This section describes how to manage the Storage Services Module (SSM) and provides information about SSI images.

Contents

SSM Overview

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

Note: Cisco MDS 9500 Series switches running Cisco MDS SAN-OS Release 2.0(2b) or later support the SSM module.

The SSI image for the SSM is downloaded from the supervisor module. The image for an SSM can be specified using the SSI boot variable.

Note: The SSM can operate as a 32-port Fibre Channel switching module with the standard Cisco SAN-OS images for Release 2.1(2) or later. You need the SSI image if you use intelligent storage services.

The following table lists the features supported for the SSM:

Table 3-1 Cisco MDS SAN-OS Feature Support for the SSM.

Module	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
SSM	None	Fibre Channel switching	Fibre Channel switching	Fibre Channel switching
		Intelligent Storage Services	Intelligent Storage Services	Intelligent Storage Services
		VSFN	VSFN	Nondisruptive upgrade for Fibre Channel switching traffic[1]

When you upgrade or downgrade the SSI boot image on an SSM, you might disrupt traffic through the module. The following table describes how updating the SSI boot image affects SSM traffic.

Table 3-2 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
2.1(2) and later	Layer 2 Fibre Channel switching only	No
	Both Layer 2 Fibre Channel switching and Layer 3 Intelligent Storage Services (such as FCWA, NASB, SANTap, and ISAPI virtualization)	Yes
	Layer 3 Intelligent Storage Services (such as FCWA, NASB, SANTap, ISAPI virtualization) only	Yes

As shown in Table 3-2, Layer 3 Intelligent Storage Services traffic is disrupted when you update the SSI boot image. If you configure Layer 3 Intelligent Storage Services on your SSM, we recommend that you shut down these services before upgrading the SSI boot image. You can use dual-fabric configuration to minimize the impact of shutting down Layer 3 services.

Initial Troubleshooting Checklist

Begin troubleshooting SSM issues by verifying that the following conditions are met:

Checklist	Check off
Verify that the SSI boot variable is set.	

Verify that the SSI image is present and pointed to by the SSI boot variable.
Verify that the EPLD version is 2.1(2) or later for Layer 2.
Verify that you have configured all SSM ports prior to upgrading to Cisco SAN-OS Release 3.0(1) or later. Do not use port mode auto.
Verify that you have the appropriate licensing. The SSM can operate as a 32-port Fibre Channel switching module with no additional licensing requirements. The SSM requires the Storage Services Enabler package to provision Intelligent Storage Services on the module.

Common Troubleshooting Tools in Fabric Manager

Using Fabric Manager, access the following navigation paths to help you troubleshoot SSM issues:

- In Fabric Manager, choose **End Devices > SSM** to access the SSM configuration.
- In Device Manager, choose **Physical > Inventory** to determine the SSI image version.

Common Troubleshooting Commands in the CLI

The following commands may be useful in troubleshooting PortChannel and trunking issues:

- **show boot-variables**
- **show version**
- **install ssi**
- **show version module** *number* **epld**
- **show version epld**
- **show ssm provisioning**

SSM Issues

This section describes troubleshooting issues for the SSM and SSI images.

SSM Fails to Boot

If the SSM fails to boot, you may see the following system message:

> **Error Message** IMAGE_DNLD-SLOT#-2-ADDON_IMG_DNLD_FAILED: Module image download process failed. [chars].

> > **Explanation** The add-on image download to the module failed. This module is not operational until an add-on image has been successfully installed.
> > **Recommended Action** Verify the location and version of your module image. Enter the **install module** CLI command or use a similar Fabric Manager/Device Manager procedure to download a new module image.
> > **Symptom** SSM fails to boot.

Table 3-3 SSM Fails to Boot

Symptom	Solution

	Possible Cause	
SSM fails to boot.	SSI boot variable is not set.	Set the boot variable and install the SSI image. See the "Recovering a Replacement SSM" section
	SSI image is not present.	Download the SSI image and install. See the "Upgrading the SSI Image" section.
	SSI image is not compatible with Cisco SAN-OS image.	If an incorrect or incompatible SSI image is downloaded to an SSM it fails to boot three times and then powered down. Refer to the *Cisco MDS SAN-OS Release Compatibility Matrix for Storage Service Interface Images* at the following website to check image compatibility: http://www.cisco.com/en/US/products/ps5989/products_device_support_table09186a0080485272 See the "Upgrading the SSI Image" section.

Upgrading the SSI Image

You can specify the SSI boot image for a Storage Services Module (SSM) to configure Fibre Channel switching and Intelligent Storage Services.

Note: 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.

To upgrade or downgrade the SSI boot image for SSM modules using the CLI, follow these steps:

---

1. Verify that the correct SSI boot image is present on your switch (see the "Verifying the SSI Boot Image" section).
2. Use the **install ssi** command to upgrade or downgrade the SSI boot image on the module (see the "Using the install ssi Command" section).

Note: The SSM must be running EPLD version 2.1(2) for you to use the **install ssi** command. You must install the SSM on a Cisco MDS 9500 Series switch to upgrade the EPLD. See the "Installing EPLD Images on Modules" section.

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, follow these steps:

---

1. Log in to the switch through the console port, an SSH session, or a Telnet session.

2. If your SSM module boots, use the **dir modflash://slot-1/** command to verify that the SSI software image file corresponding to your Cisco MDS SAN-OS release is present on the SSM. 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* at the following URL for more information: Cisco MDS SAN-PS Release Compatibility Matrix

```
switch# dir modflash://4-1/
4004128 Sep 26 13:43:02 2005 m9000-ek9-ssi-mz.2.1.2.bin
...
```

> You can find the SSI boot images at the following URL:
> SSI Boot Images

3. If your SSM module does not boot, you need to check for the SSI image in bootflash instead of modflash. Use the **dir bootflash://slot-1/** command to verify that the SSI software image file corresponding to your Cisco MDS SAN-OS release is present on the SSM. 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.

```
switch# dir bootflash:
40295206     Aug 05 15:23:51 1980  ilc1.bin
12456448     Jul 30 23:05:28 1980  kickstart-image1
12288        Jun 23 14:58:44 1980  lost+found/
27602159     Jul 30 23:05:16 1980  system-image1
12447232     Aug 05 15:08:30 1980  kickstart-image2
28364853     Aug 05 15:11:57 1980  system-image2
4004128      Sep 26 13:43:02 2005 m9000-ek9-ssi-mz.2.1.2.bin
```

4. If you need to obtain the appropriate SSI software image file, follow these steps:

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

> b. If your SSM boots, then verify that you have enough free space available on the modflash: on the SSM using the **dir modflash://slot-1/** command. The download site on Cisco.com shows the size of the boot image file in bytes.

> The following example shows how to display the available memory for the modflash: for the SSM in slot 4:

```
switch# dir modflash://4-1/
3118535 Apr 25 15:35:06 2005 m9000-ek9-ssi-mz.2.0.4a.bin
...
```

> c. If your SSM does not boot, then verify that you have enough free space available on the bootflash: on the active supervisor module using the **dir bootlash://slot-1/** command. The download site on Cisco.com shows the size of the boot image file in bytes.

> The following example shows how to display the available memory for the modflash: for the SSM in slot 4:

```
switch# dir bootflash:
40295206     Aug 05 15:23:51 1980  ilc1.bin
12456448     Jul 30 23:05:28 1980  kickstart-image1
12288        Jun 23 14:58:44 1980  lost+found/
27602159     Jul 30 23:05:16 1980  system-image1
12447232     Aug 05 15:08:30 1980  kickstart-image2
28364853     Aug 05 15:11:57 1980  system-image2
4004128      Sep 26 13:43:02 2005 m9000-ek9-ssi-mz.2.1.2.bin
...
```

Verifying the SSI Boot Image   5

d. Delete the unneeded files from modflash or bootflash if there is not enough space.

```
switch# '''delete modflash://4-1/m9500-ek9-ssi-mz.2.0.4a.bin'''
```

e. Copy the boot image file from the FTP server to modflash or bootflash.

```
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.bi
```

Note: If you are using bootflash to initially boot your SSM, you should copy the SSI image to modflash after the SSM boots and set the SSI boot variable to use the image in modflash.

Using the install ssi Command

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 you are then asked if you want 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 "Installing EPLD Images on Modules" section.

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

1. Log in to the switch through the console port, an SSH session, or a Telnet session.
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.

3. Verify the Cisco MDS SAN-OS release that is running on the switch and verify the location and name of the SSI boot image that is on the switch by following the procedure described in the "Verifying the SSI Boot Image" section.

4. If the SSM boots, then install the SSI image 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 is displayed at the command prompt indicating that the operation will disrupt traffic, and you are then asked if you want to continue.

5. If the SSM does not boot, install the SSI image in bootflash on the active supervisor module.

```
switch# install ssi bootflash:/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 is displayed at the command prompt indicating that the operation will disrupt traffic and you are then asked if you want to continue.

6. Install the SSI image 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 is displayed at the command prompt indicating that the operation will disrupt traffic and you are then asked if you want to continue.

7. 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
```

8. Save the new boot variable configuration so that 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 when the switch reboots. In addition, SSM restarts in Fibre Channel switching mode. You must perform this procedure again to recover the SSI boot image configuration.

9. 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
```

Recovering a Replacement SSM

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 SSM is replaced, the new SSM might not initialize.

To recover the SSM, follow these steps:

1. Log in to the switch through the console port, an SSH session, or a Telnet session.

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
```

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

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

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

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

5. After the SSM initializes, follow the procedure described in the "Upgrading the SSI Image" section.

SSM Upgrade Is Disruptive

Symptom SSM upgrade is disruptive.

Table 3-4 SSM Upgrade is Disruptive

Symptom	Possible Cause	Solution
SSM upgrade disruptive.	Cisco SAN-OS, SSI, or ELPD Release prior to release 2.1(2).	Upgrade to release 2.1(2) or a later version of Cisco SAN-OS, SSI, and ELPD images. Use the **show version module** *number* **epld** CLI command to verify the current ELPD version. See the "Installing EPLD Images on Modules" section and the "Upgrading the SSI Image" section.
	SSM provisioned for Layer 3 application and not powered down.	Deprovision the Layer 3 application before upgrading by using the **no ssm enable feature** CLI command.

Installing EPLD Images on Modules

Tip: Refer to the *Cisco MDS SAN-OS Release Notes for Cisco MDS 9000 EPLD Images* to verify whether or not the EPLD has changed for the Cisco SAN-OS image version being used.

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

To install an EPLD image on a switching, services, or supervisor module, follow these steps:

---

1. Log in to the switch through the console port, an SSH session, or a Telnet session.
2. Issue the **show version** command to determine which Cisco MDS SAN-OS release is 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) 2002-2005, 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 are covered under the GNU Public
License. A copy of the license is available at
http://www.gnu.org/licenses/gpl.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]

...
```

3. If necessary, upgrade the Cisco MDS SAN-OS software that is running on your switch.
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: <u>EPLD Images</u>

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 supervisor module.

```
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 module 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 supervisor modules:

```
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 module 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 module 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 automatically synchronizes the ELPD image to the standby supervisor module if automatic copying is enabled.

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

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
```

Installing EPLD Images on Modules   11

```
WARNING: Upgrade process could take up to 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 EPLD images are forcefully upgraded. If the module is not present in the switch, an error returns. 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)?
```

Back to Main Page: Cisco MDS SAN-OS Troubleshooting Guide