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Cisco MDS 9000 Family Software Upgrade and Downgrade Guide

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This document provides information to upgrade the software on any switch in the Cisco MDS 9000 Family.

This guide includes the following sections:

Note For documentation purposes, we use the term upgrade in this document. However, *upgrade* refers to both upgrading and downgrading your switch depending on your needs.

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Tip The *Cisco MDS 9000 Family CLI Configuration Guide* has a separate version for each major release. The documentation links within this quick reference point to the Cisco SAN-OS Release 3.x. If you need an another version of this document, refer to the *Cisco MDS 9000 Family Configuration Guides* link to access the related topic from the required version.

Caution All command-line interface (CLI) session examples provided in this document are only intended for reference. The actual session output differs based on the switch model being used. This document displays examples obtained from switches in the Cisco MDS 9500 Series.

About Software Images

Each switch is shipped with a Cisco MDS SAN-OS operating system for Cisco MDS 9000 Family switches. The Cisco MDS SAN-OS consists of two images—the kickstart image and the system image. To upgrade the switch to a new image, you must specify the variables that direct the switch to the images.

- To select the kickstart image, use the KICKSTART variable.
- To select the system image, use the SYSTEM variable.

The images and variables are important factors in any install procedure. You must specify the variable and the image to upgrade your switch. Both images are not always required for each install.

Note Unless explicitly stated, the software install procedures in this document apply to any switch in the Cisco MDS 9000 Family.

Dependent Factors for Software Installation

The software image install procedure is dependent on the following factors:

- Software images—The kickstart and system image files reside in directories or folders that can be accessed from the Cisco MDS 9000 Family switch prompt.
- Image version—Each image file has a version.
- Flash disks on the switch—The bootflash: resides on the supervisor module and the CompactFlash disk is inserted into the slot0: device.
- Supervisor modules—There are single or dual supervisor modules.

Selecting the Correct Software Images for Cisco MDS 9500 Series Switches

The Supervisor-1 and Supervisor-2 modules supported by Cisco MDS 9500 Series switches require different system and kickstart images. You can determine which images to use on your switch by the naming conventions shown in Table 1.

Table 1 Supervisor Module Software Image Naming Conventions

Cisco MDS 9500 Series Switch Type	Supervisor Module Type	Naming Convention
9506 or 9509	Supervisor-1 module	Filename begins with m9500-sf1ek9
	Supervisor-2module	Filename begins with m9500-sf2ek9
9513	Supervisor-2 module	Filename begins with m9500-sf2ek9

Use the **show module** command to display the type of supervisor module in the switch.

Example 1 shows the output for a switch with Supervisor-1 modules.

Example 1 show module Command Output for Supervisor-1 Modules

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

Example 2 shows the output for a switch with Supervisor-2 modules.

Example 2 show module Command Output for Supervisor-2 Modules

```
switch# show module
Mod Ports Module-Type Model Status
--- ----- -------------------------------- ------------------ ------------
...
...
7 0 Supervisor/Fabric-2 DS-X9530-SF2-K9 active *
8 0 Supervisor/Fabric-2 DS-X9530-SF2-K9 ha-standby
```

Installing SAN-OS Software on a New Cisco MDS Switch

To install to the latest SAN-OS software image on your Cisco MDS 9000 Family switch, follow these steps:

Step 1 Log in to Cisco.com to access the links provided in this document. To log in to Cisco.com, go to the URL http://www.cisco.com/ and click **Log In** at the top of the page. Enter your Cisco Systems user name and password.

Note Unregistered Cisco.com users cannot access the links provided in this document.

Step 2 Verify the following physical connections for the new Cisco MDS 9000 Family switch:

- The console port is physically connected to a computer terminal (or terminal server).
- The management 10/100 Ethernet port (mgmt0) is connected to an external hub, switch, or router.

These procedures are specified in the hardware installation guide for the required product. Refer to one of the following documents to obtain more information:

- *Cisco MDS 9100 Series Hardware Installation Guide*
- *Cisco MDS 9216 Switch Hardware Installation Guide*
- *Cisco MDS 9500 Series Hardware Installation Guide*

Tip Save the host ID information for future use (for example, to enable licensed features). The host ID information is provided in the Proof of Purchase document that accompanies the switch.

Step 3 Verify that the default console port parameters are identical to the parameters of the computer terminal (or terminal server) attached to the switch console port:

- 9600 baud
- 8 data bits
- 1 stop bit
- No parity

Refer to the "Configuring Console Settings" section in the "Initial Configuration" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

Step 4 Power up the Cisco MDS 9000 Family switch. The switch boots automatically and the `switch#` prompt appears in your terminal window.

Step 5 Obtain the IP address, subnet mask, and default gateway information that is required for the Cisco MDS 9000 Family switch to communicate over the supervisor module Ethernet interface. This information is required to configure and manage the switch.

Refer to the "Switch Setup Information" section in the "Initial Configuration" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

Tip You have the option to change the default password during the initial setup process. All Cisco MDS 9000 Family switches have the network administrator as a default user (admin) and a default password (`admin`). You cannot change the default user at any time.

By default, two roles exist in all switches:

- Network operator (network-operator)—Has permission to view the configuration only. The operator cannot make any configuration changes.
- Network administrator (network-admin)—Has permission to execute all commands and make configuration changes. The administrator can also create and customize up to 64 additional roles. One (of these 64 additional roles) can be configured during the initial setup process.

Step 6 Enter **yes** to enter the setup mode and assign the information obtained in Step 5.

Refer to the "Assigning Setup Information" section in the "Initial Configuration" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

Note Press **Ctrl-C** at any prompt to skip the remaining configuration options and proceed with what is configured until that point.

Tip If you do not wish to answer a previously configured question, or if you wish to skip answers to any questions, press **Enter**. If a default answer is not available (for example, a switch name), the switch uses the previously configured settings and skips to the next question.

The CLI configuration steps (using factory defaults) are as follows:

```
This setup utility will guide you through the basic configuration of
the system. Setup configures only enough connectivity for management
of the system.

Press Enter incase you want to skip any dialog. Use ctrl-c at anytime
to skip away remaining dialogs.

Would you like to enter the basic configuration dialog (yes/no): yes

Enter the password for admin: admin-password
```

Tip If you create a short, easy-to-decipher password, your password is rejected. Be sure to configure a strong password as shown in the sample configuration. Passwords are case sensitive. You must explicitly create a password that meets the requirements listed in the "Characteristics of Strong Passwords" section in the "Configuring Users and Common Roles" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

```
Create another login account (yes/no) [n]: yes
```

Note While configuring your initial setup, you can create an additional user account (in the network-admin role) besides the administrator's account. The user name must contain non-numeric characters. Refer to the "Configuring User Accounts" section in the "Configuring Users and Common Roles" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

```
Enter the user login ID: user_name

Enter the password for user_name: user-password

Configure SNMPv3 Management parameters (yes/no) [y]: yes

SNMPv3 user name [admin]: admin

Enter the SNMPv3 password (minimum of eight characters).
SNMPv3 user authentication password : admin_pass
```

Note By default, if the admin password is at least eight characters, then the SNMP authentication password is the same as the admin password (at least eight characters). If the admin password is less than eight characters, then you need to provide a new password for SNMP.
The admin password can have a minimum of one character, but the SNMP authentication password must have a minimum of eight characters.

Tip If you use SNMPv3, then do not configure the SNMPv2 community string. Refer to the "SNMP Version 1 and Version 2c" section in the "Configuring SMNP" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

```
Configure read-only SNMP community string (yes/no) [n]: yes

SNMP community string: snmp_community
```

Note The switch name is limited to 32 alphanumeric characters.

```
Enter the switch name: switch_name

Continue with Out-of-band (mgmt0) management configuration? [yes/no]: yes
```

Note IP version 6(IPv6) is supported in Cisco MDS SAN-OS Release 3.0(1) and later. However, the setup script only supports IP version 4 (IPv4) for the management interface. For information on configuring IPv6 on the management interface, refer the *Cisco MDS 9000 Family CLI Configuration Guide, Release 3.x*, or the *Cisco MDS 9000 Family Fabric Manager Configuration Guide, Release 3.x*.

```
Mgmt0 IP address: ip_address

Mgmt0 IP netmask: subnet_mask

Continue with in-band (VSAN1) management configuration? (yes/no) [no]: no

Enable the ip routing capabilities? (yes/no) [y]: yes

Configure static route: (yes/no) [y]: yes

Destination prefix: dest_prefix

Destination prefix mask: dest_mask

Next hop ip address: next_hop_address
```

Note Be sure to configure the IP route, the IP default network address, and the IP default gateway address to enable SNMP access. If IP routing is enabled, the switch uses the IP route and the default network IP address. If IP routing is disabled, the switch uses the default gateway IP address.

```
Configure the default-network: (yes/no) [y]: yes
```

Note The default network address is the Destination prefix: dest_prefix provided above

```
Default network IP address: dest_prefix

Configure the default-gateway: (yes/no) [y]: yes

IP address of the default-gateway: default_gateway

Configure the DNS IP address? (yes/no) [y]: yes

DNS IP address: name_server_ip_address

Configure the default domain name? (yes/no) [n]: yes

Default domain name: domain_name

Enable the telnet service? (yes/no) [y]: yes

Enabled SSH service? (yes/no) [n]: yes
```

Note Refer to the "Generating the SSH Server Key Pair" section in the "Configuring Users and Common Roles" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

```
Type the SSH key you would like to generate (dsa/rsa/rsa1)? dsa

Enter the number of key bits? (512 to 2048): 768

Configure NTP server? (yes/no) [n]: yes

NTP server IP address: ntp_server_IP_address

Configure default switchport interface state (shut/noshut) [shut]: shut
```

Note The mgmt0 interface is not shut down at this point—only the Fibre Channel, iSCSI, FCIP, and Gigabit Ethernet interfaces are shut down.

```
Configure default switchport trunk mode (on/off/auto) [on]: on

Configure default zone policy (permit/deny) [deny]: deny

Enable full zoneset distribution (yes/no) [n]: no
```

Note Refer to the "Zone Set Distribution" section in the "Configuring and Managing Zones" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

```
Enable FCID persistence in all the VSANs on this switch (yes/no) [n]: no
```

Note Refer to the "Persistent FC IDs" section in the "Configuring Domain Parameters" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

```
The following configuration will be applied:
  username admin password admin_pass role network-admin
  username user_name password user_pass role network-admin
  snmp-server user admin network-admin auth md5 admin_pass priv admin_pass
  snmp-server community snmp_community ro
  switchname switch
  interface mgmt0
    ip address ip_address subnet_mask
    no shutdown
  ip routing
  ip route dest_prefix dest_mask dest_address
  ip default-network dest_prefix
  ip default-gateway default_gateway
  ip name-server name_server
  ip domain-name domain_name
  telnet server enable
  ssh key dsa 768 force
  ssh server enable
  ntp server ipaddr ntp_server
  no system default switchport shutdown
  system default switchport trunk mode auto
  no zone default-zone permit vsan 1-4093
  no zoneset distribute full vsan 1-4093
  no fcdomain fcid persistent global-enable

Would you like to edit the configuration? (yes/no) [n]: no

Use this configuration and save it? (yes/no) [y]: yes
```

Caution If you do not save the configuration at this point, your changes will not be updated the next time that the switch is rebooted. Type **yes** in order to save the new configuration. This process ensures that the kickstart and system boot images are also automatically configured. Refer to the "Software Images" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

Tip Up to this point, you can only configure the switch using the CLI. After this step, you can continue configuring the switch using the CLI or switch over to using the Cisco MDS 9000 Family Fabric Manager application. Refer to the *Cisco MDS 9000 Family Fabric Manager Configuration Guide*.

If you continue to use the CLI, the login prompt automatically appears in your terminal window.

Step 7 Log in to the switch using the new user name and password.

Step 8 Verify that the required licenses are installed in the switch using the **show license** command.

Note The switch is initially shipped with the required licenses installed in the system; however, the initial license file will not cover unlicensed features that may be used during the grace period. Refer to the "Obtain a Factory-Installed License" section in the "Obtaining and Installing Licenses" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

The example CLI output for a valid license follows:

```
switch# show license
license.lic:
SERVER this_host ANY
VENDOR cisco
INCREMENT ENTERPRISE_PKG cisco 1.0 permanent uncounted \
        VENDOR_STRING=MDS HOSTID=VDH=REG070201 \
        NOTICE="<LicFileID>ent_ips_main_fm.lic</LicFileID><LicLineID>0</LicLineI
D> \
        <PAK>dummyPak</PAK>" SIGN=FB454F0A0D40
INCREMENT MAINFRAME_PKG cisco 1.0 permanent uncounted \
        VENDOR_STRING=MDS HOSTID=VDH=REG070201 \
        NOTICE="<LicFileID>ent_ips_main_fm.lic</LicFileID><LicLineID>1</LicLineI
D> \
        <PAK>dummyPak</PAK>" SIGN=0DAE1B086D9E
INCREMENT SAN_EXTN_OVER_IP cisco 1.0 permanent 7 VENDOR_STRING=MDS \
        HOSTID=VDH=REG070201 \
        NOTICE="<LicFileID>ent_ips_main_fm.lic</LicFileID><LicLineID>2</LicLineI
D> \
        <PAK>dummyPak</PAK>" SIGN=D336330C76A6
INCREMENT FM_SERVER_PKG cisco 1.0 permanent uncounted \
        VENDOR_STRING=MDS HOSTID=VDH=REG070201 \
        NOTICE="<LicFileID>ent_ips_main_fm.lic</LicFileID><LicLineID>3</LicLineI
D> \
        <PAK>dummyPak</PAK>" SIGN=AEAEA04629E8
```

Step 9 Ensure that the required space is available in the bootflash for the kickstart and system image files to be copied using the **dir bootflash:** command.

Note Before downloading and installing SAN-OS software, verify that the release is supported by your Cisco System MDS reseller. If you purchased support through a Cisco Systems reseller, contact them directly for more information. Otherwise, contact Cisco Technical support at this URL: http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml. Cisco Systems employees should refer to the Original Storage Manufacturers (OSMs) support matrix.

```
switch# dir bootflash:
      12288     Jan 01 00:01:06 1980  lost+found/
    3821032     Apr 06 16:50:22 2006  m9000-ek9-ssi-mzg.2.1.1a.bin
   14765056     Mar 21 15:35:06 2006  m9500-sf1ek9-kickstart-mz.2.1.1.bin
   15944704     Apr 06 16:46:04 2006  m9500-sf1ek9-kickstart-mz.2.1.1a.bin
   48063243     Mar 21 15:34:46 2006  m9500-sf1ek9-mz.2.1.1.bin
   48036239     Apr 06 16:45:41 2006  m9500-sf1ek9-mz.2.1.1a.bin

Usage for bootflash://sup-local
  130642562 bytes used
   53917054 bytes free
  184559616 bytes total
```

Step 10 If you need more space on the active supervisor module bootflash, delete unnecessary files to make space available.

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

Step 11 Verify that there is space available on the standby supervisor module bootflash on a Cisco MDS 9500 Series switch.

```
switch# dir bootflash://sup-standby/
      12288     Jan 01 00:01:06 1980  lost+found/
    3821032     Apr 06 16:50:22 2006  m9000-ek9-ssi-mzg.2.1.1a.bin
   14765056     Mar 21 15:35:06 2006  m9500-sf1ek9-kickstart-mz.2.1.1.bin
   15944704     Apr 06 16:46:04 2006  m9500-sf1ek9-kickstart-mz.2.1.1a.bin
   48063243     Mar 21 15:34:46 2006  m9500-sf1ek9-mz.2.1.1.bin
   48036239     Apr 06 16:45:41 2006  m9500-sf1ek9-mz.2.1.1a.bin

Usage for bootflash://sup-standby
  130642562 bytes used
   53917054 bytes free
  184559616 bytes total
```

Step 12 If you need more space on the standby supervisor module bootflash on a Cisco MDS 9500 Series switch, delete unnecessary files to make space available.

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

Step 13 Verify that the switch is running the required software version by issuing the **show version** command—you might need to downgrade to the latest certified original storage manufacturer (OSM) release.

```
switch# show version
Cisco Storage Area Networking Operating System (SAN-OS) Software
TAC support: http://www.cisco.com/tac
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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 1.1.0
 loader:    version 1.2(2)
 kickstart: version 2.1(1a)
 system:    version 2.1(1a)

 BIOS compile time:       10/24/03
 kickstart image file is: bootflash:/m9500-sf1ek9-kickstart-mz.2.1.1a.bin
 kickstart compile time:  4/6/2005 19:00:00 [09/18/2005 18:47:39]
 system image file is:    bootflash:/m9500-sf1ek9-mz.2.1.1a.bin
 system compile time:     4/6/2005 19:00:00 [09/18/2005 19:15:42]
...
```

If the required software version is displayed, you can continue configuring the switch using one of the following options:

- Refer to the *Cisco MDS 9000 Family CLI Configuration Guide* for information on configuring further Cisco SAN-OS features using the CLI.
- Refer to the *Cisco MDS 9000 Family Fabric Manager Configuration Guide* for more information on using the Cisco MDS 9000 Family Fabric Manager to configure your switch.

If the required version is not displayed, continue with the next step to download the required version.

Step 14 Access the Software Download Center using this URL:

http://www.cisco.com/kobayashi/sw-center/sw-stornet.shtml

Step 15 Click the required Cisco MDS SAN-OS image file. You see the Technical Support Encryption Software Export Distribution Authorization form.

Step 16 Complete the required forms to obtain authorization.

Note Unregistered Cisco.com users and users with guest access cannot download SAN-OS images. If you have not already done so, go through the registration procedure before continuing with the rest of the installation. The Cisco System regulatory affairs and compliance team investigates your download request and responds based on internal policies. If you are entitled to download encryption software, your request is approved and you receive an authorization e-mail. After this point, you can continue to download the required software.

Step 17 Copy the MDS SAN-OS kickstart and system images to the active supervisor module bootflash using FTP or TFTP.

Note When you download an image file, change to your FTP environment IP Address or DNS name and the path where the files are located.

```
switch# copy ftp://ftpserver.cisco.com/MDS/m9500-sf1ek9-kickstart-mz.2.1.2b.bin
bootflash:m9500-sf1ek9-kickstart-mz.2.1.2b.bin
switch# copy ftp://ftpserver.cisco.com/MDS/m9500-sf1ek9-mz.2.1.2b.bin
bootflash:m9500-sf1ek9-mz.2.1.2b.bin
```

Step 18 Read the release notes for the related image file. Refer to the Cisco MDS 9000 Series Multilayer Switches release notes.

Step 19 Perform the upgrade by issuing the **install all** command.

The following example displays the result of the **install all** command if the system and kickstart files are specified locally. Refer to the "Copying Files" section in the "Initial Configuration" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

```
switch# install all kickstart bootflash:m9500-sf1ek9-kickstart-mz.2.1.2b.bin system
bootflash:m9500-sf1ek9-mz.2.1.2b.bin
Verifying image bootflash:/m9500-sf1ek9-kickstart-mz.2.1.2b.bin
[####################] 100% -- SUCCESS
Verifying image bootflash:/m9500-sf1ek9-mz.2.1.2b.bin
[####################] 100% -- SUCCESS
Extracting "slc" version from image bootflash:/m9500-sf1ek9-mz.2.1.2b.bin.
####################] 100% -- SUCCESS
Extracting "ips" version from image bootflash:/m9500-sf1ek9-mz.2.1.2b.bin.
[####################] 100% -- SUCCESS
Extracting "system" version from image bootflash:/m9500-sf1ek9-mz.2.1.2b.bin.
[####################] 100% -- SUCCESS
Extracting "kickstart" version from image bootflash:/m9500-sf1ek9-kickstart-mz.2.1.2b.bin.
[####################] 100% -- SUCCESS
Extracting "loader" version from image bootflash:/m9500-sf1ek9-kickstart-mz.2.1.2b.bin.
[####################] 100% -- SUCCESS
Compatibility check is done:
Module  bootable          Impact  Install-type  Reason
------  --------  --------------  ------------  ------
     1       yes  non-disruptive       rolling
     2       yes      disruptive       rolling  Hitless upgrade is not supported
     3       yes      disruptive       rolling  Hitless upgrade is not supported
     4       yes  non-disruptive       rolling
     5       yes  non-disruptive         reset
     6       yes  non-disruptive         reset
```

```
Images will be upgraded according to following table:
Module       Image       Running-Version          New-Version  Upg-Required
------  ----------  --------------------  --------------------  ------------
     1         slc               2.1(2a)               2.1(2b)           yes
     1        bios      v1.1.0(10/24/03)      v1.1.0(10/24/03)            no
     2         ips               2.1(2a)               2.1(2b)           yes
     2        bios      v1.1.0(10/24/03)      v1.1.0(10/24/03)            no
     3         ips               2.1(2a)               2.1(2b)           yes
     3        bios      v1.1.0(10/24/03)      v1.1.0(10/24/03)            no
     4         slc               2.1(2a)               2.1(2b)           yes
     4        bios      v1.1.0(10/24/03)      v1.1.0(10/24/03)            no
     5      system               2.1(2a)               2.1(2b)           yes
     5   kickstart               2.1(2a)               2.1(2b)           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
     6      system               2.1(2a)               2.1(2b)           yes
     6   kickstart               2.1(2a)               2.1(2b)           yes
     6        bios      v1.1.0(10/24/03)      v1.1.0(10/24/03)            no
     6      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.

Syncing image bootflash:/m9500-sf1ek9-kickstart-mz.2.1.2b.bin to standby.
[####################] 100% -- SUCCESS
Syncing image bootflash:/m9500-sf1ek9-mz.2.1.2b.bin to standby.
[####################] 100% -- SUCCESS
Jan 18 23:40:03 Hacienda %VSHD-5-VSHD_SYSLOG_CONFIG_I: Configuring console from
Performing configuration copy.
[####################] 100% -- SUCCESS

Module 6: Waiting for module online.
```

Note At this point, the previously active supervisor module is rebooting after a nondisruptive switchover has taken place. Refer to the "Switchover Mechanisms" section in the "Configuring High Availability" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

```
Auto booting bootflash:/m9500-sf1ek9-kickstart-mz.2.1.2b.bin
bootflash:/m9500-sf1ek9-mz.2.1.2b.bin...
Booting kickstart image: bootflash:/m9500-sf1ek9-kickstart-mz.2.1.2b.bin....
.....................................Image verification OK
Starting kernel...
INIT: version 2.78 booting
Checking all filesystems..r.r.. done.
Loading system software
Uncompressing system image: bootflash:/im9500-sf1ek9-mz.2.1.2b.bin
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCC
INIT: Entering runlevel: 3
```

Step 20 Verify the status of the modules on the switch using the **show module** command.

```
switch# show module
Mod  Ports  Module-Type                       Model              Status
---  -----  -------------------------------- ------------------ ------------
1    8      IP Storage Services Module       DS-X9308-SMIP      ok
2    0      Caching Services Module          DS-X9560-SMAP      ok
3    0      Caching Services Module          DS-X9560-SMAP      ok
4    32     1/2 Gbps FC Module               DS-X9032           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)
---  -----------  ------  --------------------------------------------------
1    2.1(2b)      0.206   20:41:00:05:30:00:00:00 to 20:48:00:05:30:00:00:00
2    2.1(2b)      0.702   --
3    2.1(2b)      0.702   --
4    2.1(2b)      0.3     22:01:00:05:30:00:00:00 to 22:20:00:05:30:00:00:00
5    2.1(2b)      0.602   --
6    2.1(2b)      0.602   --

Mod  MAC-Address(es)                         Serial-Num
---  --------------------------------------  ----------
1    00-05-30-00-9d-d2 to 00-05-30-00-9d-de  JAB064605a2
2    00-05-30-01-37-7a to 00-05-30-01-37-fe  JAB072705ja
3    00-05-30-01-57-7a to 00-05-30-01-57-fe  JAB072005ja
4    00-05-30-00-2d-e2 to 00-05-30-00-2d-e6  JAB06280ae9
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

* this terminal session
```

You have now installed the Cisco MDS SAN-OS software in a new switch.

Upgrading SAN-OS Software on an Existing Cisco MDS Switch

To upgrade your switch to use the latest Cisco MDS SAN-OS software on your Cisco MDS 9000 Family switch, follow these steps:

Step 1 Log in to Cisco.com to access the links provided in this document. To log in to Cisco.com, go to the URL http://www.cisco.com/ and click **Log In** at the top of the page. Enter your Cisco Systems user name and password.

Note Unregistered Cisco.com users cannot access the links provided in this document.

Step 2 Verify the following physical connections for the new Cisco MDS 9000 Family switch:

- The console port is physically connected to a computer terminal (or terminal server).
- The management 10/100 Ethernet port (mgmt0) is connected to an external hub, switch, or router.

These procedures are specified in the hardware installation guide for the required product. Refer to one of the following documents to obtain more information:

- *Cisco MDS 9100 Series Hardware Installation Guide*
- *Cisco MDS 9216 Switch Hardware Installation Guide*
- *Cisco MDS 9500 Series Hardware Installation Guide*

Step 3 Log in to the switch.

Step 4 Issue the **copy running-config startup-config** command to create a backup of your existing configuration file. Refer to the "Saving Your Configuration" section in the "Initial Configuration" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

Step 5 Verify that the requested license files installed in the switch are displayed in response to the **show license usage** command.

Note The switch is initially shipped with the required licenses installed in the system; however, the initial license file will not cover unlicensed features that may be used during the grace period. Refer to the "Obtain a Factory-Installed License" section in the "Obtaining and Installing Licenses" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*. If no license is displayed at this point, perform Step 6 and Step 7 to install the required licenses. If the required licenses are displayed at this point, skip to Step 8.

The example CLI output for a valid license follows:

```
switch# show license usage
Feature               Insta License Status Expiry Date Comments
                      lled  Count
--------------------------------------------------------------------------------
FM_SERVER_PKG          Yes      -   Unused never       -
MAINFRAME_PKG          Yes      -   Unused never       -
ENTERPRISE_PKG         Yes      -   In use never       -
SAN_EXTN_OVER_IP       Yes      1   Unused never       -
--------------------------------------------------------------------------------
```

The example CLI output for licenses with expiring grace periods follows:

```
switch# show license usage
Feature               Insta License Status Expiry Date Comments
                      lled  Count
--------------------------------------------------------------------------------
FM_SERVER_PKG          No       -   In use             Grace Period 78days 5hrs
MAINFRAME_PKG          No       -   Unused             -
ENTERPRISE_PKG         No       -   In use             Grace Period 88days 5hrs
SAN_EXTN_OVER_IP       No       0   Unused             -
--------------------------------------------------------------------------------
```

Step 6 Install licenses (if necessary) to ensure that the required features are available on the switch. Perform the following steps:

a. Use the **show license host-id** command to obtain the serial number for your switch. The host ID is also referred to as the switch serial number.

```
switch# show license host-id
License hostid: VDH=FOX064317SQ
```

Tip Use the entire ID that appears after the colon (:) sign. In this example, the host ID is VDH=FOX064317SQ.

b. Obtain your Claim Certificate or the Proof of Purchase document. This document accompanies every Cisco MDS switch.

c. Locate the Product Authorization Key (PAK) from the Claim Certificate or Proof of Purchase document.

d. Locate the website URL from the Claim Certificate or Proof of Purchase document.

e. Access the specified URL that applies to your switch and enter the switch serial number and the PAK. The license key file is sent to you by e-mail. The license key file is digitally signed to only authorize use on the switch for which it was requested. The requested features are also enabled once the SAN-OS software on the specified switch accesses the license key file.

Caution Install the license file in the specified Cisco MDS 9000 Family switch without making any modifications.

Refer to the "Performing a Manual Installation" section in the "Obtaining and Installing Licenses" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

Step 7 Install the license key file when you receive it by e-mail. Perform the following steps:

a. Perform the installation by issuing the **install license** command on the active supervisor module from the switch console.

```
switch# install license bootflash:license_file.lic
Installing license ..done
```

Note If you provide a target name for the license key file, the file is installed with the specified name. Otherwise, the file name specified in the license key file is used to install the license.

b. Exit the switch console.

Refer to the "Installing a License Key File" section in the "Obtaining and Installing Licenses" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

Step 8 Ensure that the required space is available in the bootflash: directory for the image file(s) to be copied using the **dir bootflash:** command. Use the **delete bootflash:***filename* command to remove unnecessary files.

Note Before downloading and installing Cisco SAN-OS software, verify that the release is supported by your Cisco System MDS reseller. If you purchased support through a Cisco Systems reseller, contact them directly for more information. Otherwise, contact Cisco Technical support at this URL: http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml. Cisco Systems employees should refer to the Original Storage Manufacturers (OSMs) support matrix.

```
switch# dir bootflash:
      12288     Jan 01 00:01:06 1980  lost+found/
    3821032     Apr 06 16:50:22 2006  m9000-ek9-ssi-mzg.2.1.1a.bin
   14765056     Mar 21 15:35:06 2006  m9500-sf1ek9-kickstart-mz.2.1.1.bin
   15944704     Apr 06 16:46:04 2006  m9500-sf1ek9-kickstart-mz.2.1.1a.bin
   48063243     Mar 21 15:34:46 2006  m9500-sf1ek9-mz.2.1.1.bin
   48036239     Apr 06 16:45:41 2006  m9500-sf1ek9-mz.2.1.1a.bin

Usage for bootflash://sup-local
  130642562 bytes used
   53917054 bytes free
  184559616 bytes total
```

Step 9 If you need more space on the active supervisor module bootflash, delete unnecessary files to make space available.

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

Step 10 Verify that there is space available on the standby supervisor module bootflash on a Cisco MDS 9500 Series switch.

```
switch# dir bootflash://sup-standby/
      12288     Jan 01 00:01:06 1980  lost+found/
    3821032     Apr 06 16:50:22 2006  m9000-ek9-ssi-mzg.2.1.1a.bin
   14765056     Mar 21 15:35:06 2006  m9500-sf1ek9-kickstart-mz.2.1.1.bin
   15944704     Apr 06 16:46:04 2006  m9500-sf1ek9-kickstart-mz.2.1.1a.bin
   48063243     Mar 21 15:34:46 2006  m9500-sf1ek9-mz.2.1.1.bin
   48036239     Apr 06 16:45:41 2006  m9500-sf1ek9-mz.2.1.1a.bin

Usage for bootflash://sup-standby
  130642562 bytes used
   53917054 bytes free
  184559616 bytes total
```

Step 11 If you need more space on the standby supervisor module bootflash on a Cisco MDS 9500 Series switch, delete unnecessary files to make space available.

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

Step 12 Access the Software Download Center using this URL:

http://www.cisco.com/kobayashi/sw-center/sw-stornet.shtml

Step 13 Click the required Cisco MDS SAN-OS (new) image file.

You see the Technical Support Encryption Software Export Distribution Authorization form.

Step 14 Complete the required forms to obtain authorization.

Step 15 Download the files to an FTP or TFTP server.

Step 16 Copy the MDS SAN-OS kickstart and system images to the active supervisor module bootflash using FTP or TFTP.

Note When you download an image file, change to your FTP environment IP Address or DNS name and the path where the files are located.

```
switch# copy ftp://ftpserver.cisco.com/MDS/m9500-sf1ek9-kickstart-mz.2.1.2b.bin
bootflash:m9500-sf1ek9-kickstart-mz.2.1.2b.bin
switch# copy ftp://ftpserver.cisco.com/MDS/m9500-sf1ek9-mz.2.1.2b.bin
bootflash:m9500-sf1ek9-mz.2.1.2b.bin
```

Step 17 Read the release notes for the related image file. Refer to the Cisco MDS 9000 Series Multilayer Switches release notes.

Step 18 Issue the **show version** command at the EXEC level switch prompt to verify the current software version in the switch.

Step 19 Verify that the switch is running the required software version by issuing the **show version** command—you might need to downgrade to the latest certified original storage manufacturer (OSM) release.

```
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 1.1.0
 loader:    version 1.2(2)
 kickstart: version 2.1(1a)
 system:    version 2.1(1a)

 BIOS compile time:       10/24/03
 kickstart image file is: bootflash:/m9500-sf1ek9-kickstart-mz.2.1.1a.bin
 kickstart compile time:  4/6/2005 19:00:00 [09/18/2005 18:47:39]
 system image file is:    bootflash:/m9500-sf1ek9-mz.2.1.1a.bin
 system compile time:     4/6/2005 19:00:00 [09/18/2005 19:15:42]
...
```

Step 20 Issue the **show incompatibility system bootflash:***filename* command to determine incompatibilities, if any. Refer to the "Determining Incompatibility" section in the "Software Images" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

The file name specified for this command must already exist in the switch.

Use this command to obtain further information if the **install all** command returns the following message:

```
Warning: The startup config contains commands not supported by the standby supervisor; as
a result, some resources might become unavailable after a switchover.

Do you wish to continue? (y/ n) [y]: n

switch# show incompatibility system bootflash:m9500-sf1ek9-kickstart-mz.2.1.2b.bine
The following configurations on active are incompatible with the system image
The following configurations on active are incompatible with the system image
1) Service : cfs , Capability : CAP_FEATURE_CFS_ENABLED_DEVICE_ALIAS
Description : CFS - Distribution is enabled for DEVICE-ALIAS
Capability requirement : STRICT
Disable command : no device-alias distribute
```

These incompatibilities can be the result of existing or new software or hardware. You must disable features that are not supported in earlier releases.

```
switch# config t
switch(config)# no device-alias distribute
switch(config)# exit
switch# copy running-config startup-config
```

Issue the **show incompatibility system bootflash:***filename* again to verify that there are no incompatibilities.

Step 21 Verify compatibility between the existing software and the new software. See the "Verifying Software Release Compatibility" section on page 34 for more information.

Step 22 Verify that your switch is running compatible hardware. See the "Verifying Hardware Release Compatibility" section on page 35 for more information.

Step 23 If you have configured FC IDs, enable the persistent FC ID feature using the **fcdomain fcid persistent vsan** command. To display the persistent FC ID feature status, use the **show fcdomain fcid vsan** for each VSAN on the switch.

The example CLI output follows:

```
switch# show fcdomain vsan 2
The local switch is the Principal Switch.

Local switch run time information:
        State: Stable
        Local switch WWN:    20:02:00:05:30:00:a7:9f
        Running fabric name: 20:02:00:05:30:00:a7:9f
        Running priority: 128
        Current domain ID: 0x6e(110)

Local switch configuration information:
        State: Enabled
        FCID persistence: Enabled
        Auto-reconfiguration: Disabled
        Contiguous-allocation: Disabled
        Configured fabric name: 20:01:00:05:30:00:28:df
        Configured priority: 128
        Configured domain ID: 0x00(0) (preferred)

Principal switch run time information:
        Running priority: 128
```

Note As of SAN-OS Release 2.0(1b), the persistent FC ID feature is globally enabled on the switch.

Step 24 Perform the upgrade by issuing the **install all** command.

The following example displays the result of the **install all** command if the system and kickstart files are specified locally.

```
switch# install all kickstart bootflash:m9500-sf1ek9-kickstart-mz.2.1.2b.bin system
bootflash:m9500-sf1ek9-mz.2.1.2b.bin
Verifying image bootflash:/m9500-sf1ek9-kickstart-mz.2.1.2b.bin
[####################] 100% -- SUCCESS
Verifying image bootflash:/m9500-sf1ek9-mz.2.1.2b.bin
[####################] 100% -- SUCCESS
Extracting “slc” version from image bootflash:/m9500-sf1ek9-mz.2.1.2b.bin.
####################] 100% -- SUCCESS
Extracting “ips” version from image bootflash:/m9500-sf1ek9-mz.2.1.2b.bin.
[####################] 100% -- SUCCESS
Extracting “system” version from image bootflash:/m9500-sf1ek9-mz.2.1.2b.bin.
[####################] 100% -- SUCCESS
Extracting “kickstart” version from image bootflash:/m9500-sf1ek9-kickstart-mz.2.1.2b.bin.
[####################] 100% -- SUCCESS
Extracting “loader” version from image bootflash:/m9500-sf1ek9-kickstart-mz.2.1.2b.bin.
[####################] 100% -- SUCCESS
Compatibility check is done:
Module  bootable          Impact  Install-type  Reason
------  --------  --------------  ------------  ------
     1       yes  non-disruptive       rolling
     2       yes      disruptive       rolling  Hitless upgrade is not supported
     3       yes      disruptive       rolling  Hitless upgrade is not supported
     4       yes  non-disruptive       rolling
     5       yes  non-disruptive         reset
     6       yes  non-disruptive         reset

Images will be upgraded according to following table:
Module       Image       Running-Version           New-Version  Upg-Required
------  ----------  --------------------  --------------------  ------------
     1         slc               2.1(2a)               2.1(2b)           yes
     1        bios      v1.1.0(10/24/03)      v1.1.0(10/24/03)            no
     2         ips               2.1(2a)               2.1(2b)           yes
     2        bios      v1.1.0(10/24/03)      v1.1.0(10/24/03)            no
     3         ips               2.1(2a)               2.1(2b)           yes
     3        bios      v1.1.0(10/24/03)      v1.1.0(10/24/03)            no
     4         slc               2.1(2a)               2.1(2b)           yes
     4        bios      v1.1.0(10/24/03)      v1.1.0(10/24/03)            no
     5      system               2.1(2a)               2.1(2b)           yes
     5   kickstart               2.1(2a)               2.1(2b)           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
     6      system               2.1(2a)               2.1(2b)           yes
     6   kickstart               2.1(2a)               2.1(2b)           yes
     6        bios      v1.1.0(10/24/03)      v1.1.0(10/24/03)            no
     6      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.

Syncing image bootflash:/m9500-sf1ek9-kickstart-mz.2.1.2b.bin to standby.
[####################] 100% -- SUCCESS
Syncing image bootflash:/m9500-sf1ek9-mz.2.1.2b.bin to standby.
[####################] 100% -- SUCCESS
Jan 18 23:40:03 Hacienda %VSHD-5-VSHD_SYSLOG_CONFIG_I: Configuring console from
Performing configuration copy.
[####################] 100% -- SUCCESS

Module 6: Waiting for module online.
|
Auto booting bootflash:/m9500-sf1ek9-kickstart-mz.2.1.2b.bin
bootflash:/m9500-sf1ek9-mz.2.1.2b.bin...
Booting kickstart image: bootflash:/m9500-sf1ek9-kickstart-mz.2.1.2b.bin....
....................................Image verification OK
Starting kernel...
INIT: version 2.78 booting
Checking all filesystems..r.r.. done.
Loading system software
Uncompressing system image: bootflash:/m9500-sf1ek9-mz.2.1.2b.bin
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCC
INIT: Entering runlevel: 3
```

If the configuration meets all guidelines when the **install all** command is issued, all modules (supervisor and switching) are upgraded. Refer to the "Benefits of Using the **install all** Command" section in the "Software Images" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

Step 25 Open a new terminal session to view the upgraded supervisor module using the **show module** command. Refer to the "Viewing the State of A Module" section in the "Managing Modules" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

```
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    2.1(2b)      0.206   20:41:00:05:30:00:00:00 to 20:48:00:05:30:00:00:00
5    2.1(2b)      0.602   --
6    2.1(2b)      0.602   --
8    2.1(2b)      0.702   --
9    2.1(2b)      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
```

You have now upgraded the Cisco MDS SAN-OS software in your existing switch.

Downgrading from a Higher Release

Use the **install all** command to reload the switch and handle configuration conversions. When downgrading any switch in the Cisco MDS 9000 Family, avoid using the **reload** command.

For example, to revert to Cisco MDS SAN-OS Release 1.3(4b) or 1.3(5) from Release 2.x, follow these steps:

Step 1 Verify that the system image files for the downgrade are present on the active supervisor module bootflash:.

```
switch# dir bootflash:
      12288     Jan 01 00:01:06 1980  lost+found/
    3821032     Apr 06 16:50:22 2006  m9000-ek9-ssi-mzg.2.1.1a.bin
   14765056     Mar 21 15:35:06 2006  m9500-sf1ek9-kickstart-mz.1.3.4b.bin
   15944704     Apr 06 16:46:04 2006  m9500-sf1ek9-kickstart-mz.2.1.1a.bin
   48063243     Mar 21 15:34:46 2006  m9500-sf1ek9-mz.1.3.4b.bin
   48036239     Apr 06 16:45:41 2006  m9500-sf1ek9-mz.2.1.1a.bin

Usage for bootflash://sup-local
  130642562 bytes used
   53917054 bytes free
  184559616 bytes total
```

Step 2 If the software image file is not present, download it from a FTP or TFTP server to the active supervisor module bootflash:. You can obtain the software image file from the Cisco.com software download center at the following URL:

http://www.cisco.com/kobayashi/sw-center/sw-stornet.shtml

Note If you need more space on the active supervisor module bootflash:, use the **delete** command to remove unnecessary files.

```
switch# copy ftp://ftpserver.cisco.com/MDS/m9500-sf1ek9-mz.1.3.4b.bin
bootflash:m9500-sf1ek9-mz.2.1.2b.bin
```

Step 3 Issue the **show incompatibility system** *image-filename c*ommand to determine if you need to disable any features not supported by the older release.

```
Switch# show incompatibility system bootflash:m9500-ek9-mz.1.3.4b.bin
The following configurations on active are incompatible with the system image
1) Service :cfs , Capability :CAP_FEATURE_CFS_ENABLED_CALLHOME
Description :CFS - Distribution is enabled for CALLHOME
Capability requirement :STRICT

2) Service :cfs , Capability :CAP_FEATURE_CFS_ENABLED_PORT_SECURITY
Description :CFS - Distribution is enabled for PORT-SECURITY
Capability requirement :STRICT

3) Service :cfs , Capability :CAP_FEATURE_CFS_ENABLED_NTP
Description :CFS - Distribution is enabled for NTP
Capability requirement :STRICT
```

```
4) Service :cfs , Capability :CAP_FEATURE_CFS_ENABLED_TACACS
Description :CFS - Distribution is enabled for TACACS
Capability requirement :STRICT

5) Service :cfs , Capability :CAP_FEATURE_CFS_ENABLED_RADIUS
Description :CFS - Distribution is enabled for RADIUS
Capability requirement :STRICT
```

Step 4 Disable any features that are incompatible with the downgrade system image.

```
switch# config t
switch(config)# no callhome distribute
switch(config)# no port-security distribute
switch(config)# no ntp distribute
switch(config)# no tacacs+ distribute
switch(config)# no radius distribute
switch(config)# exit
switch#
```

Step 5 Save the configuration using the **copy running-config startup-config** command.

Step 6 Issue the **install all** command to downgrade the software (see the "Upgrading SAN-OS Software on an Existing Cisco MDS Switch" section on page 13).

Migrating from Supervisor-1 Modules to Supervisor-2 Modules

As of Cisco MDS SAN-OS Release 3.0(1), the Cisco MDS 9509 and 9506 Directors support both Supervisor-1 and Supervisor-2 modules. Supervisor-1 and Supervisor-2 modules cannot be installed in the same switch, except during migration. Both the active and standby supervisor modules must be of the same type, either Supervisor-1 or Supervisor-2 modules. For Cisco MDS 9513 Directors, both supervisor modules must be Supervisor-2 modules.

The procedure described in this section ensures that your configuration is correctly synchronized after completing the migration.

Caution Migrating your supervisor modules is a disruptive operation.

Note Migrating from Supervisor-2 modules to Supervisor-1 modules is not supported.

To migrate from Supervisor-1 modules to Supervisor-2 modules on a Cisco MDS 9509 or 9506 Director, follow these steps:

Step 1 Ensure that the configured domain ID is the same as the current domain ID for every VSAN on the switch by following these steps:

a. Issue a **show vsan** command to display all the VSANs on the switch.

```
switch# show vsan
vsan 1 information
         name:VSAN0001  state:active
         interoperability mode:default
         loadbalancing:src-id/dst-id/oxid
         operational state:down

vsan 2 information
         name:VSAN0002  state:active
         interoperability mode:default
         loadbalancing:src-id/dst-id/oxid
         operational state:down

vsan 10 information
         name:VSAN0010  state:active
         interoperability mode:default
         loadbalancing:src-id/dst-id
         operational state:down

vsan 4094:isolated_vsan
```

b. Display the current and configured domain IDs for a VSAN.

```
switch# show fcdomain vsan 1
The local switch is the Principal Switch.

Local switch run time information:
        State: Stable
        Local switch WWN:    20:01:00:05:30:00:35:df
        Running fabric name: 20:01:00:05:30:00:35:df
        Running priority: 128
        Current domain ID: 0x6a(106)

Local switch configuration information:
        State: Enabled
        FCID persistence: Enabled
        Auto-reconfiguration: Disabled
        Contiguous-allocation: Disabled
        Configured fabric name: 20:01:00:05:30:00:28:df
        Configured priority: 128
        Configured domain ID: 0x00(0) (preferred)

Principal switch run time information:
        Running priority: 128
```

c. Change the configured domain ID if it differs from the current domain ID.

```
switch# config t
switch(config)# fcdomain domain 106 static vsan 1
switch(config)# exit
switch#
```

d. Repeat Step b and Step c for each VSAN on the switch.

Step 2 Save the configuration.

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

Step 3 Verify that the switch is running Cisco SAN-OS Release 3.0(1) or later. Upgrade the switch, if necessary (see the "Upgrading SAN-OS Software on an Existing Cisco MDS Switch" section on page 13).

```
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 0.0.11
  kickstart: version 3.0(1) [build 3.0(0.294)] [gdb]
  system:    version 3.0(1) [build 3.0(0.294)] [gdb]
...
```

Step 4 Issue a **show module** command to determine which Supervisor-1 module is the standby.

```
switch# show module
Mod  Ports  Module-Type                       Model              Status
---  -----  --------------------------------- ------------------ ------------
1    16     1/2 Gbps FC Module                DS-X9016           ok
2    32     Storage Services Module           DS-X9032-SSM       ok
3    8      IP Storage Services Module        DS-X9308-SMIP      ok
4    12     1/2/4 Gbps FC Module              DS-X9112           ok
5    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    ha-standby
6    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    active *
...
```

Step 5 Take the standby Supervisor-1 module out of service.

```
switch# out-of-service module 6
```

Step 6 Verify that the standby Supervisor-1 module is powered down.

```
switch# show module
Mod  Ports  Module-Type                       Model              Status
---  -----  --------------------------------- ------------------ ------------
1    16     1/2 Gbps FC Module                DS-X9016           ok
2    32     Storage Services Module           DS-X9032-SSM       ok
3    8      IP Storage Services Module        DS-X9308-SMIP      ok
4    12     1/2/4 Gbps FC Module              DS-X9112           ok
5    0      Supervisor/Fabric-1                                  powered-dn
6    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    active *
...
```

Step 7 Remove the standby Supervisor-1 module from the chassis.

Step 8 Install the Supervisor-2 module in the chassis.

Step 9 Establish a console session on the standby Supervisor-2 module console port (see the "Accessing the Switch" section on page 14).

Step 10 If the `loader>` prompt appears on the standby Supervisor-2 module console session, perform the following steps. Otherwise continue to Step 11.

a. Verify that the Cisco SAN-OS system image and kickstart image are on the standby Supervisor-2 module bootflash:.

```
loader> dir bootflash:
40295206     Aug 05 15:23:51 1980  ilc1.bin
12456448     Jul 30 23:05:28 1980  kickstart-image
12288        Jun 23 14:58:44 1980  lost+found/
27602159     Jul 30 23:05:16 1980  system-image
12447232     Aug 05 15:08:30 1980  kickstart-image2
28364853     Aug 05 15:11:57 1980  system-image2

Usage for bootflash://sup-local
  135404544 bytes used
   49155072 bytes free
  184559616 bytes total
```

b. If the images are present boot the standby Supervisor-2 module skip to Step h. Otherwise, continue to the next step.

c. Enter the local IP address and the subnet mask for the switch, and press **Enter**.

```
loader> ip address 10.16.1.2 255.255.255.0
Found Intel EtherExpressPro100 82559ER at 0xe800, ROM address 0xc000
Probing...[Intel EtherExpressPro100 82559ER]Ethernet addr: 00:05:30:00:52:27
Address: 172.16.1.2
Netmask: 255.255.255.0
Server: 0.0.0.0
Gateway: 0.0.0.0
```

d. Enter the IP address of the default gateway, and press **Enter**.

```
loader> ip default-gateway 10.16.1.1
Address: 172.16.1.2
Netmask: 255.255.255.0
Server: 0.0.0.0
Gateway: 172.16.1.1
```

e. Boot the kickstart image file from the bootflash: (if present) or from a server.

```
loader> boot tftp://10.16.10.100/kickstart-latest
Address: 172.16.1.2
Netmask: 255.255.255.0
Server: 172.16.10.100
Gateway: 172.16.1.1
Booting: /kick-282 console=ttyS0,9600n8nn quiet loader_ver= “1.0(2)”....
.........................................Image verification OK
Starting kernel...
INIT: version 2.78 booting
Checking all filesystems..... done.
Loading system software
INIT: Sending processes the TERM signal
Sending all processes the TERM signal... done.
Sending all processes the KILL signal... done.
Entering single-user mode...
INIT: Going single user
INIT: Sending processes the TERM signal
switch(boot)#
```

The `switch(boot)#` prompt indicates that you have a usable kickstart image.

f. Download a Cisco SAN-OS system image to the Supervisor-2 module from a TFTP server.

```
switch(boot)# copy tftp://10.16.10.100/system-img bootflash:system-img
Trying to connect to tftp server......
```

g. Download a kickstart image to the Supervisor-2 module from a TFTP server, if necessary.

```
switch(boot)# copy tftp://10.16.10.100/kickstart-img bootflash:kickstart-img
Trying to connect to tftp server......
```

h. Boot the standby Supervisor-2 module.

```
loader> boot bootflash:kickstart-imag bootflash:system-img
```

Step 11 Verify that the standby Supervisor-2 module is in the warm standby state using a **show system redundancy status** command on the active Supervisor-1 module session.

```
switch# show system redundancy status
Redundancy mode
---------------
      administrative:   HA
         operational:   Warm

This supervisor (sup-2)
-----------------------
    Redundancy state:   Active
    Supervisor state:   Active
      Internal state:   Active with warm standby

Other supervisor (sup-1)
------------------------
    Redundancy state:   Standby
    Supervisor state:   Warm standby
      Internal state:   Warm standby
```

Step 12 Copy the running configuration to the startup configuration on the active Supervisor-1 module to ensure that any running configuration changes are saved to the startup configuration and the ASCII configuration is synchronized and up to date on the warm standby Supervisor-2 module.

```
switch# copy running-config start-config
```

Step 13 If your switch has SSMs installed and intelligent services are provisioned, perform Step a through Step c. Otherwise, continue to Step 14.

a. Power down all SSMs on the switch.

```
switch# config t
switch(config)# poweroff module 2
switch(config)# exit
switch#
```

Caution Do not copy the running configuration to the startup configuration after powering down the SSMs. If you do, you will lose the configuration on the SSM interfaces.

b. Verify that the SSMs are powered down.

```
switch# show module
Mod  Ports  Module-Type                      Model              Status
---  -----  -------------------------------- ------------------ ------------
1    16     1/2 Gbps FC Module               DS-X9016           ok
2    32     Storage Services Module                             powered-dn
3    8      IP Storage Services Module       DS-X9308-SMIP      ok
4    12     1/2/4 Gbps FC Module             DS-X9112           ok
5    0      Supervisor/Fabric-2              DS-X9530-SF2-K9    ha-standby
6    0      Supervisor/Fabric-1              DS-X9530-SF1-K9    active *
...
```

c. Copy the contents of the SSM NVRAM to the standby Supervisor-2 module.

```
switch# copy ssm-nvram standby-sup
```

Step 14 Initiate a switchover on the active Supervisor-1 module to power it down and cause the standby Supervisor-2 module to become the active supervisor module.

```
switch# system switchover
```

Step 15 Verify that the Supervisor-1 module is powered down.

```
switch# show module
Mod  Ports  Module-Type                      Model              Status
---  -----  -------------------------------- ------------------ ------------
1    16     1/2 Gbps FC Module               DS-X9016           ok
2    32     Storage Services Module          DS-X9032-SSM       ok
3    8      IP Storage Services Module       DS-X9308-SMIP      ok
4    12     1/2/4 Gbps FC Module             DS-X9112           ok
5    0      Supervisor/Fabric-2              DS-X9530-SF2-K9    active *
6    0      Supervisor/Fabric-1                                 powered-dn
...
```

Step 16 Remove the Supervisor-1 module from the chassis.

Step 17 Set the baud rate on the active Supervisor-2 module console session to the default value of 9600.

```
switch# config t
switch(config)# line console
switch(config-console)# speed 9600
switch(config-console)# end
switch# show line console
line Console:
    Speed:        9600 bauds
    Databits:     8 bits per byte
    Stopbits:     1 bit(s)
    Parity:       none
    Modem In: Disable
    Modem Init-String -
        default : ATQ0V1H0S0=1\015
```

Step 18 Install the other Supervisor-2 module in the chassis.

Step 19 Verify that the standby Supervisor-2 module is in the HA-standby state.

```
switch# show system redundancy status
Redundancy mode
---------------
      administrative:   HA
         operational:   HA

This supervisor (sup-1)
-----------------------
    Redundancy state:   Active
    Supervisor state:   Active
      Internal state:   Active with HA standby

Other supervisor (sup-2)
------------------------
    Redundancy state:   Standby
    Supervisor state:   HA standby
      Internal state:   HA standby
```

Step 20 If the Cisco MDS SAN-OS system image on the supervisor modules is the desired release, issue the **install all** command.

```
switch# install all
```

If you want a different release of the Cisco SAN-OS system image running on the switch, issue the **install all** command specifying the system image to perform a hitless upgrade (see the "Upgrading SAN-OS Software on an Existing Cisco MDS Switch" section on page 13).

```
switch# install all system tftp://10.16.10.100/system-img
```

Upgrading EPLD Images on Modules

Switches and directors in the Cisco MDS 9000 Family contain several electrically programmable logical devices (EPLDs) that provide hardware functionalities in all modules. Starting with Cisco MDS SAN-OS Release 1.2, 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 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 9216 Switches do not support EPLD upgrades.
- The EPLD upgrade or downgrade process disrupts traffic.

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

To install the latest EPLD image on a module, follow these 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 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) 2002-2005, 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]

...
```

Step 3 If necessary, upgrade the Cisco MDS SAN-OS software running on your switch (see the "Software Upgrade Methods" section on page 4).

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 module 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 modules.

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

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

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

The example CLI output follows:

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

The authenticity of host '10.6.16.22' can't be established.
RSA1 key fingerprint is 55:2e:1f:0b:18:76:24:02:c2:3b:62:dc:9b:6b:7f:b7.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '10.6.16.22' (RSA1) to the list of known hosts.
user@10.6.16.22's password:
epld.img             100% |****************************|  1269 KB    00:00

Module Number                                       2
EPLD                            Curr Ver     New Ver
-----------------------------------------------------
Power Manager                   0x06
XBUS IO                         0x07        0x08
UD Flow Control                 0x05
PCI ASIC I/F                    0x05        0x05

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

Step 7 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 update 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.

The example CLI output follows:

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

Module 2 is not online, Do you want to continue (y/n) ? y
cchetty@171.69.16.22's password:
epld.img             100% |****************************|  1269 KB    00:00
\ <-----------------------------------------------------------progress twirl
Module 2 EPLD upgrade is successful
```

Note Switches in the Cisco MDS 9100 Series do not support a forced EPLD upgrade. When you upgrade the EPLD module on these switches, you receive the following message:

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

Step 8 Use the **show version module** *number* **epld** command to view all current EPLD versions on a specified module.

The example CLI output follows:

```
switch# show version module 2 epld
Module Number                       2
EPLD Device                   Version
-----------------------------------
Power Manager                    0x06
XBUS IO                          0x07
UD Flow Control                  0x05
PCI ASIC I/F                     0x05
```

Step 9 Use the **show version epld** *url* command to view the available EPLD versions.

The example CLI output follows:

```
switch# show version epld bootflash:m9000-epld-2.1.2.img
user@10.6.16.22's password:

Module Name                     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             0x08
                                PCI ASIC I/F        0x05
1/2 Gbps FC Module (32 port)    XBUS IO             0x07
                                PCI ASIC I/F        0x05
Advanced Services Module        XBUS IO             0x07
                                UD Flow Control     0x05
                                PCI Bridge          0x04
IP Storage Services Module      XBUS IO             0x02
                                UD Flow Control     0x05
                                PCI ASIC I/F        0x05
                                Services MOdule I/F 0x12
                                IPS DB I/F          0x08
MDS 9100 Series Fabric Switch   XBUS IO             0x03
```

Verifying Software Release Compatibility

Table 2 lists the upgrade compatibility issues for various Cisco SAN-OS releases and features.

Table 2 Cisco MDS 9000 Family Cisco SAN-OS Upgrade Release Compatibility Issues

From Release	To Release	Related Documentation
1.0(2) or 1.0(2a)	1.0(3a)	"Upgrading from Prior Releases to Release 1.0(3a)" information in the "New Features in Release 1.0(3a)" section in the Release Notes for Cisco SAN-OS Release 1.0(3a)
1.1(1a)	1.0(4) or 1.0(3a)	"Downgrading to 1.0(4) or to 1.0(3a) from Release 1.1.1a" information in the "Limitations and Restriction" section in the Release Notes for Cisco SAN-OS Release 1.1(1a)
1.0(4) or 1.0(3a)	1.1(1a)	
Any later release	Any earlier release	"Downgrading from a Higher Release" information in the "Limitations and Restriction" section in the Release Notes for Cisco SAN-OS Release 1.1(2) "Handling Feature Incompatibility When Downgrading" information in the "New Features in Release 1.2(1a)" section in the Release Notes for Cisco SAN-OS Release 1.2(1a)
1.2(1a)	1.2(1b)	"Limitations" section in the Release Notes for Cisco SAN-OS Release 1.2(1b)
1.2(1b)	1.2(1a)	
1.1(x), 1.2(x), or 1.3(x)	1.0(x)	"Downgrading to Release 1.0(x)" information in the "Limitations and Restriction" section in the Release Notes for Cisco SAN-OS Release 1.3(1)
1.0(x), 1.1(x), or 1.2(x)	1.3(2a) or 1.3(3)	Caveat CSCee18613 in the "Resolved Caveats" section in the Release Notes for Cisco SAN-OS Release 1.3(3c)
1.0(x), 1.1(x), 1.2(x), or 1.3(x)	2.0(x)	"Image Upgrade" section in Release Notes for Cisco SAN-OS Release 2.0(4a)
1.0(x), 1.1(x), 1.2(x), or 1.3(x)	2.1(x)	"Image Upgrade" section in Release Notes for Cisco SAN-OS Release 2.1(2d)
1.0(x), 1.1(x), 1.2(x), or 1.3(x)	3.0(x)	"Image Upgrade" section in Release Notes for Cisco SAN-OS Release 3.0(1)
2.0(x) or 2.1(x)	3.0(x)	"Image Upgrade" section in Release Notes for Cisco SAN-OS Release 3.0(1)

Verifying Hardware Release Compatibility

Table 3 lists the compatibility information for available hardware.

Table 3 Cisco MDS 9000 Family Compatibility Information for Available Hardware

Hardware	Software Version	Related Documentation
IP Services (IPS) module	1.1(1) and later	"IPS Module Backward Compatibility" information in the "Limitations and Restriction" section in the Release Notes for Cisco SAN-OS Release 1.1(1) "Rolling Upgrades" information in the "Limitations and Restrictions" section in the Release Notes for Cisco SAN-OS Release 1.3(2a)
	1.1(3) to 1.3(3c)	Caveat CSCee06496 in the "Open Caveats Section" in the Release Notes for Cisco SAN-OS Release 1.3(3)
Cisco MDS 9100 Series	Any release	"MDS 9100 Series" information in the "New Features in Release 1.2(1a)" section in the Release Notes for Cisco SAN-OS Release 1.2(1a)
Advanced Services Module (ASM)	1.2(2a) to 1.3(6)	"The 32-Port Fibre Channel Advanced Services Module" information in the "New Features in Release 1.2(2a)" section in the Release Notes for Cisco SAN-OS Release 1.2(2a)
	2.0(1b) to 2.1(1a)	"Specifying the ASM-SFN Boot Image for VSFN" section in the "Managing Modules" chapter in the *Cisco MDS 9000 Family Configuration Guide*. "Specifying the SSI Boot Image for Fibre Channel Switching and Intelligent Storage Services" section in the "Managing Modules" chapter in the *Cisco MDS 9000 Family Configuration Guide*.
	2.1(2) and later	Not supported.
Caching Services Module (CSM)	1.3(1) and later	"The Caching Services Module" information in the "New Features in Release 1.3(1)" section in the Release Notes for Cisco SAN-OS Release 1.3(1) "Rolling Upgrades" information in the "Limitations and Restrictions" section in the Release Notes for Cisco SAN-OS Release 1.3(2a)" "CSM Backward Compatibility" section in the Release Notes for Cisco MDS SVC Release 1.3(4m)
Standby supervisor module boot variables	Any release	"Standby Supervisor Module Boot Variables" information in the "New Features in Release 1.3(1)" section in the Release Notes for Cisco SAN-OS Release 1.3(1)
Replacing modules	Any release	"Replacing Modules" information in the "New Features in Release 1.3(1)"section in the Release Notes for Cisco SAN-OS Release 1.3(1)
Upgrading modules	1.3(1) to 1.3(2a)	"Upgrading Modules Under Specific Conditions" information in the "Limitations and Restriction" section in the Release Notes for Cisco SAN-OS Release 1.3(2a)

Table 3 Cisco MDS 9000 Family Compatibility Information for Available Hardware (continued)

Hardware	Software Version	Related Documentation
Storage Services Module (SSM)	2.0(2b) to 2.1(1b)	"32-Port Fibre Channel Storage Services Module" information in the "New Features in Cisco MDS SAN-OS Release 2.0(2b)" section in the Release Notes for Cisco SAN-OS 2.0(2b). "Specifying the SSI Boot Image for Fibre Channel Switching and Intelligent Storage Services" section in the "Managing Modules" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*. "Specifying the ASM-SFN Boot Image for VSFN" section in the "Managing Modules" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.
	2.1(2) to 2.1(2d)	"Specifying the SSI Boot Image for Fibre Channel Switching and Intelligent Storage Services" section in the "Managing Modules" chapter in the *Cisco MDS 9000 Family Configuration Guide*.
	3.0(1) and later	"Specifying the SSI Boot Image for Fibre Channel Switching and Intelligent Storage Services" section in the "Managing Modules" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.
4-Gbps Fibre Channel switching module	3.0(1) and later	"Configuring Generation 2 Switching Modules" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.
4-port 10-Gbps Fibre Channel switching module	3.0(1) and later	"Configuring Generation 2 Switching Modules" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.
Supervisor-2 module	3.01) and later	"Configuring Console Port Settings" section, "Configuring COM1 Port Settings", and "Configuring Mode Connections" in the "Initial Configuration" chapter in the *Cisco MDS 9000 Family CLI Configuration Guide*.

Verifying SAN-OS Feature Compatibility

The Cisco MDS Release Feature Matrix identifies the minimum Cisco SAN-OS software release required for major features available in switches in the Cisco MDS 9000 Family. You can find the Cisco MDS Release Feature Matrix at this URL:

http://www.cisco.com/en/US/products/hw/ps4159/ps4358/prod_bulletin09186a00801e25cc.html

Related Documentation

The documentation set for the Cisco MDS 9000 Family includes the following documents. To find a document online, use the Cisco MDS SAN-OS Documentation Locator at: http://www.cisco.com/en/US/products/ps5989/products_documentation_roadmap09186a00804500c1.html. For information on IBM TotalStorage SAN Volume Controller Storage Software for the Cisco MDS 9000 Family, refer to the IBM TotalStorage Support website: http://www.ibm.com/storage/support/2062-2300/

Release Notes

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

Compatibility Information

- *Cisco MDS 9000 SAN-OS Hardware and Software Compatibility Information*
- *Cisco MDS 9000 Family Interoperability Support Matrix*
- *Cisco MDS SAN-OS Release Compatibility Matrix for IBM SAN Volume Controller Software for Cisco MDS 9000*
- *Cisco MDS SAN-OS Release Compatibility Matrix for Storage Service Interface Images*

Regulatory Compliance and Safety Information

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

Hardware Installation

- *Cisco MDS 9500 Series Hardware Installation Guide*
- *Cisco MDS 9200 Series Hardware Installation Guide*
- *Cisco MDS 9216 Switch Hardware Installation Guide*
- *Cisco MDS 9100 Series Hardware Installation Guide*
- *Cisco MDS 9020 Fabric Switch Hardware Installation Guide*

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

Cisco Fabric Manager

- *Cisco MDS 9000 Family Fabric Manager Quick Configuration Guide*
- *Cisco MDS 9000 Family Fabric Manager Configuration Guide*
- *Cisco MDS 9000 Fabric Manager Online Help*
- *Cisco MDS 9000 Fabric Manager Web Services Online Help*

Command-Line Interface

- *Cisco MDS 9000 Family Software Upgrade and Downgrade Guide*
- *Cisco MDS 9000 Family CLI Quick Configuration Guide*
- *Cisco MDS 9000 Family CLI Configuration Guide*
- *Cisco MDS 9000 Family Command Reference*
- *Cisco MDS 9000 Family Quick Command Reference*
- *Cisco MDS 9020 Fabric Switch Configuration Guide and Command Reference*
- *Cisco MDS 9000 Family SAN Volume Controller Configuration Guide*

Troubleshooting and Reference

- *Cisco MDS 9000 Family Troubleshooting Guide*
- *Cisco MDS 9000 Family MIB Quick Reference*
- *Cisco MDS 9020 Fabric Switch MIB Quick Reference*
- *Cisco MDS 9000 Family SMI-S Programming Reference*
- *Cisco MDS 9000 Family System Messages Reference*
- *Cisco MDS 9020 Fabric Switch System Messages Reference*

Installation and Configuration Note

- *Cisco MDS 9000 Family SSM Configuration Note*
- *Cisco MDS 9000 Family Port Analyzer Adapter Installation and Configuration Note*

Obtaining Documentation

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

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

Cisco.com

You can access the most current Cisco documentation at this URL:

http://www.cisco.com/techsupport

You can access the Cisco website at this URL:

http://www.cisco.com

You can access international Cisco websites at this URL:

http://www.cisco.com/public/countries_languages.shtml

Product Documentation DVD

The Product Documentation DVD is a comprehensive library of technical product documentation on a portable medium. The DVD enables you to access multiple versions of installation, configuration, and command guides for Cisco hardware and software products. With the DVD, you have access to the same HTML documentation that is found on the Cisco website without being connected to the Internet. Certain products also have .PDF versions of the documentation available.

The Product Documentation DVD is available as a single unit or as a subscription. Registered Cisco.com users (Cisco direct customers) can order a Product Documentation DVD (product number DOC-DOCDVD= or DOC-DOCDVD=SUB) from Cisco Marketplace at this URL:

http://www.cisco.com/go/marketplace/

Ordering Documentation

Registered Cisco.com users may order Cisco documentation at the Product Documentation Store in the Cisco Marketplace at this URL:

http://www.cisco.com/go/marketplace/

Nonregistered Cisco.com users can order technical documentation from 8:00 a.m. to 5:00 p.m. (0800 to 1700) PDT by calling 1 866 463-3487 in the United States and Canada, or elsewhere by calling 011 408 519-5055. You can also order documentation by e-mail at tech-doc-store-mkpl@external.cisco.com or by fax at 1 408 519-5001 in the United States and Canada, or elsewhere at 011 408 519-5001.

Documentation Feedback

You can rate and provide feedback about Cisco technical documents by completing the online feedback form that appears with the technical documents on Cisco.com.

You can submit comments about Cisco documentation by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Cisco Product Security Overview

Cisco provides a free online Security Vulnerability Policy portal at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

From this site, you will find information about how to:

- Report security vulnerabilities in Cisco products.
- Obtain assistance with security incidents that involve Cisco products.
- Register to receive security information from Cisco.

A current list of security advisories, security notices, and security responses for Cisco products is available at this URL:

http://www.cisco.com/go/psirt

To see security advisories, security notices, and security responses as they are updated in real time, you can subscribe to the Product Security Incident Response Team Really Simple Syndication (PSIRT RSS) feed. Information about how to subscribe to the PSIRT RSS feed is found at this URL:

http://www.cisco.com/en/US/products/products_psirt_rss_feed.html

Reporting Security Problems in Cisco Products

Cisco is committed to delivering secure products. We test our products internally before we release them, and we strive to correct all vulnerabilities quickly. If you think that you have identified a vulnerability in a Cisco product, contact PSIRT:

- For Emergencies only—security-alert@cisco.com

  An emergency is either a condition in which a system is under active attack or a condition for which a severe and urgent security vulnerability should be reported. All other conditions are considered nonemergencies.
- For Nonemergencies—psirt@cisco.com

In an emergency, you can also reach PSIRT by telephone:

- 1 877 228-7302
- 1 408 525-6532

Tip We encourage you to use Pretty Good Privacy (PGP) or a compatible product (for example, GnuPG) to encrypt any sensitive information that you send to Cisco. PSIRT can work with information that has been encrypted with PGP versions 2.*x* through 9.*x*.

Never use a revoked or an expired encryption key. The correct public key to use in your correspondence with PSIRT is the one linked in the Contact Summary section of the Security Vulnerability Policy page at this URL:

http://www.cisco.com/en/US/products/products_security_vulnerability_policy.html

The link on this page has the current PGP key ID in use.

If you do not have or use PGP, contact PSIRT at the aforementioned e-mail addresses or phone numbers before sending any sensitive material to find other means of encrypting the data.

Obtaining Technical Assistance

Cisco Technical Support provides 24-hour-a-day award-winning technical assistance. The Cisco Technical Support & Documentation website on Cisco.com features extensive online support resources. In addition, if you have a valid Cisco service contract, Cisco Technical Assistance Center (TAC) engineers provide telephone support. If you do not have a valid Cisco service contract, contact your reseller.

Cisco Technical Support & Documentation Website

The Cisco Technical Support & Documentation website provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The website is available 24 hours a day, at this URL:

http://www.cisco.com/techsupport

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

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

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

Submitting a Service Request

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

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

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

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

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553-2447

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

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

Definitions of Service Request Severity

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

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

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

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

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

Obtaining Additional Publications and Information

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

- The *Cisco Product Quick Reference Guide* is a handy, compact reference tool that includes brief product overviews, key features, sample part numbers, and abbreviated technical specifications for many Cisco products that are sold through channel partners. It is updated twice a year and includes the latest Cisco offerings. To order and find out more about the Cisco Product Quick Reference Guide, go to this URL:

  http://www.cisco.com/go/guide

- Cisco Marketplace provides a variety of Cisco books, reference guides, documentation, and logo merchandise. Visit Cisco Marketplace, the company store, at this URL:

  http://www.cisco.com/go/marketplace/

- *Cisco Press* publishes a wide range of general networking, training and certification titles. Both new and experienced users will benefit from these publications. For current Cisco Press titles and other information, go to Cisco Press at this URL:

  http://www.ciscopress.com

- *Packet* magazine is the Cisco Systems technical user magazine for maximizing Internet and networking investments. Each quarter, Packet delivers coverage of the latest industry trends, technology breakthroughs, and Cisco products and solutions, as well as network deployment and troubleshooting tips, configuration examples, customer case studies, certification and training information, and links to scores of in-depth online resources. You can access Packet magazine at this URL:

  http://www.cisco.com/packet

- *iQ Magazine* is the quarterly publication from Cisco Systems designed to help growing companies learn how they can use technology to increase revenue, streamline their business, and expand services. The publication identifies the challenges facing these companies and the technologies to help solve them, using real-world case studies and business strategies to help readers make sound technology investment decisions. You can access iQ Magazine at this URL:

  http://www.cisco.com/go/iqmagazine

  or view the digital edition at this URL:

  http://ciscoiq.texterity.com/ciscoiq/sample/

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in designing, developing, and operating public and private internets and intranets. You can access the Internet Protocol Journal at this URL:

  http://www.cisco.com/ipj

- Networking products offered by Cisco Systems, as well as customer support services, can be obtained at this URL:

  http://www.cisco.com/en/US/products/index.html

- Networking Professionals Connection is an interactive website for networking professionals to share questions, suggestions, and information about networking products and technologies with Cisco experts and other networking professionals. Join a discussion at this URL:

  http://www.cisco.com/discuss/networking

- World-class networking training is available from Cisco. You can view current offerings at this URL:

  http://www.cisco.com/en/US/learning/index.html

This document is to be used in conjunction with the documents listed in the "Related Documentation" section.