/tablebuild.pl/mds9000-ssi-3des

Step 5 If you need to obtain the appropriate SSI software image file, perform the following steps:

a. Download the SSI software image file from Cisco.com to your FTP server.

b. Verify that you have enough free space available on the active and standby supervisor memory devices which you plan to use, either bootflash: or slot0:. The download site on Cisco.com shows the size of the boot image file in bytes.

Note As of Cisco MDS SAN-OS Release 2.1(2), we recommend that you use modflash: on the SSM. You can check the available space using the **dir modflash://***slot***-1/** command.

The following example shows how to display the available memory for the bootflash: devices on the active and standby supervisors.

```
switch# dir bootflash:
   12288 Jan 01 00:01:06 1980 lost+found/
14765056 Mar 21 15:35:06 2005 m9500-sf1ek9-kickstart-mz.2.1.1.bin
15944704 Apr 06 16:46:04 2005 m9500-sf1ek9-kickstart-mz.2.1.1a.bin
48063243 Mar 21 15:34:46 2005 m9500-sf1ek9-mz.2.1.1.bin
48036239 Apr 06 16:45:41 2005 m9500-sf1ek9-mz.2.1.1a.bin

Usage for bootflash://sup-local
141066240 bytes used
 43493376 bytes free
184559616 bytes total

switch# show module
Mod  Ports  Module-Type                       Model              Status
---  -----  --------------------------------- ------------------ ------------
4    32     Storage Services Module           DS-X9032-SSM       ok
5    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    active *
6    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    ha-standby
...
```

The **show module** command output shows that the standby supervisor is in slot 6. Use the **attach** command to access the supervisor module.

```
switch# attach module 6
...
switch(standby)# dir bootflash:
   12288 Jan 01 00:01:06 1980 lost+found/
14765056 Mar 21 15:35:06 2005 m9500-sf1ek9-kickstart-mz.2.1.1.bin
15944704 Apr 06 16:46:04 2005 m9500-sf1ek9-kickstart-mz.2.1.1a.bin
48063243 Mar 21 15:34:46 2005 m9500-sf1ek9-mz.2.1.1.bin
48036239 Apr 06 16:45:41 2005 m9500-sf1ek9-mz.2.1.1a.bin

Usage for bootflash://sup-local
141066240 bytes used
 43493376 bytes free
184559616 bytes total

switch(standby)# exit
switch#
```

The following example shows how to display the available memory for the slot0: devices on the active and standby supervisors.

```
switch# dir slot0:
   12288 Jan 01 00:01:06 1980 lost+found/
14765056 Mar 21 15:35:06 2005 m9500-sf1ek9-kickstart-mz.2.1.1.bin
15944704 Apr 06 16:46:04 2005 m9500-sf1ek9-kickstart-mz.2.1.1a.bin
48063243 Mar 21 15:34:46 2005 m9500-sf1ek9-mz.2.1.1.bin
48036239 Apr 06 16:45:41 2005 m9500-sf1ek9-mz.2.1.1a.bin

Usage for slot:
141066240 bytes used
 43493376 bytes free
184559616 bytes total

switch# show module
Mod  Ports  Module-Type                       Model              Status
---  -----  --------------------------------- ------------------ ------------
4    32     Storage Services Module           DS-X9032-SSM       ok
5    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    active *
6    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    ha-standby
...
```

The **show module** command output shows that the standby supervisor is in slot 6. Use the **attach** command to access the supervisor module.

```
switch# attach module 6
...
switch(standby)# dir slot0:
   12288 Jan 01 00:01:06 1980 lost+found/
14765056 Mar 21 15:35:06 2005 m9500-sf1ek9-kickstart-mz.2.1.1.bin
15944704 Apr 06 16:46:04 2005 m9500-sf1ek9-kickstart-mz.2.1.1a.bin
48063243 Mar 21 15:34:46 2005 m9500-sf1ek9-mz.2.1.1.bin
48036239 Apr 06 16:45:41 2005 m9500-sf1ek9-mz.2.1.1a.bin

Usage for slot0:
141066240 bytes used
 43493376 bytes free
184559616 bytes total

switch(standby)# exit
switch#
```

c. Delete the unneeded files, if there is not enough space.

```
switch# delete bootflash:m9500-sf1ek9-kickstart-mz.2.1.1.bin
```

The **show module** command output shows that the standby supervisor is in slot 6. Use the **attach** command to access the supervisor module.

```
switch# attach module 6
...
switch(standby)# delete bootflash:m9500-sf1ek9-kickstart-mz.2.1.1.bin
switch(standby)# exit
switch#
```

d. Copy the boot image file from the FTP server to the bootflash: or slot0: device in the active supervisor module. The following example shows how to copy to bootflash:

Note As of Cisco MDS SAN-OS Release 2.1(2), we recommend that you copy the image to modflash: on the SSM.

```
switch# copy ftp://10.1.7.2/m9000-ek9-ssi-mz.2.1.2.bin
bootflash:m9000-ek9-ssi-mz.2.1.2.bin
```

Note The system will automatically synchronize the SSI image to the standby supervisor if automatic copying is enabled.

```
switch# config t
switch(config)# boot auto-copy
```

Configuring the SSI Image Boot Variable

The following steps describe how to configure the SSI image boot variable for Fibre Channel switching and Intelligent Storage Services on the SSM on switches running Cisco MDS SAN-OS release 2.0(2b) through Release 2.1(1a) on the SSM.

Step 1 Log into the switch through the console port, an SSH session, or a Telnet session.

Step 2 Verify that the SSM is physically installed in the switch. If the module is not physically installed, insert it into the desired slot. Issue a **show module** command to verify the status of the module.

```
switch# show module
Mod  Ports  Module-Type                       Model              Status
---  -----  --------------------------------- ------------------ ------------
4    32     Storage Services Module           DS-X9032-SSM       ok
5    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    active *
6    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    ha-standby
...
```

Note the slot number for later reference.

Step 3 Verify the Cisco MDS SAN-OS release running on the switch and the location and name of the SSI boot image on the switch following the procedure described in the "Verifying the SSI Boot Image" section on page 11-20.

Step 4 Configure the SSI image boot variable to specify the SSI image to use when the SSM reloads.

```
switch# config terminal
switch(config)# boot ssi bootflash:m9000-ek9-ssi-mz.2.1.1a.bin module 4
switch(config)# exit
switch#
```

Note You can only specify one image for the SSI variable per module.

Caution The SSI boot variable must reference the correct SSI boot image, otherwise the SSM fails to initialize. If you do not correctly set the SSI boot variable, the SSM remains in the power-down state after attempting to initialize three times.

Step 5 Issue the **show boot** command to display the current contents of the SSI boot variable.

```
switch# show boot
sup-1
kickstart variable = bootflash:/boot-2-0-1-9
system variable = bootflash:/isan-2-0-1-9
sup-2
kickstart variable = bootflash:/boot-2-0-1-9
system variable = bootflash:/isan-2-0-1-9
Module 4
ssi variable = bootflash:/m9000-ek9-ssi-mz.2.1.1a.bin
```

Step 6 Save the new boot variable configuration so the new boot image is used when the switch reboots.

```
switch# copy running-config startup-config
```

Note If you do not save this configuration, it is lost on a switch reboot. In addition the SSM stays in the power-down state if your switch is running Cisco MDS SAN-OS Release 2.1(1a) or earlier. You must perform this procedure again to recover the SSI image boot variable configuration.

Step 7 Reload the SSM to load the new boot image.

```
switch# reload module 4
reloading module 4 ...
```

The **reload** command power cycles the SSM.

Caution Reloading the SSM disrupts traffic through the module.

Step 8 Issue the **show module** command to verify the status of the SSM.

```
switch# show module
Mod  Ports  Module-Type                       Model              Status
---  -----  --------------------------------- ------------------ ------------
4    32     Storage Services Module           DS-X9032-SSM       ok
5    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    active *
6    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    ha-standby

Mod  Sw           Hw      World-Wide-Name(s) (WWN)
---  -----------  ------  --------------------------------------------------
4    2.1(2)       0.30    20:c1:00:05:30:00:06:de to 20:e0:00:05:30:00:06:de
5    2.1(2)       4.0     --
6    2.1(2)       4.0     --

Mod      Application Image Description       Application Image Version
-------- ----------------------------       -------------------------
4        SSI linecard image                 2.1(1a)

Mod  MAC-Address(es)                         Serial-Num
---  --------------------------------------  ----------
4    00-05-30-00-9e-b2 to 00-05-30-00-9e-b6  JAB06480590
5    00-0e-38-c6-2c-6c to 00-0e-38-c6-2c-70  JAB082504MQ
6    00-0f-34-94-4d-34 to 00-0f-34-94-4d-38  JAB083407D3

* this terminal session
```

Using the install ssi Command

You can use the **install ssi** command to update the boot image on an SSM. If the SSM is performing Fibre Channel switching and no Intelligent Storage Services are provisioned on the module, this operation does not disrupt traffic through the module. If the SSM is configured for Intelligent Storage Services, a warning is displayed at the command prompt indicating that the operation will disrupt traffic and asking if you wish to continue.

Note The SSM must be running EPLD version 2.1(2) to use the **install ssi** command. You must install the SSM on a Cisco MDS 9500 Series switch to update the EPLD. See the "EPLD Configuration" section on page 11-12.

To upgrade or downgrade the SSM boot image for Intelligent Storage Services, follow these steps:

Step 1 Log into the switch through the console port, an SSH session, or a Telnet session.

Step 2 Verify that the SSM is physically installed in the switch. If the module is not physically installed, insert it into the desired slot. Issue a **show module** command to verify the status of the module.

```
switch# show module
Mod  Ports  Module-Type                       Model              Status
---  -----  --------------------------------- ------------------ ------------
```

```
4     32      Storage Services Module          DS-X9032-SSM       ok

5     0       Supervisor/Fabric-1              DS-X9530-SF1-K9    active *
6     0       Supervisor/Fabric-1              DS-X9530-SF1-K9    ha-standby
...
```

Note the slot number for later reference.

Step 3 Verify the Cisco MDS SAN-OS release running on the switch and the location and name of the SSI boot image on the switch following the procedure described in the "Verifying the SSI Boot Image" section on page 11-20.

Step 4 Install the SSI image on the SSM.

Note As of Cisco SAN-OS Release 3.0(2), if the SSI boot image is located on bootflash: the **install ssi** command copies the SSI boot image to the modflash: on the SSM.

```
switch# install ssi modflash://4-1/m9000-ek9-ssi-mz.2.1.2.bin module 4
```

Note If the SSM is configured for Layer 3 Fibre Channel switching or Intelligent Storage Services, a warning will be displayed at the command prompt indicating that the operation will disrupt traffic and you will be asked if you wish to continue.

Note As of Cisco MDS SAN-OS Release 2.1(2), we recommend that you reference the SSI boot image on modflash: on the SSM. Use the **install ssi modflash://***slot***-1/***filename* **module** *slot* command to install the SSI image.

Step 5 Issue the **show boot** command to display the current contents of the image boot variable for the SSM.

```
switch# show boot
sup-1
kickstart variable = bootflash:/boot-2-0-1-9
system variable =
bootflash:/isan-2-0-1-9;bootflash:/isan-2-0-0-181b;bootflash:/isan-2-0-0-181b
sup-2
kickstart variable = bootflash:/boot-2-0-1-9
system variable =
bootflash:/isan-2-0-1-9;bootflash:/isan-2-0-0-181b;bootflash:/isan-2-0-0-181b
Module 4
ssi variable = modflash://4-1/m9000-ek9-ssi-mz.2.1.2.bin
```

Step 6 Save the new boot variable configuration so the new boot image is used when the switch reboots.

```
switch# copy running-config startup-config
```

Note If you do not save this configuration, it is lost on a switch reboot. In addition, SSM stays in the power-down state if your switch is running Cisco MDS SAN-OS Release 2.1(1a) or earlier, or comes up in Fibre Channel switching mode if your switch is running Cisco MDS SAN-OS Release 2.1(2) or later. You must perform this procedure again to recover the SSI image boot variable configuration.

Step 7 Issue the **show module** command to verify the status of the SSM.

```
switch# show module
```

```
Mod  Ports  Module-Type                       Model              Status
---  -----  --------------------------------- ------------------ ------------
4    32     Storage Services Module           DS-X9032-SSM       ok
5    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    active *
6    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    ha-standby

Mod  Sw           Hw      World-Wide-Name(s) (WWN)
---  -----------  ------  --------------------------------------------------
4    2.1(2)       0.30    20:c1:00:05:30:00:06:de to 20:e0:00:05:30:00:06:de
5    2.1(2)       4.0     --
6    2.1(2)       4.0     --

Mod      Application Image Description       Application Image Version
-------- ----------------------------       -------------------------
4        SSI linecard image                 2.1(2)

Mod  MAC-Address(es)                         Serial-Num
---  --------------------------------------  ----------
4    00-05-30-00-9e-b2 to 00-05-30-00-9e-b6  JAB06480590
5    00-0e-38-c6-2c-6c to 00-0e-38-c6-2c-70  JAB082504MQ
6    00-0f-34-94-4d-34 to 00-0f-34-94-4d-38  JAB083407D3

* this terminal session
```

Managing SSMs and Supervisor Modules

This section describes the considerations for replacing SSMs and supervisor modules and for upgrading and downgrading Cisco MDS SAN-OS releases.

Considerations for Replacing SSMs and Supervisor Modules

If you replace an SSM or supervisor module, you should consider the following:

- If you replace an SSM with another SSM and the boot image is on bootflash:, respectively, you can leave the boot image installed on the active supervisor.
- If you replace an SSM with another SSM and the SSI boot image is on the modflash:, the SSM might not initialize. See the "Recovering an SSM After Replacing Corrupted CompactFlash Memory" section on page 11-28.
- If you replace an SSM with any other module, you can leave the boot image installed on the active supervisor or remove it. The active supervisor module detects the module type and boots the module appropriately.
- If you replace a supervisor module in a switch with active and standby supervisors, no action is required because the boot image is automatically synchronized to the new supervisor module.
- If you replace a supervisor module in a switch with no standby supervisor, you need to reimplement the configuration on the new supervisor.

Recovering an SSM After Replacing Corrupted CompactFlash Memory

In Cisco MDS SAN-OS Release 2.1(2) and later, you use the CompactFlash memory (modflash:) on the SSM to store the SSI image. If the modflash: on the SSM is replaced, the SSM might not initialize. To recover the SSM, follow these steps:

Step 1 Log into the switch through the console port, an SSH session, or a Telnet session.

Step 2 Display the values assigned to the SSI image boot variable for each module and note the values for later reference.

```
switch# show boot module
Module 2
ssi variable = modflash://2-1/m9000-ek9-ssi-mz.2.1.2.bin
Module 4
ssi variable = modflash://4-1/m9000-ek9-ssi-mz.2.1.2.bin
```

Step 3 Clear the values assigned to the SSI image boot variable.

```
switch# config t
switch(config)# no boot ssi
```

Step 4 Reload the SSM to initialize in Fibre Channel switching mode.

```
switch# reload module 4
reloading module 4 ...
```

Step 5 After the SSM initialize, follow the procedure described in the "Upgrading the SSI Boot Image on an SSM" section on page 11-19.

Step 6 Reassign the SSI boot variables cleared in Step 3,

```
switch# config t
```

```
switch(config)# boot ssi modflash://2-1/m9000-ek9-ssi-mz.2.1.2.bin module 2
```

Considerations for Upgrading and Downgrading Cisco MDS SAN-OS Releases

Consider the following when upgrading and downgrading the Cisco MDS SAN-OS software on a switch containing an SSM:

- Once you set the SSI image boot variable, you do not need to reset it for upgrades or downgrades to any Cisco MDS SAN-OS release that supports boot images. You can use the **install all** command or Fabric Manager GUI to upgrade SSMs once it has been installed. The CLI is required for the procedures described in the "Upgrading the SSI Boot Image on an SSM" section on page 11-19.
- If you downgrade to a Cisco MDS SAN-OS release that does not support the SSM, you must power down the module. The boot variables for the module are lost.
- The SSM cannot be configured for both the SSI and any other third-party software on the module such as VSFN.
- The following example shows successful **install all** command output including an SSI image.

Note The SSI boot variable setting is included in the **install all** output. Also, if the SSI boot image is located on bootflash: the **install all** command copies the SSI boot image to the modflash: on the SSMs.

```
Switch# install all system bootflash:isan-2-1-1a kickstart bootflash:boot-2-1-1a ssi
bootflash:ssi-2.1.1a

Copying image from bootflash:ssi-2.1.1a to modflash://2-1/ssi-2.1.1a.
[####################] 100% -- SUCCESS

Verifying image bootflash:/ssi-2.1.1a

[####################] 100% -- SUCCESS

Verifying image bootflash:/boot-2-1-1a

[####################] 100% -- SUCCESS

Verifying image bootflash:/isan-2-1-1a

[####################] 100% -- SUCCESS

Extracting "slc" version from image bootflash:/isan-2-1-1a.

[####################] 100% -- SUCCESS

Extracting "ips4" version from image bootflash:/isan-2-1-1a.

[####################] 100% -- SUCCESS

Extracting "system" version from image bootflash:/isan-2-1-1a.

[####################] 100% -- SUCCESS

Extracting "kickstart" version from image bootflash:/boot-2-1-1a.

[####################] 100% -- SUCCESS
```

```
Extracting "loader" version from image bootflash:/boot-2-1-1a.

[####################] 100% -- SUCCESS

Compatibility check is done:

Module bootable Impact Install-type Reason
------ -------- -------------- ------------ ------
2 yes non-disruptive rolling
3 yes disruptive rolling Hitless upgrade is not supported
4 yes disruptive rolling Hitless upgrade is not supported
5 yes non-disruptive reset

Images will be upgraded according to following table:

Module Image Running-Version New-Version Upg-Required
------ ---------- ------------------- -------------------- ------------
2 slc 2.0(3) 2.1(1a) yes
2 bios v1.1.0(10/24/03) v1.1.0(10/24/03) no
3 slc 2.0(3) 2.1(1a) yes
3 SSI 2.0(3) 2.1(1a) yes
3 bios v1.0.8(08/07/03) v1.1.0(10/24/03) yes
4 ips4 2.0(3) 2.1(1a) yes
4 bios v1.1.0(10/24/03) v1.1.0(10/24/03) no
5 system 2.0(3) 2.1(1a) yes
5 kickstart 2.0(3) 2.1(1a) yes
5 bios v1.1.0(10/24/03) v1.1.0(10/24/03) no
5 loader 1.2(2) 1.2(2) no

Do you want to continue with the installation (y/n)? [n] y

Install is in progress, please wait.

Module 6:Force downloading.

-- SUCCESS

Syncing image bootflash:/SSI-2.1.1a to standby.

[####################] 100% -- SUCCESS

Syncing image bootflash:/boot-2-1-1a to standby.

[####################] 100% -- SUCCESS

Syncing image bootflash:/isan-2-1-1a to standby.

[####################] 100% -- SUCCESS

Setting boot variables.

[####################] 100% -- SUCCESS

Performing configuration copy.

[####################] 100% -- SUCCESS

Module 3:Upgrading Bios/loader/bootrom.

[####################] 100% -- SUCCESS

Module 6:Waiting for module online.
```

```
-- SUCCESS

"Switching over onto standby".

----------------------------
```

Default Settings

Table 11-11 lists the default settings for the supervisor module.

Table 11-11 Default Supervisor Module Settings

Parameters	Default
Administrative connection	Serial connection.
Global switch information	• No value for system name. • No value for system contact. • No value for location.
System clock	No value for system clock time.
In-band (VSAN 1) interface	IP address, subnet mask, and broadcast address assigned to the VSAN are set to 0.0.0.0.

Table 11-12 lists the default settings for the SSM.

Table 11-12 Default SSM Settings

Parameters	Default
Initial state when installed	• Power-down state on switches with Cisco MDS SAN-OS Release 2.1(1a) and earlier installed. • Fibre Channel switching mode on switches with Cisco MDS SAN-OS Release 2.1(2) and later installed and SSMs with EPLD version 2.0(2) and later installed.