C H A P T E R **5**

Software Images

This chapter describes how to install and upgrade software images. 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 and the CompactFlash disk is inserted into the slot0: device.
- Supervisor modules—There are single or dual supervisor modules. In the dual supervisor scenario, the standby supervisor module should be updated first.

This chapter includes the following sections:

About Software Images

Each switch is shipped with a Cisco MDS SAN-OS operating system for Cisco MDS 9000 Family switches. The 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 which 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 (see the "Specifying Kickstart and System Boot Variables" section on page 5-23). Both images are not always required for each install.

Note Unless explicitly stated, the software install procedures in this section apply to any switch in the Cisco MDS 9500 Series and the Cisco MDS 9200 Series.

Essential Upgrade Prerequisites

Before attempting to migrate to any software image version, follow these guidelines:

- Scheduling

  Schedule the upgrade when the fabric is stable and steady. Ensure that everyone who has access to the switch or the network is not configuring the switch or the network during this time. All configurations will be disallowed at this time.

- Space

  Verify that sufficient space is available in the location where you are copying the images. This location includes the active and standby supervisor modules or bootflash: (internal to the switch). Use the **dir** command to ensure that the required free space is available for the image files to be copied.

  - Standby supervisor module bootflash: directory (see the"Connecting to a Module" section on page 6-4).
  - Internal bootflash offers approximately 200 MB of user space

- Hardware

  Avoid power interruption during any install procedure. These kinds of problems can corrupt the software image.

- Connectivity (to retrieve images from remote servers)

  - Configure the IP address for the 10/100 BASE-T Ethernet port connection (interface mgmt0).
  - Ensure the switch has a route to the remote server. The switch and the remote server must be in the same subnetwork if you do not have a router to route traffic between subnets. Verify connectivity to the remote server using the **ping** command.

- Images

  - The specified system and kickstart images must be compatible with each other.
  - If the kickstart image is not specified, the switch uses the current running kickstart image. If you specify a different system image, ensure that it is compatible with the running kickstart image.

  – Images can be retrieved in one of two ways:

  Local—images are locally available on the switch (the **install all** command uses the specified local images).

  Remote—images are in a remote location and the user specifies the destination using the remote server parameters and the file name to be used locally.

- Commands

  – Verify that the **auto-sync** option is disabled.

  – The switchover mode, if configured, must be configured as HA standby (see the "Switchover Mechanisms" section on page 4-3).

  – We recommend the one-step **install all** command to upgrade your software. This command upgrades all modules in any Cisco MDS 9000 Family switch (see the "The install all command" section on page 5-5).

  Only one **install all** command can be running on a switch at any time.

  The **install all** command can only be issued from the switch console.

  No other command can be issued while running the **install all** command.

  The **install all** command cannot be performed on the standby supervisor module—it can only be issued on the active supervisor module.

  If the switching module(s) are not compatible with the new supervisor module image, some traffic disruption may be noticed in the related modules, depending on your configuration. These modules are identified in the summary when you issue the **install all** command. You can choose to proceed with the upgrade or abort at this point.

✎ **Note**   When you issue the **install all** command, the switch displays a summary of changes that will be made to your configuration and waits for your authorization to continue executing the command process.

Table 5-1 summarizes terms used in this chapter with specific reference to the install and upgrade process.

Table 5-1   Terms Specific to this Chapter

Term		Definition
bootable		The modules ability to boot or not boot based on image compatibility.
impact		The type of software upgrade mechanism—disruptive or non-disruptive.
install-type	reset	Resets the module.
	sw-reset	Resets the card immediately after switchover.
	rolling	Upgrades each module in sequence.
	copy-only	Updates the software for BIOS, loader, or bootrom.

Software Upgrade Mechanisms

The Cisco MDS SAN-OS software, designed for mission-critical high availability environments, provides the ability to upgrade software without any disruptions. To realize the benefits of nondisruptive upgrades on the Cisco MDS 9509 Director, it is highly recommended that you install dual supervisor modules.

You can upgrade any switch in the Cisco MDS 9500 Series and the Cisco MDS 9200 Series using one of three mechanisms:

- Automated, one-step upgrade using the **install all** command (see the "Performing an Automated, One-Step Upgrade" section on page 5-5).

- Manual, step-by-step upgrade (see the "Performing a Manual Upgrade on a Dual Supervisor Switch" section on page 5-17)

- Quick, one-step upgrade using the **reload** command. This upgrade is disruptive (see the "Quick, One-Step Upgrade" section on page 5-29).

For nondisruptive upgrades, use the automated one-step upgrade or the manual step-by-step upgrade. In some cases, the software upgrades may be disruptive. These exception scenarios can occur under the following conditions:

- A single supervisor system with kickstart image changes

- A single supervisor system with incompatible system software images

- A dual supervisor system with incompatible system software images

Tip   The **install all** command compares and presents the results of the compatibility before proceeding with the installation. You have the opportunity to exit, if you do not want to proceed with these changes.

To determine version compatibility between switch images, use the **show install all impact** command (see the "Addressing Incompatible Features" section on page 4-7). This command displays the impact of using the **install all** command.

Performing an Automated, One-Step Upgrade

You can perform an automated upgrade on any switch in the Cisco MDS 9200 Series or the Cisco MDS 9000 Series using the **install all** command.

The install all command

The **install all** command upgrades all modules in any Cisco MDS 9000 Family switch. Figure 5-1 provides an overview of the switch status before and after issuing the **install all** command.

Figure 5-1   The install all Command Effect

The **install all** command automatically verifies if the standby supervisor module is functioning (if present). If it is not functioning, it reloads that module and uses the **reload module** *slot* **force-dnld** command to force it to function.

> **Note**   The **install all** command is only effective on switches running Cisco MDS SAN-OS Release 1.0(3) and later releases.

Benefits of Using the install all Command

The **install all** command provides the following benefits:

- You can upgrade the entire switch using just one command.
- You will receive descriptive information on the intended changes to your system before you issue the command.
- You have the option to cancel the command. Once the effects of the command are presented, you can choose to continue or cancel when you see this question (the default is **no**):

  ```
  Do you want to continue y/n? [n] :y
  ```

- You can upgrade the entire switch using the least disruptive procedure. The manual install procedure involves several commands and processes and takes longer.

- You can view the progress of this command on the console screen of the supervisor module(s).

- The image integrity is automatically checked by the **install all** command. This includes the running kickstart and system images.

- A platform validity check is performed to verify that a wrong image is not used—for example, to check if an MDS 9509 image is used to upgrade an MDS 9216 switch.

- Use the **Ctrl-c** escape sequence to gracefully abort the **install all** command. The command sequence completes the update step in progress and returns to the switch prompt. (Other upgrade commands cannot be aborted using **Ctrl-c**.)

- After issuing the **install all** command, if any step in the sequence fails, the command will complete the step in progress and abort.

    For example, if a switching module fails to be updated for any reason (for example, due to an unstable fabric state), then the command sequence disruptively updates that module and aborts. In such cases, you can verify the problem on the affected switching module and manually upgrade the other switching modules.

Recognizing Failure Cases

The following situations will cause the **install all** command to abort:

- If the **auto-sync** option is enabled.

- If the standby supervisor module bootflash: directory does not have sufficient space to accept the updated image.

- If the specified system and kickstart images are not compatible.

- If the **install all** command is issued on the standby supervisor module.

- If the fabric or switch is configured while the upgrade is in progress.

- If a module is removed or inserted while the upgrade is in progress.

- If the switch has any power disruption while the upgrade is in progress.

- If the entire path for the remote location is not specified accurately.

- If images are incompatible after an upgrade. For example, a switching module image may be incompatible with the system image, or a kickstart image may be incompatible with a system image. This is also identified by the **show install all impact** and **show install** commands in the compatibility check section of the output (under the Bootable column).

Caution   Avoid aborting the switch progress after issuing the **install all** command. If the **install all** command is aborted, be sure to verify the state of the switch at every level. If you issue the command and then abort, you may need to use the manual procedure commands to complete the upgrade. This necessity depends on the state of the switch at the time of the failure.

Using the install all Command

To perform an automated software upgrade on any switch, follow these steps:

Step 1 Log into the switch through the console port of the active supervisor.

Step 2 Create a backup of your existing configuration file, if required (see the "Working with Configuration Files" section on page 3-23).

Step 3 Perform the upgrade by issuing the **install all** command on the active supervisor module from the switch console.

```
switch# install all system bootflash:system-image kickstart bootflash:kickstart-image

Verifying image bootflash:/system-image
[####################] 100% -- SUCCESS

Verifying image bootflash:/kickstart-image
[####################] 100% -- SUCCESS

Extracting "system" version from image bootflash:/kickstart-image.
[####################] 100% -- SUCCESS

Extracting "kickstart" version from image bootflash:/system-image.
[####################] 100% -- SUCCESS

Extracting "loader" version from image bootflash:/system-image.
[####################] 100% -- SUCCESS

Extracting "slc" version from image bootflash:/kickstart-image.
[####################] 100% -- SUCCESS



Compatibility check is done:
Module  bootable         Impact  Install-type  Reason
------  --------  --------------  ------------  ------
     5       yes  non-disruptive         reset
     6       yes  non-disruptive         reset
     9       yes  non-disruptive       rolling


Images will be upgraded according to following table:
Module      Image      Running-Version               New-Version  Upg-Required
------  ----------  --------------------      --------------------  ------------
     5      system                 1.2(1)                    1.3(1)           yes
     5   kickstart                 1.2(1)                    1.3(1)           yes
     5        bios     v1.0.7(03/20/03)          v1.0.7(03/20/03)            no
     5      loader                 1.0(3a)                   1.0(3a)           no
     6      system                 1.2(1)                    1.3(1)           yes
     6   kickstart                 1.2(1)                    1.3(1)           yes
     6        bios     v1.0.7(03/20/03)          v1.0.7(03/20/03)            no
     6      loader                 1.0(3a)                   1.0(3a)           no
     9         slc                 1.2(1)                    1.3(1)           yes
     9        bios     v1.0.7(03/20/03)          v1.0.7(03/20/03)            no
```

Step 4 Enter **yes** if you wish to continue with the installation.

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

Install is in progress, please wait.

Syncing image bootflash:/system-image to standby.
```

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

Syncing image bootflash:/kickstart-image to standby.
[####################] 100% -- SUCCESS

Performing configuration copy.
[####################] 100% -- SUCCESS

Module 6: Waiting for module online.
 -- SUCCESS
```

✎
Note   If you are logged into the standby supervisor module, you will see the following output when the install all command is issued on the active supervisor module.

```
Auto booting bootflash:/system-image bootflash:/m9500
-sf1ek9-mzg.1.3.0.9.bin...
Booting kickstart image: bootflash:/system-image....
......................................Image verification OK

Starting kernel...
INIT: version 2.78 booting
Checking all filesystems..r... done.
Loading system software
Uncompressing system image: bootflash:/kickstart-image
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
INIT: Entering runlevel: 3


Continue on installation process, please wait.
The login will be disabled until the installation is completed.

Waiting for MTS to come up

Module 6: Waiting for module online.
 -- SUCCESS

Module 9: Non-disruptive upgrading.
[###################] 100% -- SUCCESS


Install has been successful.
```

Step 5   Exit the switch console and open a new terminal session to view the upgraded supervisor module using the **show module** command.

✎
Note   If the configuration meets all guidelines when the **install all** command is issued, all modules (supervisor and switching) are upgraded. This is true for any switch in the Cisco MDS 9000 Family.

Sample install all Commands

Example 5-1 displays the result of the **install all** command if the system and kickstart files are specified in the command line.

Example 5-1   Files Specified Locally

```
switch# install all system bootflash:system-image kickstart bootflash:kickstart-image
Verifying image bootflash:/kickstart-image.bin
[####################] 100% -- SUCCESS

Verifying image bootflash:/system-image.bin
[####################] 100% -- SUCCESS

Extracting "slc" version from image bootflash:/system-image.bin.
[####################] 100% -- SUCCESS

Extracting "system" version from image bootflash:/system-image.bin.
[####################] 100% -- SUCCESS

Extracting "kickstart" version from image bootflash:/kickstart-image.bin.
[####################] 100% -- SUCCESS

Extracting "loader" version from image bootflash:/kickstart-image.bin.
[####################] 100% -- SUCCESS

Compatibility check is done:
Module  bootable         Impact  Install-type  Reason
------  --------  --------------  ------------  ------
     2       yes  non-disruptive          none
     5       yes  non-disruptive          none
     6       yes  non-disruptive          none
     9       yes  non-disruptive          none


Images will be upgraded according to following table:
Module       Image      Running-Version          New-Version  Upg-Required
------  ----------  --------------------  --------------------  ------------
     2         slc                1.2(1)                1.2(1)           no
     2        bios     v1.1.1(03/20/03)      v1.1.1(03/20/03)           no
     5      system                1.2(1)                1.2(1)           no
     5   kickstart                1.2(1)                1.2(1)           no
     5        bios     v1.1.1(03/20/03)      v1.1.1(03/20/03)           no
     5      loader                1.0(3a)               1.0(3a)          no
     6      system                1.2(1)                1.2(1)           no
     6   kickstart                1.2(1)                1.2(1)           no
     6        bios     v1.1.1(03/20/03)      v1.1.1(03/20/03)           no
     6      loader                1.0(3a)               1.0(3a)          no
     9         slc                1.2(1)                1.2(1)           no
     9        bios     v1.1.1(03/20/03)      v1.1.1(03/20/03)           no

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

Install is in progress, please wait.

Syncing image bootflash:/kickstart-image.bin to standby.
[####################] 100% -- SUCCESS

Syncing image bootflash:/system-image.bin to standby.
[####################] 100% -- SUCCESS

Performing configuration copy.
```

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

Module 5: Waiting for module online.
 -- SUCCESS

Install has been successful.
```

Example 5-2 displays the result of the **install all** command if the system and kickstart files are automatically downloaded using a remote (TFTP, FTP, SCP, or SFTP) download option.

⚠

Caution   Specify the exact, complete, path of the remote location. The system will not allow you to proceed if the entire path is not accurately specified. Some examples of incomplete **install all** commands are provided below, Example 5-2 provides an accurate, complete example.

```
switch# install all system bootflash:system-image kickstart tftp:
Please provide a complete URI
switch# install all system scp:
Please provide a complete URI
```

Example 5-2   Files Specified in a Remote Location

```
switch# install all
system scp://user@171.71.00.000/home/user/golden-sanity/system-image
kickstart scp://user@171.71.00.000/home/user/golden-sanity/kickstart-image
For scp://user@171.71.00.000, please enter password:
For scp://user@171.71.00.000, please enter password:
Copying image from scp://user@171.71.00.000/tftpboot/kickstart-image to
bootflash:///m9500-sf1ek9-kickst
art-mzg.1.3.0.12b.bin.
[####################] 100% -- SUCCESS
Copying image from scp://user@171.71.00.000/tftpboot/system-image to
bootflash:///m9500-sf1ek9-mzg.1.3.0.12b.bi
n.
[####################] 100% -- SUCCESS
Verifying image bootflash:///kickstart-image
[####################] 100% -- SUCCESS
Verifying image bootflash:///system-image
[####################] 100% -- SUCCESS
Extracting "slc" version from image bootflash:///system-image.
[####################] 100% -- SUCCESS
Extracting "system" version from image bootflash:///system-image.
[####################] 100% -- SUCCESS
Extracting "kickstart" version from image bootflash:///kickstart-image.
[####################] 100% -- SUCCESS
Extracting "loader" version from image bootflash:///kickstart-image.
[####################] 100% -- SUCCESS

Compatibility check is done:
Module  bootable         Impact  Install-type  Reason
------  --------  --------------  ------------  ------
    2      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
------  ----------  --------------------  --------------------  ------------
    2         slc             1.2(1)              1.3(1)           yes
    2        bios     v1.0.7(03/20/03)     v1.0.7(03/20/03)        no
    5      system             1.2(1)              1.3(1)           yes
    5   kickstart             1.2(1)              1.3(1)           yes
    5        bios     v1.0.7(03/20/03)     v1.0.7(03/20/03)        no
```

```
    5       loader              1.0(3a)              1.0(3a)              no
    6       system              1.2(1)               1.3(1)              yes
    6     kickstart             1.2(1)               1.3(1)              yes
    6       bios      v1.0.7(03/20/03)     v1.0.7(03/20/03)              no
    6       loader              1.0(3a)              1.0(3a)              no

Do you want to continue with the installation (y/n)? [n] :y
Install is in progress, please wait.
Syncing image bootflash:///kickstart-image to standby.
[####################] 100% -- SUCCESS
Syncing image bootflash:///system-image to standby.
[####################] 100% -- SUCCESS
Performing configuration copy.
[####################] 100% -- SUCCESS

Module 6: Waiting for module online.
 -- SUCCESS
Synchronizing with Firmbase...
General Software Firmbase[r] SMM Kernel 1.1.1002 Oct 11 2002 13:36:57
Copyright (C) 2002 General Software, Inc.

Firmbase initialized.

00000589K Low Memory Passed
01045376K Ext Memory Passed
Wait.....

(C) 2002 General Software, Inc.
Pentium III-1.0-6E69-AA6E

General Software Pentium III Embedded BIOS 2000 (tm) Revision 1.0.(7)
Copyright (C) 2002 General Software, Inc.
MDS9000 BIOS design.
+------------------------------------------------------------------------------+
|          System BIOS Configuration, (C) 2002 General Software, Inc.          |
+-----------------------------------+------------------------------------------+
| System CPU          : Pentium III | Low Memory          : 630KB              |
| Coprocessor         : Enabled     | Extended Memory      : 1021MB            |
| Embedded BIOS Date  : 03/20/03    | ROM Shadowing        : Enabled           |
+-----------------------------------+------------------------------------------+
Loader Loading stage1.5.\

Loader loading, please wait...

Auto booting bootflash:/m9500-sf1ek9-kickstart-mzg.1.3.0.12b.bin bootflash:/m95
00-sf1ek9-mzg.1.3.0.12b.bin...
Booting kickstart image: bootflash:/m9500-sf1ek9-kickstart-mzg.1.3.0.12b.bin...
.
....................................Image verification OK

Starting kernel...
INIT: version 2.78 booting
Checking all filesystems..... done.
Loading system software
Uncompressing system image: bootflash:/m9500-sf1ek9-mzg.1.3.0.12b.bin
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
INIT: Entering runlevel: 3

MDS Switch
switch login: admin
Password:
switch(standby)#
```

Example 5-3 displays the file output on the console of the standby supervisor module. It is a continuation of the output displayed in Example 5-1 and Example 5-2.

Example 5-3   Output of the install all Command on the Standby Supervisor Module Console

```
switch(standby)# Synchronizing with Firmbase...
General Software Firmbase[r] SMM Kernel 1.1.1002 Oct 11 2002 13:36:57
Copyright (C) 2002 General Software, Inc.

Firmbase initialized.

00000589K Low Memory Passed
01045376K Ext Memory PassedI Embedded BIOS 2000 (tm) Revision 1.0.(7)
Wait.....                           Inc.
MDS9000 BIOS design.

(C) 2002 General Software, Inc.
Pentium III-1.0-6E69-AA6E


+------------------------------------------------------------------------------+
|           System BIOS Configuration, (C) 2002 General Software, Inc.         |
+-------------------------------------+----------------------------------------+
| System CPU          : Pentium III   | Low Memory          : 630KB            |
| Coprocessor         : Enabled       | Extended Memory     : 1021MB           |
| Embedded BIOS Date  : 03/20/03      | ROM Shadowing       : Enabled          |
+-------------------------------------+----------------------------------------+
Loader Loading stage1.5.

Loader loading, please wait...

Auto booting bootflash:/m9500-sf1ek9-kickstart-mzg.1.3.0.12b.bin
bootflash:/system-image...
Booting kickstart image: bootflash:/kickstart_image...
.
....................................Image verification OK

Starting kernel...
INIT: version 2.78 booting
Checking all filesystems...r.. done.
Loading system software
Uncompressing system image: bootflash:/system-image
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
INIT: Entering runlevel: 3

Continue on installation process, please wait.
The login will be disabled until the installation is completed.
Waiting for MTS to come up

Module 6: Waiting for module online.
 -- SUCCESS

Module 2: Non-disruptive upgrading.
[#                  ]   0%Jul 17 19:51:22 switch %IMAGE_DNLD-SLOT2-2-IMG_DNLD_STARTED:
Module image download process. Ple
ase wait until completion...
Jul 17 19:51:39 switch %IMAGE_DNLD-SLOT2-2-IMG_DNLD_COMPLETE:  Module image download
process. Download successful.
[###################] 100% -- SUCCESS

Install has been successful.

MDS Switch
switch login: admin
```

```
Password:
switch#

Install has been successful.
```

Example 5-4 displays the **install all** command output of a TFTP GET operation.

Example 5-4   Successful TFTP Get Operation

```
switch# install all system tftp://192.168.1.10/system-image kickstart
tftp://192.168.1.10/kickstart-image

Copying image from tftp://192.168.1.10/system-image to bootflash://kickstart-image
[####################] 100% -- SUCCESS
Copying image from tftp://192.168.1.10/system-image to
bootflash:///m9500-sf1ek9-mzg.1.3.0.12b.bin.
[####################] 100% -- SUCCESS
Verifying image bootflash:///kickstart-image
[####################] 100% -- SUCCESS
Verifying image bootflash:///system-image
[####################] 100% -- SUCCESS
Extracting "slc" version from image bootflash:///system-image
[####################] 100% -- SUCCESS
Extracting "system" version from image bootflash:///system-image
[####################] 100% -- SUCCESS
Extracting "kickstart" version from image bootflash:///kickstart-image
[####################] 100% -- SUCCESS
Extracting "loader" version from image bootflash:///kickstart-image
[####################] 100% -- SUCCESS
Compatibility check is done:
Module  bootable         Impact  Install-type  Reason
------  --------  --------------  ------------  ------
     2       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
------  ----------  --------------------  --------------------  ------------
     2         slc              1.2(1)                1.3(1)           yes
     2        bios     v1.0.7(03/20/03)      v1.0.7(03/20/03)            no
     5      system              1.2(1)                1.3(1)           yes
     5   kickstart              1.2(1)                1.3(1)           yes
     5        bios     v1.0.7(03/20/03)      v1.0.7(03/20/03)            no
     5      loader              1.0(3a)               1.0(3a)            no
     6      system              1.2(1)                1.3(1)           yes
     6   kickstart              1.2(1)                1.3(1)           yes
     6        bios     v1.0.7(03/20/03)      v1.0.7(03/20/03)            no
     6      loader              1.0(3a)               1.0(3a)            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-mzg.1.3.0.12b.bin to standby.
[####################] 100% -- SUCCESS

Syncing image bootflash:///m9500-sf1ek9-mzg.1.3.0.12b.bin to standby.
[####################] 100% -- SUCCESS

Performing configuration copy.
[####################] 100% -- SUCCESS

Module 6: Waiting for module online.
```

```
 -- SUCCESS
Synchronizing with Firmbase...
General Software Firmbase[r] SMM Kernel 1.1.1002 Oct 11 2002 13:36:57
Copyright (C) 2002 General Software, Inc.

Firmbase initialized.

00000589K Low Memory Passed
01045376K Ext Memory Passed
Wait.....

(C) 2002 General Software, Inc.
Pentium III-1.0-6E69-AA6E

General Software Pentium III Embedded BIOS 2000 (tm) Revision 1.0.(7)
Copyright (C) 2002 General Software, Inc.
MDS9000 BIOS design.
+-----------------------------------------------------------------------------+
|          System BIOS Configuration, (C) 2002 General Software, Inc.         |
+--------------------------------------+--------------------------------------+
| System CPU         : Pentium III     | Low Memory          : 630KB          |
| Coprocessor        : Enabled         | Extended Memory     : 1021MB         |
| Embedded BIOS Date : 03/20/03        | ROM Shadowing       : Enabled        |
+--------------------------------------+--------------------------------------+
Loader Loading stage1.5.

Loader loading, please wait...

Auto booting bootflash:/m9500-sf1ek9-kickstart-mzg.1.3.0.12b.bin bootflash:/m95
00-sf1ek9-mzg.1.3.0.12b.bin...
Booting kickstart image: bootflash:/m9500-sf1ek9-kickstart-mzg.1.3.0.12b.bin...
.
....................................Image verification OK

Starting kernel...
INIT: version 2.78 booting
Checking all filesystems..... done.
Loading system software
Uncompressing system image: bootflash:/m9500-sf1ek9-mzg.1.3.0.12b.bin
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
INIT: Entering runlevel: 3

MDS Switch
switch login: admin
Password:
No directory, logging in with HOME=/
switch(standby)# exit

MDS Switch
switch login: admin
Password:
switch(standby)#
```

Example 5-5 displays the **install all** command output of a failed operation due to a full standby disk.

Example 5-5   Failed Operation due to a Full Standby bootflash: Directory

```
switch# install all system tftp://10.24.3.36/m9500-1.0.3 kickstart tftp:
//10.24.3.36/m9500-kickstart.1.0.3
Verifying image bootflash:/kickstart-image.bin
[####################] 100% -- SUCCESS

Verifying image bootflash:/system-image.bin
```

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

            Extracting "slc" version from image bootflash:/system-image.bin.
            [####################] 100% -- SUCCESS

            Extracting "system" version from image bootflash:/system-image.bin.
            [####################] 100% -- SUCCESS

            Extracting "kickstart" version from image bootflash:/kickstart-image.bin.
            [####################] 100% -- SUCCESS

            Extracting "loader" version from image bootflash:/kickstart-image.bin.
            [####################] 100% -- SUCCESS

            Compatibility check is done:
            Module  bootable         Impact  Install-type  Reason
            ------  --------  --------------  ------------  ------
                 2       yes  non-disruptive          none
                 5       yes  non-disruptive          none
                 6       yes  non-disruptive          none
                 9       yes  non-disruptive          none


            Images will be upgraded according to following table:
            Module      Image      Running-Version           New-Version Upg-Required
            ------  ----------  ------------------  --------------------  ------------
                 2         slc              1.2(1)                1.2(1)            no
                 2        bios    v1.1.1(03/20/03)      v1.1.1(03/20/03)            no
                 5      system              1.2(1)                1.2(1)            no
                 5   kickstart              1.2(1)                1.2(1)            no
                 5        bios    v1.1.1(03/20/03)      v1.1.1(03/20/03)            no
                 5      loader              1.0(3a)               1.0(3a)           no
                 6      system              1.2(1)                1.2(1)            no
                 6   kickstart              1.2(1)                1.2(1)            no
                 6        bios    v1.1.1(03/20/03)      v1.1.1(03/20/03)            no
                 6      loader              1.0(3a)               1.0(3a)           no
                 9         slc              1.2(1)                1.2(1)            no
                 9        bios    v1.1.1(03/20/03)      v1.1.1(03/20/03)            no


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

            Install is in progress, please wait.

            Syncing image bootflash:/boot-77b.bin to standby.
            [#                   ]   0% -- FAIL. Return code 0x401E0008 (request was aborted, standby
            disk may be full).

            Install has failed. Return code 0x40930013
            (Syncing images to standby failed).
```
<-----------------------------insufficient space message

Example 5-6 displays the **install all** command output of a failed operation due to an invalid image.

Example 5-6   Failed Operation due to an Invalid Image

```
switch# install all system kickstart-image kickstart system-image
Verifying image bootflash:/m9500-sf1ek9-mzg.1.3.0.12b.bin
[#                   ]   0% -- FAIL. Return code 0x4045001E (mismatch vendor info for
image).
Compatibility check failed. Return code 0x40930011 (Image verification failed).
switch#
```

Example 5-7   Failed Operation due to an Image Incompatible Supervisor Modules

```
switch# install all system kickstart-image kickstart system-image
install all system kickstart-image kickstart system-image

Copying image from system-image to bootflash://kickstart-image
[#                   ]   0% -- FAIL. Return code 0xFFFFFFFF ((null)).
Compatibility check failed. Return code 0x4093000F (Copying image failed).
```

Performing a Manual Upgrade on a Dual Supervisor Switch

⚠️

Caution   If you are a new user, use the **install all** command to perform a software upgrade. The information and instructions provided in this section targets administrators or individuals who are completely familiar with specific switch functions.

You can manually upgrade any switch in the Cisco MDS 9200 Series or the Cisco MDS 9500 Series using the procedures provided in this section. This upgrade mechanism requires you to implement some or all procedures depending on your switch or network configuration.

To perform a manual upgrade for a dual supervisor switch, follow these steps.

Step 1   "Preparing for a Manual Installation" section on page 5-17

Step 2   "Upgrading a Loader" section on page 5-20

Step 3   "Upgrading the BIOS" section on page 5-21

Step 4   "Specifying Kickstart and System Boot Variables" section on page 5-23

Step 5   "Performing a System Switchover" section on page 5-24

Preparing for a Manual Installation

To prepare any Cisco MDS 9000 Family switch for a manual software installation, follow these steps:

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

Step 2   Create a backup of your existing configuration file, if required (see the "Saving the Configuration" section on page 3-26).

Step 3   Copy the software image from a TFTP location to one of two targets: bootflash: or slot0:.

The switch remains operational while the image file is copied.

- Bootflash device (TFTP defaults to the bootflash device)—Copy the software image file from the appropriate TFTP directory to bootflash.

```
switch# copy tftp://<server IP address>/<file name in TFTP> <destination file name as
desired>
```

For example:

```
switch# copy tftp://10.1.7.2/system-image bootflash:system-image
```

✎

Note   The Cisco MDS 9216 Switch does not have an external CompactFlash (see the "Working with Configuration Files" section on page 3-23). If you are using a switch in this series, use the bootflash: directory to copy and verify files.

- CompactFlash device—Copy the software image file from the appropriate TFTP directory to the CompactFlash device in slot0:.

```
switch# copy tftp://<server IP address>/<file name in TFTP> slot0:system-image
```

You can also copy the image onto a new Flash disk from a PC and insert it in slot0: in the Cisco MDS 9500 Series switch. After you copy the image and insert it into the slot0: partition, the process is the same as the CompactFlash device after the copy command is issued.

Step 4 Verify that the file was copied in the required directory.

```
switch# dir bootflash:
40295206     Aug 05 15:23:51 1980  ilc1.bin
12456448     Jul 30 23:05:28 1980  kickstart-image1
12288        Jun 23 14:58:44 1980  lost+found/
27602159     Jul 30 23:05:16 1980  system-image1
12447232     Aug 05 15:08:30 1980  kickstart-image2
28364853     Aug 05 15:11:57 1980  system-image2

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

Step 5 Ensure that the software images are not damaged or corrupted in the saved bootflash: location.

When copying a new image to your switch, confirm that the image was not corrupted during the copy process.

Use the **show version image** command to verify that the required image was copied successfully.

```
switch# show version image bootflash:kickstart-image
  image name: m9500-sf1ek9-kickstart-mzg.1.0.3.bin
  kickstart:  version 1.0(3)
  loader:     version 1.0(3)
  compiled:   2/12/2003 11:00:00
```

✎

Note   A verification failed message is generated when you use a Cisco MDS 9500 Series image on a Cisco MDS 9200 Series switch or a Cisco MDS 9200 Series image on a Cisco MDS 9500 Series switch. Be sure to verify the right image.

Step 6 Compare the running system image and the new image by issuing the **show install all impact** command.

```
switch# show install all impact
```

Step 7 Verify if the standby supervisor module has sufficient space for the new image files.

a. Attach to the standby module to verify the space requirements.

```
switch# attach module 6
Attaching to module 6 ...
To exit type 'exit', to abort type '$.'
```

b. Change to the bootflash: directory.

```
switch(standby)# cd bootflash:
```

c. Verify if the standby supervisor module has sufficient space for the new image files.

```
switch(standby)# dir

admin    14457344  Jan 29 06:10:18 1980 kickstart-1.0.3
admin    14584832  Jan 30 02:10:02 1980 kickstart-image3
admin    14584832  Jan 31 08:25:21 1980 kickstart-image3a
admin    12288     Jan 29 00:25:33 1980 lost+found/
admin    19189547  Jan 29 06:10:01 1980 system-1.0.3
admin    19200399  Jan 30 02:09:45 1980 system-image3
admin    19153046  Jan 31 08:25:05 1980 system-image3a
```

```
                    Usage for bootflash: filesystem
                          105803776 bytes total used
                           70674432 bytes free
                          186085376 bytes available
```

d. Delete files, if required, to make more space for the new image files.

```
switch(standby)# del kickstart-1.0.3
switch(standby)# del system-1.0.3
```

e. Exit the standby supervisor module prompt.

```
switch(standby)# exit
rlogin: connection closed.
```

Step 8 Ensure that the auto-sync feature is disabled.

a. Use the **show auto-sync** command in EXEC mode to verify if this option is configured.

```
switch# show system auto-sync
auto-sync is disabled
auto-sync not started
```

If the **system auto-sync** command is disabled (default), skip to Step 9.

If **system auto-sync** command is enabled, first disable this option by continuing with Step 8b.

b. Change to configuration mode.

```
switch# config terminal
```

c. Disable the **auto-sync** option on the active supervisor module.

```
switch(config)# no system auto-sync image
```

d. Exit to the EXEC mode.

```
switch(config)# exit
```

Step 9 Copy the system and kickstart image files to the standby supervisor module. The following example assumes the standby supervisor module is in slot 6:

```
switch# copy bootflash:system-image bootflash://sup-2/system-image
switch# copy bootflash:kickstart-image bootflash://sup-2/kickstart-image
```

Step 10 Use the **show version image** command to verify the integrity of the image before loading the images. This command can be used for both the system and kickstart images.

```
switch(boot)# show version image bootflash:system-image <-------system image
 image name: m9500-sf1ek9-mz.1.0.3.bin
  bios:       version   v1.0.6(01/27/03)
  system:     version 1.0(3)
  compiled:   01/25/2003 12:00:00

switch(boot)# show version image bootflash:kickstart-image <--------kickstart image
  image name: m9500-sf1ek9-kickstart-mz.1.0.3.upg.bin
  kickstart:  version 1.0(3)
  loader:     version 1.0(3)
  compiled:   01/25/2003 12:00:00

switch# show version image bootflash:bad-image <---------failure case
Md5 Verification Failed
Image integrity check failed
```

Upgrading a Loader

Using the **install module** *slot# of the supervisor module* **loader** command, you can upgrade the (boot) loader.

Note If the loader is upgraded, you need to reboot to make the new loader effective. You can schedule the reboot at a convenient time so traffic will not be impacted.

Caution Before issuing this command, be sure to read the release notes to verify compatibility issues between the boot loader and the kickstart or system images.

To upgrade the loader on either the active or standby supervisor module, follow these steps.

Step 1 Use the **show version** command to verify the version on the active and standby supervisor modules.

```
switch# show version
Cisco Storage Area Networking Operating System (SAN-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2002-2003 by Cisco Systems, Inc. All rights reserved.
The copyright for certain works contained herein are owned by
Andiamo Systems, Inc. and/or other third parties and are used and
distributed under license.
Software
  BIOS:      version 1.0(3)
  loader:    version 1.0(2) <--------------- current running version
  kickstart: version 1.0(3)
  system:    version 1.0(3)

  BIOS compile time:       01/27/03
  kickstart image file is: bootflash:/kickstart-image
  kickstart compile time:  01/25/2003 12:00:00
  system image file is:    bootflash:/system-image
  system compile time:     01/25/2003 12:00:00

Hardware
  RAM 1027564 kB
```

Step 2 Issue the **install module** command for the required supervisor module (active or standby). This example displays the command being issued for the standby supervisor module in slot 6.

```
switch# install module 6 loader bootflash:kickstart-image
```

Note If you install a loader version that is the same as the currently-installed version, the command will not execute. When both the current version and the installed version are the same, use the **init system** command to force a loader upgrade.

Step 3 Use the **show version** command to verify the updated image on the supervisor module.

```
switch# show version
Cisco Storage Area Networking Operating System (SAN-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2002-2003 by Cisco Systems, Inc. All rights reserved.
The copyright for certain works contained herein are owned by
Andiamo Systems, Inc. and/or other third parties and are used and
distributed under license.
Software
```

```
  BIOS:      version 1.0(3)
  loader:    version 1.0(3) [last : 1.0(3)])  <---------------new running version
  kickstart: version 1.0(3)
  system:    version 1.0(3)

  BIOS compile time:       01/27/03
  kickstart image file is: bootflash:/kickstart-image
  kickstart compile time:  01/25/2003 12:00:00
  system image file is:    bootflash:/system-image
  system compile time:     01/25/2003 12:00:00

Hardware
  RAM 1027564 kB

  bootflash: 503808 blocks (block size 512b)
  slot0:     500736 blocks (block size 512b)

  switch uptime is 0 days 3 hours 56 minute(s) 6 second(s)

Last reset
  Reason: Watchdog Timeout/External Reset
  System version: 1.0(3)
```

Upgrading the BIOS

Tip   Refer to the Release Notes to verify if the BIOS has changed for the image version being used.

Program the supervisor or switching module BIOS only if a new BIOS image is provided by Cisco. Only use the provided image to upgrade the BIOS. This command does not affect traffic and can be issued at any time on any switch in the Cisco MDS 9200 Series or Cisco MDS 9500 Series.

Note   If the BIOS is upgraded, reboot to make the new BIOS effective. You can schedule the reboot at a convenient time so traffic will not be impacted.

Caution   The console baud rate automatically reverts to the default rate (9600) after any BIOS upgrade.

To upgrade the BIOS for a module, follow these steps:

Step 1   Use the **show version** command to verify the current running BIOS version.

```
switch# show version
Cisco Storage Area Networking Operating System (SAN-OS) Software
TAC support: http://www.cisco.com/tac
Copyright (c) 2002-2003 by Cisco Systems, Inc. All rights reserved.
The copyright for certain works contained herein are owned by
Andiamo Systems, Inc. and/or other third parties and are used and
distributed under license.
Software
  BIOS:      version 1.0(6)  <--------------- current running version
  loader:    version 1.0(3)
  kickstart: version 1.0(3)
```

```
        system:     version 1.0(3)

        BIOS compile time:      01/27/03
        kickstart image file is: bootflash:/kickstart-image
        kickstart compile time:  01/25/2003 12:00:00
        system image file is:    bootflash:/system-image
        system compile time:     01/25/2003 12:00:00

    Hardware
        RAM 1027564 kB
```

Step 2   Verify that the BIOS version of the system image is different form the running image.

```
switch# show version image bootflash:system-image detail
    image name: m9500-sf1ek9-mz.1.0.3.bin
    bios:       version   v1.0.6(01/27/03) <-------------- BIOS is same version 1.0.6
    system:     version 1.0(3)
    compiled:   2/28/2003 5:00:00

system service's list

package name            package version
acl                     1.0(3)
ascii-cfg               1.0(3)
bios_daemon             1.0(3)
...
```

✎
Note   If the version are different, issue the **install module** command as specified in step 3. If they are the same, you do not need to update the BIOS image.

Step 3   Run the **install module** *slot#* **bios** command to install each module (if required). In this example, the supervisor module in slot 6 was updated.

```
switch# install module 6 bios system bootflash:system-image
Started bios programming .... please wait
[#######################################] 100
BIOS upgrade succeeded for module 1
```

⚠
Caution   Do not reboot the switch if any errors were indicated in response to this command.

Step 4   Connect to the switching module using the **attach module** command.

```
switch# attach module 6
switch(standby)#
```

Step 5   Issue the **show version** command to verify that the module was updated with a the new BIOS version.

```
switch(standby)# show version
Software
    bios:       version   v1.0.6(01/27/03) <-------------- New BIOS same version
    system:     version 1.0(3)
    compiled:   2/28/2003 5:00:00
...
```

Specifying Kickstart and System Boot Variables

To specify the kickstart and system images in one or both supervisor modules (active and standby), follow these steps:

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

Step 2   Change to configuration mode.

```
switch# config terminal
```

Step 3   Specify the kickstart image to be used for the reboot.

```
switch(config)# boot kickstart bootflash:kickstart-image
```

> **Note**   You can only specify one image for the KICKSTART variable.

Step 4   Specify the first image (system image).

```
switch(config)# boot system bootflash:system-image
```

Step 5   Verify that the Flash device is physically in slot0: before issuing the next command.

Step 6   Specify the second image (kickstart image) for the reboot.

```
switch(config)# boot system slot0:kickstart-image
```

Step 7   Change to the EXEC mode.

```
switch(config)# exit
```

Step 8   Issue the **show boot** command, to display the current contents of the SYSTEM variable.

```
switch# show boot
sup-1
KICKSTART variable = bootflash:/kickstart-image
SYSTEM variable = bootflash:/system-image;
sup-2
KICKSTART variable = bootflash:/kickstart-image
SYSTEM variable = bootflash:/system-image;
```

To clear the current contents of the SYSTEM variable in both supervisor modules, use the **no boot** command.

```
switch(config)# no boot system
switch# show boot
sup-1
KICKSTART variable = bootflash:/kickstart-image
SYSTEM variable not set
sup-2
KICKSTART variable = bootflash:/kickstart-image
SYSTEM variable not set
```

To clear the current contents of the SYSTEM variable in one supervisor module, use the **sup-1** or **sup-2** options:

```
switch(config)# no boot system sup-2
switch# show boot
sup-1
KICKSTART variable = bootflash:/kickstart-image
SYSTEM variable = bootflash:/system-image
sup-2
```

```
KICKSTART variable = bootflash:/kickstart-image
SYSTEM variable not set
```

Step 9   Save the new variable configuration so the new image is used the next time you log into the switch.

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

Step 10   Reload the standby supervisor module to verify the effect of the new image on the supervisor module and the switching modules in the switch.

```
switch# reload module 6
This command will reboot the system. (y/n)? y
```

The **reload** command reboots the system and updates the variable in one or both supervisor modules automatically. Use the **reload** command after the configuration information is entered into a file and saved to the startup configuration.

Step 11   Issue the **show module** command to verify that the supervisor module in Slot 6 is running the new image.

```
switch# show module
Mod  Ports  Module-Type                       Model              Status
---  -----  ------------------------------- ------------------ ------------
1    16     1/2 Gbps FC Module                DS-X9016           ok
5    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    active *
6    0      Supervisor/Fabric-1               DS-X9530-SF1-K9    ha-standby
9    16     1/2 Gbps FC Module                DS-X9016           ok

Mod  Sw          Hw      World-Wide-Name(s) (WWN)
---  ----------  ------  ------------------------------------------------
1    1.0(3)      0.3     20:01:00:05:30:00:13:9e to 20:10:00:05:30:00:13:9e
5    1.0(3)      0.602   --
6    1.0(3)      0.0     -- <-------------- New running version in module 6
9    1.0(3)      0.0     22:01:00:05:30:00:13:9e to 22:10:00:05:30:00:13:9e

Mod  MAC-Address(es)                       Serial-Num
---  ------------------------------------  ----------
1    00-05-30-00-81-6e to 00-05-30-00-81-72  jab063908gj
5    00-05-30-00-84-1a to 00-05-30-00-84-1e  jab063909cv
6    00-05-30-00-2c-5e to 00-05-30-00-2c-62
9    00-05-30-00-03-0c to 00-05-30-00-03-10  123

·    this terminal session
```

✎
Note   The next time you reboot the switch, the saved image is used. If you do not save the configuration, the previously saved startup configuration image is used.

Performing a System Switchover

A switch in the Cisco MDS 9500 Series has two supervisor modules. For example a Cisco MDS 9509 director has one in slot 5 (sup-1) and one in slot 6 (sup-2). When both supervisor modules power up at the same time, the module in slot 5 enters the active mode, while the second module in slot 6 enters the standby mode.

This procedure assumes that slot 5 contains the currently active supervisor module and slot 6 contains the standby supervisor module.

Tip   Verify that the standby supervisor module has sufficient space to perform this procedure.

To perform a system switchover on a dual supervisor module, follow these steps:

Step 1   Switch over to the standby supervisor module (in slot 6) which becomes the active module.

```
switch# system switchover
```

The newly-active supervisor module in slot 6 takes over as the active supervisor.

Note   The previously-active supervisor module in slot 5 reboots automatically.

All incompatible switching modules are automatically detected and upgraded to the same image version as the supervisor modules. All compatible modules must be manually upgraded to be the same version as the supervisor modules.

If you are on a console port, you will see the rebooting messages as the supervisor modules come up.

Note   If you are on a Telnet or SSH session, the session is terminated.

Step 2   Use the **show module** command to determine if a switching module must be updated.

If the switching module is running an image version that is older than the image version on the supervisor module, that switching module must be updated using this procedure.

Step 3   Issue the **install module** *slot#* **image** command on the module (line card).

```
switch# install module 8 image
SW version of linecard image in Supervisor = 1.0(3)
Module 8 : SW version = 1.0(3) , Image version is same, upgrade is not required
```

The preceding example displays a module that does not need to be updated. The following example displays a module that requires an update.

```
switch# install mod 9 image
SW version of linecard image in Supervisor = 1.1(1)
Module 9 : SW version = 1.0(3) , Non disruptive image upgrade is possible
Starting non disruptive upgrade of module 9
Feb  3 02:37:13 switch %LC-2-MSG:SLOT9 LC-2-IMG_DNLD_STARTED:  Module image
download process. Please wait until completion...
Feb  3 02:37:33 switch %LC-2-MSG:SLOT9 LC-2-IMG_DNLD_COMPLETE:  Module image
download process. Download successful.
Module 9 upgrade successful
```

This command updates the specified switching module using the image version that is running on the active supervisor module.

Repeat this step for each switching module that must be updated.

Step 4   Issue the **show module** to verify the module version and the **show system redundancy status** command to ensure the modules are functioning as required.

Performing a Manual Upgrade on a Single Supervisor Switch

This procedure can be performed on any switch in the Cisco MDS 9200 Series. While it can also be performed on any Cisco MDS 9500 Series switch that has only one supervisor module, this is not recommended.

To manually upgrade a switch with a single supervisor module, follow these steps:

Step 1   Update the boot variables on the supervisor modules (see the).

Step 2   Issue the **show install all impact** command to view the effects of an installation.

```
switch# show install all impact
Verifying image bootflash:/ilc1.bin
[####################] 100% -- SUCCESS

Verifying image bootflash:/vk73a
[####################] 100% -- SUCCESS

Verifying image bootflash:/vs73a
[####################] 100% -- SUCCESS

Extracting "slc" version from image bootflash:/vs73a.
[####################] 100% -- SUCCESS

Extracting "slc" version from image bootflash:/vs73a.
[####################] 100% -- SUCCESS

Extracting "system" version from image bootflash:/vs73a.
[####################] 100% -- SUCCESS

Extracting "kickstart" version from image bootflash:/vk73a.
[####################] 100% -- SUCCESS

Extracting "loader" version from image bootflash:/vk73a.
[####################] 100% -- SUCCESS

Extracting "slc" version from image bootflash:/vs73a.
[####################] 100% -- SUCCESS

Compatibility check is done:
Module  bootable        Impact  Install-type  Reason
------  --------  --------------  ------------  ------
     2       yes  non-disruptive          none
     4       yes  non-disruptive          none
     6       yes  non-disruptive          none
     9       yes  non-disruptive          none

Images will be upgraded according to following table:
Module      Image      Running-Version          New-Version  Upg-Required
------  ----------  --------------------  --------------------  ------------
     2        slc               1.2(1)               1.2(1)            no
     2       bios   v1.0.7(03/20/03)     v1.0.7(03/20/03)            no
     4        slc               1.2(1)               1.2(1)            no
     4       bios   v1.0.7(03/20/03)     v1.0.7(03/20/03)            no
     6     system               1.2(1)               1.2(1)            no
     6   kickstart               1.2(1)               1.2(1)            no
     6       bios   v1.0.7(03/20/03)     v1.0.7(03/20/03)            no
     6      loader             1.0(3a)             1.0(3a)            no
     9        slc               1.2(1)               1.2(1)            no
     9       bios   v1.0.7(03/20/03)     v1.0.7(03/20/03)            no
```

Step 3   Copy the software image from a remote location to the bootflash: directory.

```
switch# copy scp://171.00.16.26//tftpboot/NDrel/qa/excal/final/kickstart-image
bootflash:kickstart-image
Enter username:user
user@171.00.16.26's password:
m9200-ek9-kickstart- 100% |*****************************| 14219 KB    00:16
```

Step 4   Verify that the file was copied in the required directory.

```
switch# dir bootflash:
40295206     Aug 05 15:23:51 1980  image.bin
12456448     Jul 30 23:05:28 1980  kickstart-image1
12288        Jun 23 14:58:44 1980  lost+found/
27602159     Jul 30 23:05:16 1980  system-image1
12447232     Aug 05 15:08:30 1980  kickstart-image2
28364853     Aug 05 15:11:57 1980  system-image2

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

Step 5   Ensure that the software images are not damaged or corrupted in the saved bootflash: location.

When copying a new image to your switch, you should confirm that the image was not corrupted during the copy process.

Use the **show version image** command to verify that the required image was copied successfully.

```
switch# show version image bootflash:kickstart-image
  image name: m9200-ek9-kickstart
  kickstart:  version 1.0(3)
  loader:     version 1.0(3)
  compiled:   2/12/2003 11:00:00
```

✎

Note   A verification failed message is generated when you use a Cisco MDS 9500 Series image on a Cisco MDS 9200 Series switch or a Cisco MDS 9200 Series image on a Cisco MDS 9500 Series switch. Be sure to verify the right image.

Step 6   Issue the **install all** command on the supervisor module.

✎

Note   If you install a loader version that is the same as the currently-installed version, the command will not execute. When both the current version and the installed version are the same, use the **init system** command to force a loader upgrade.

```
switch# install all system bootflash:system-image kickstart bootflash:kickstart-image

Image verification is in progress, please wait.
This command is going to install system image m9200-ek9-mz.1.0.2.37a.bin
and kickstart image m9200-ek9-kickstart-mz.1.0.2.37a.bin
on this system
The command will:
 - Install the Loader, if required
 - Install the BIOS, if required
 - Update boot variables
 - Save configuration
 - Reload the supervisor

Do you want to continue y/n ? [n] : y
```

```
                Installing Loader, please wait.
                Installing Loader on module 1 ... not required (same version)
                Installing BIOS, please wait.
                Installing BIOS on module 1 ... not required (same version)
                Updating boot variables .. successful
                Saving configuration, please wait.
                Synchronizing with Firmbase...
                General Software Firmbase[r] SMM Kernel 1.1.1002 Oct 11 2002 13:36:57
                Copyright (C) 2002 General Software, Inc.

                Firmbase initialized.
                ...
                00000589K Low Memory Passed
                00979840K Ext Memory Passed
                Wait.....
                ...
                General Software Pentium III Embedded BIOS 2000 (tm) Revision 1.0.(6)
                (C) 2002 General Software, Inc.ware, Inc.
                Pentium III-1.0-6E69-AA6E
                +------------------------------------------------------------------------------+
                |          System BIOS Configuration, (C) 2002 General Software, Inc.          |
                +-------------------------------------+----------------------------------------+
                | System CPU        : Pentium III     | Low Memory         : 630KB             |
                | Coprocessor       : Enabled         | Extended Memory    : 957MB             |
                | Embedded BIOS Date : 01/27/03       | ROM Shadowing       : Enabled          |
                +-------------------------------------+----------------------------------------+
                Loader Loading stage1.5.

                Loader loading, please wait...
                ...
                Auto booting bootflash:/kick-1.0.2.37a bootflash:/system-1.0.2.37a;...
                Booting kickstart image: bootflash:/kick-1.0.2.37a....
                ..........................................Image verification OK

                Starting kernel...
                INIT: version 2.78 booting
                Checking all filesystems..... done.
                Loading system software
                Uncompressing system image: bootflash:/system-1.0.2.37a
                CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
                Uncompressing linecard components
                INIT: Entering runlevel: 3

                MDS Switch
                switch login: admin
                Password:
```

Step 7   Use the **show version** command to verify the updated image on the supervisor module.

```
                switch# show version
                Cisco Storage Area Networking Operating System (SAN-OS) Software
                TAC support: http://www.cisco.com/tac
                Copyright (c) 2002-2003 by Cisco Systems, Inc. All rights reserved.
                The copyright for certain works contained herein are owned by
                Andiamo Systems, Inc. and/or other third parties and are used and
                distributed under license.

                Software
                  BIOS:      version 1.0.6
                  loader:    version 1.0(2.37a)
                  kickstart: version 1.0(3) [build 1.0(2.37a)]
                  system:    version 1.0(3) [build 1.0(2.37a)]
                  BIOS compile time:      01/27/03
```

```
        kickstart image file is: bootflash:/kick-1.0.2.37a
        kickstart compile time:  3/6/2003 12:00:00
        system image file is:    bootflash:/system-1.0.2.37a
        system compile time:     3/6/2003 12:00:00
Hardware
  RAM 963052 kB
  bootflash: 503808 blocks (block size 512b)
  slot0:          0 blocks (block size 512b)
  switch uptime is 0 days 0 hour 2 minute(s) 36 second(s)
  Last reset at 433817 usecs after Thu Feb 14 11:34:31 1980
    Reason: Reset Requested by CLI command reload
    System version: 1.0(4v)
```

Step 8   Use the **show module** command to determine if the switching module must be updated.

If the switching module is running an image version that is older than the image version on the supervisor module, that switching module must be updated. If the switching module image is not compatible with the supervisor module image, the switching module image will be automatically updated.

Step 9   Issue the **install module** *slot#* **image** command on the module (line card). The following example displays a module that does not need to be updated.

```
switch# install module 2 image
SW version of linecard image in Supervisor = 1.0(4u)

Module 2 : SW version = 1.0(4u) , Image version is same, upgrade is not required
```

The following example displays a module that needs to be updated.

```
switch# install mod 2 image
SW version of linecard image in Supervisor = 1.0(3)
Module 2 : SW version = 1.0(4u) , Non disruptive image upgrade is possible
Starting non disruptive upgrade of module 2
Feb  3 02:37:13 switch %LC-2-MSG:SLOT2 LC-2-IMG_DNLD_STARTED:  Module image
download process. Please wait until completion...
Feb  3 02:37:33 switch %LC-2-MSG:SLOT2 LC-2-IMG_DNLD_COMPLETE:  Module image
download process. Download successful.
Module 2 upgrade successful
```

This command updates the specified switching module using the image version that is running on the active supervisor module.

Quick, One-Step Upgrade

To perform a quick, one-step upgrade on a Cisco MDS 9000 Family switch, follow these steps:

Step 1   Copy the kickstart and system image files to the required location (see the).

Step 2   Set the boot variables (see the).

Step 3   Issue the **reload** command. The **reload** command reboots the system. This upgrade is disruptive.

🔎

Tip   Use the **install all** command to gracefully reload the switch and handle configuration conversions.

Recovering a Corrupted Bootflash

All switch configurations reside in the internal bootflash. If you have a corrupted internal bootflash, you could potentially lose your configuration. Be sure to save and back up your configuration files periodically.

The regular switch boot goes through the following sequence (see Figure 5-2):

1. The basic input/output system (BIOS) loads the boot loader.

2. The boot loader loads the kickstart image into RAM and starts the kickstart image.

3. The kickstart image loads and starts the system image.

4. The system image reads the startup configuration file.

Figure 5-2   Regular Boot Sequence
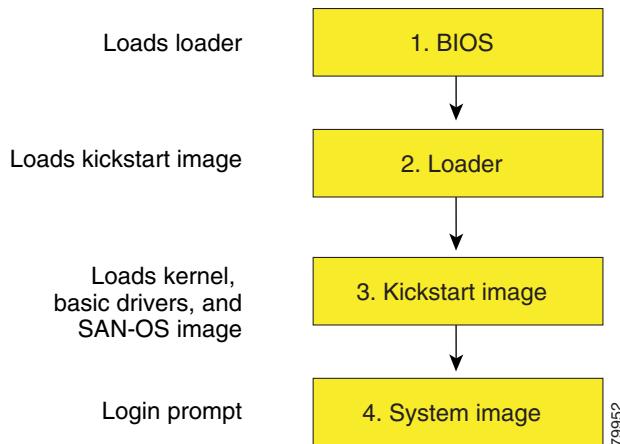
If the images on your switch are corrupted and you are not able to proceed (error state), you can determine the reason and attempt to interrupt the switch boot sequence and recover the image by entering the BIOS configuration utility described in the following section. Access this utility only when needed to recover a corrupted internal disk.

Caution   The BIOS changes explained in this section are required only if you need to recover a corrupted bootflash.

Recovery procedures require the regular sequence to be interrupted. The internal switch sequence goes through four phases between the time you turn the switch on and the time the switch prompt appears on your terminal—BIOS, boot loader, Kickstart, and system (see Table 5-2 and Figure 5-3).

Table 5-2   Recovery Interruption

Phase	Normal Prompt[1]	Recovery Prompt[2]	Description
BIOS	`loader>`	`No bootable device`	The BIOS begins the power-on self test, memory test, and other operating system applications. While the test is in progress, press **Ctrl-C** to enter the BIOS configuration utility and use the netboot option.
Boot loader	`Starting kickstart`	`loader>`	The boot loader uncompresses loaded software to boot an image using its file name as reference. These images are made available through bootflash. When the memory test is over, press **Esc** to enter the boot loader prompt[3].
Kickstart	`Uncompressing system`	`switch(boot)#`	When the boot loader phase is over, press **Ctrl-]** [4](Control key plus right bracket key**)** to enter the `switch(boot)#` prompt. If the corruption causes the console to stop at this prompt, copy the system image and reboot the switch.
System	`Login:`	—	The system image loads the configuration file of the last saved running configuration and returns a switch login prompt.

1. This prompt or message appears at the end of each phase.
2. This prompt or message appears when the switch cannot progress to the next phase.
3. To remain at the loader prompt, be sure to disable the **auto-sync** option.
4. Depending on your telnet client, these keys may differ. Refer to the documentation provided by your telnet client.

Figure 5-3   Regular and Recovery Sequence
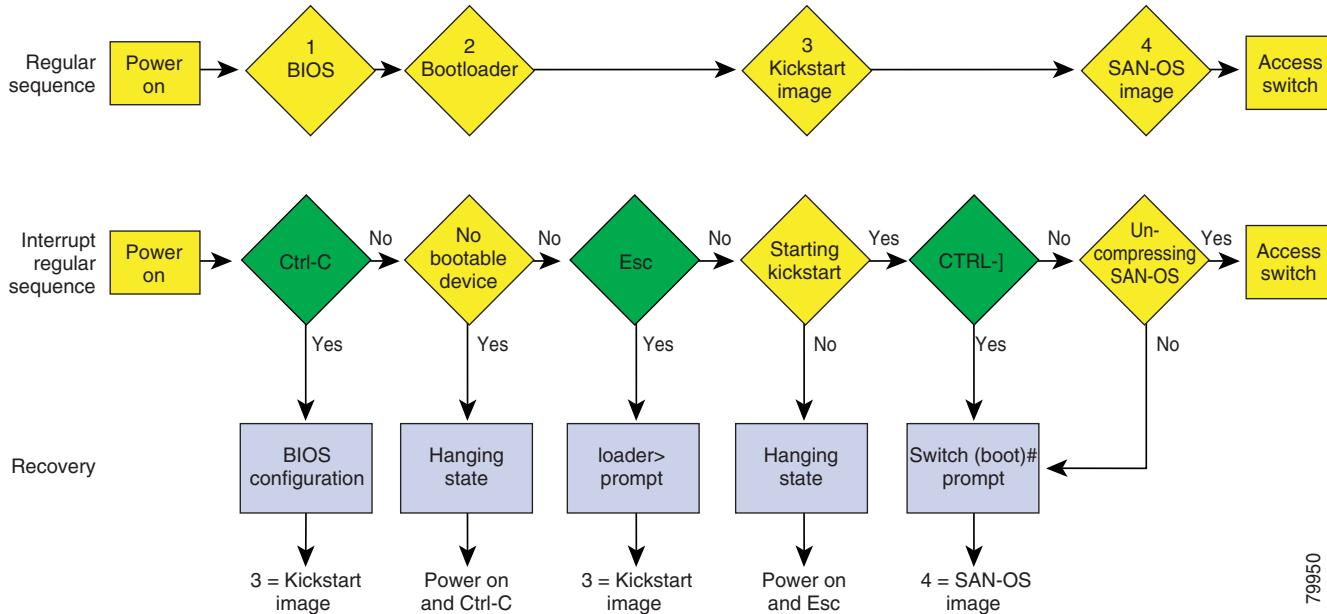
Recovery Using BIOS Setup

To recover a corrupted bootflash image (`no bootable device found` message) for a switch with a single supervisor module, follow these steps:

Step 1   Connect to the console port of the required switch.

Step 2   Boot or reboot the switch.

Step 3   Press **Ctrl-C** to interrupt the BIOS setup during the BIOS memory test.

You see the netboot BIOS Setup Utility screen (see).

Figure 5-4   *BIOS Setup Utility*


```
+-------------------------------------------------------------------+
|                   System BIOS Setup - Utility v1.0                |
|            (C) 2002 General Software, Inc. All rights reserved     |
+-------------------------------------------------------------------+
|                                                                   |
|                                                                   |
|                                                                   |
|                    >Basic CMOS Configuration                      |
|                    Reset CMOS to last known values                |
|                    Reset CMOS to factory defaults                 |
|                       Write to CMOS and Exit                      |
|                     Exit without changing CMOS                    |
|                                                                   |
+-------------------------------------------------------------------+
|          ^E/^X/<Tab> to select. <Esc> to continue (no save)       |
|                          www.gensw.com                            |
```

✎
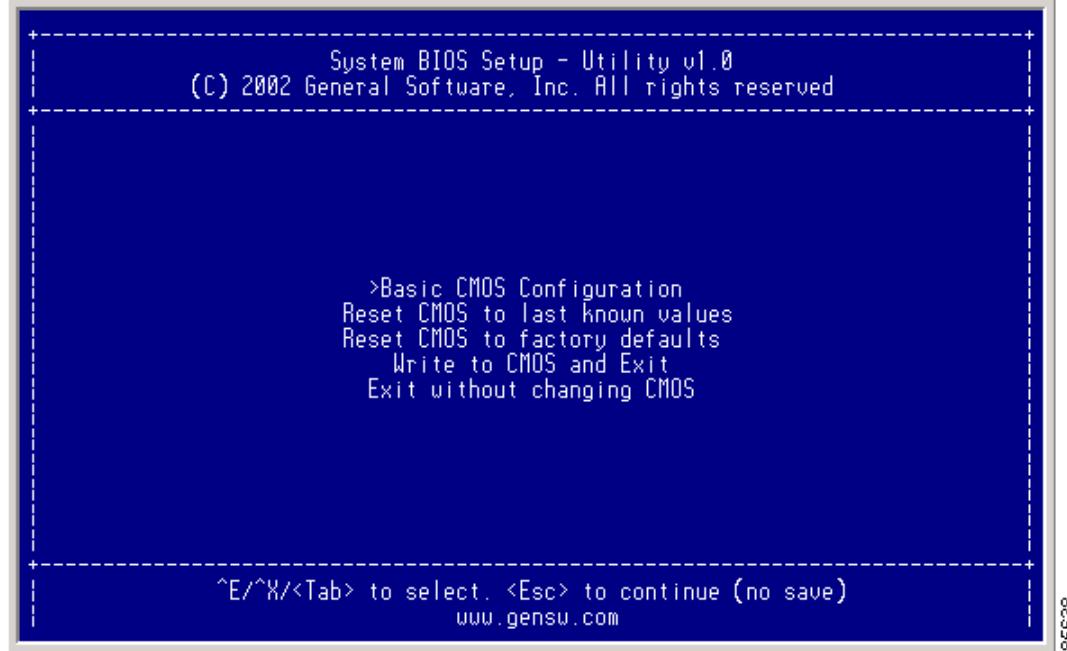
Note   Your navigating options are provided at the bottom of the screen.
Tab = Jump to next field
Ctrl-E = Down arrow
Ctrl-X = Up arrow
Ctrl-H = Erase (Backspace might not work if your terminal is not configured properly.)

Step 4   Press the **Tab** key to select the Basic CMOS Configuration, and press **Enter.**

You see the BIOS setup CMOS Configuration screen (see Figure 5-5).

Figure 5-5   BIOS Setup Configuration (CMOS)
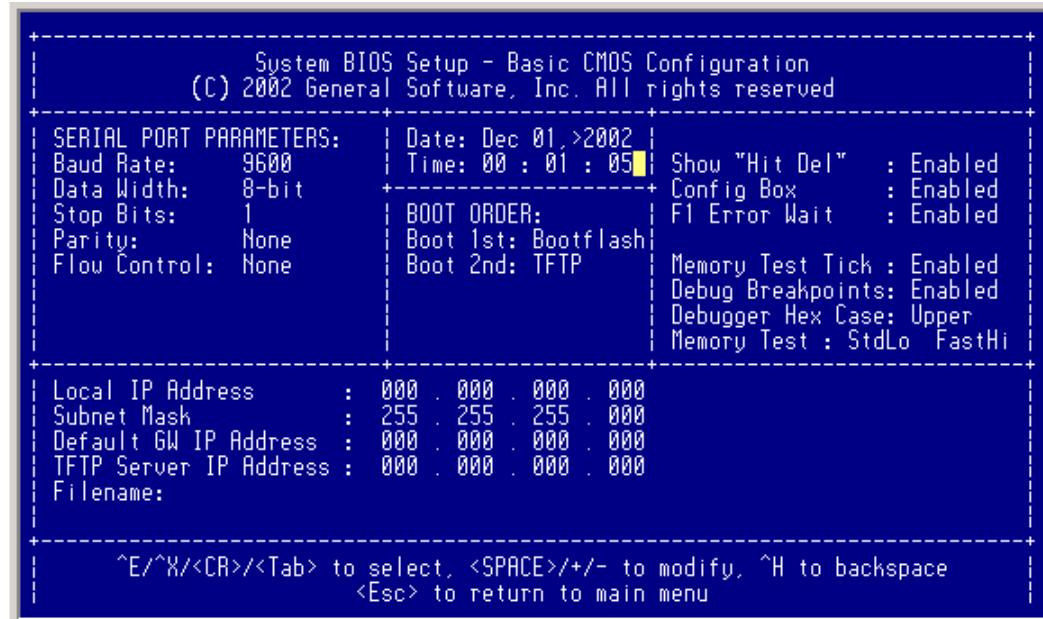
Step 5   Change the "Boot 1st:" field to **TFTP**.

Step 6   Press the **Tab** key until you reach the local IP Address field.

Step 7   Enter the local IP address for the switch, and press the **Tab** key.

Step 8   Enter the subnet mask for the IP address, and press the **Tab** key.

Step 9   Enter the IP address of the default gateway, and press the **Tab** key.

Step 10   Enter the IP address of the TFTP server, and press the **Tab** key.

Step 11   Enter the image name (kickstart), and press the **Tab** key. This path should be relative to the TFTP server root directory.

⚠

Caution   The file name must be entered exactly as it is displayed on your TFTP server. For example, if you have a file name **MDS9500-kiskstart_mzg.10**, then enter this name using the exact upper case characters and file extensions as shown on your TFTP server.

You see the configured changes (see Figure 5-6).

Figure 5-6   BIOS Setup Configuration (CMOS) Changes
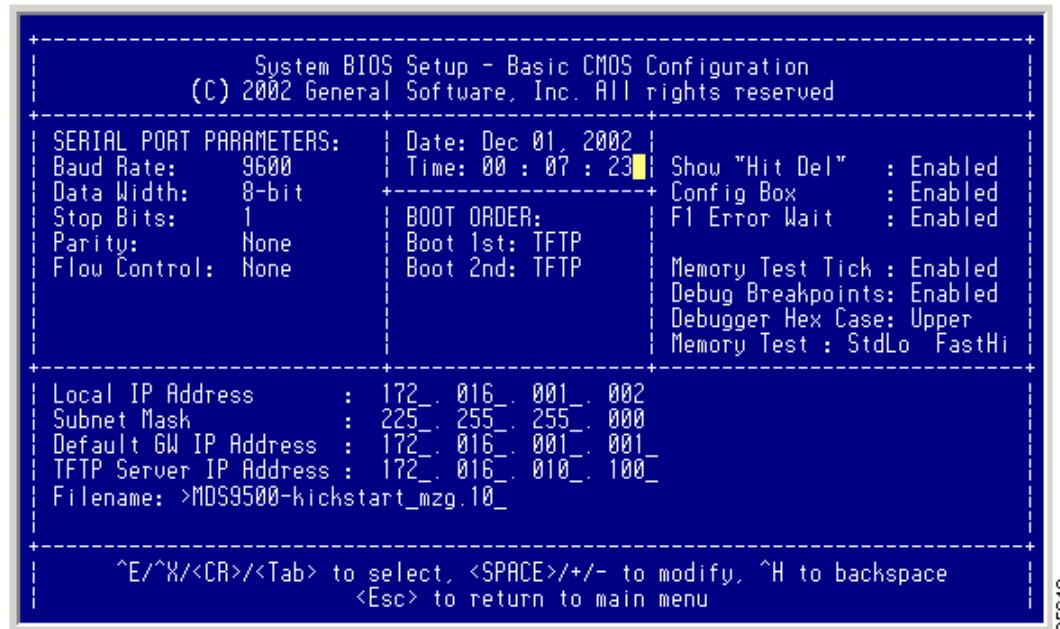
Step 12   Press the **Esc** key to return to the main menu.

Step 13   Choose **Write to CMOS and Exit** from the main screen to save your changes.

> **Note**   These changes are saved in the CMOS.

> **Caution**   The switch must have IP connectivity to reboot using the newly configured values.

You are placed at the following prompt:

```
switch(boot)#
```

Step 14   Enter the **init system** command at the `switch(boot)` prompt, and press **Enter**.

```
switch(boot)# init system
```

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

> **Note**   The **init system** command also installs a new loader from the existing (running) kickstart image.

Step 15   Follow the procedure specified in the "Recovery from the switch(boot)# Prompt" section on page 5-36.

Recovery from the loader> Prompt

To recover a corrupted kickstart image (system error state) for a switch with a single supervisor module, follow these steps:

Step 1   Press the **Esc** key to interrupt the boot loader setup after the BIOS memory test.

✎

Note   Press **Esc** immediately after you see the following message:

```
00000589K Low Memory Passed
00000000K Ext Memory Passed
Hit ^C if you want to run SETUP....
Wait.....
```
If you wait too long, you will skip the boot loader phase and enter the kickstart phase.

You see the `loader>` prompt.

⚠

Caution   The `loader>` prompt is different from the regular `switch#` or `switch(boot)#` prompt. The CLI command completion feature does not work at this prompt and may result in undesired errors. You must type the command exactly as you want the command to appear.

Step 2   Enter the local IP address and the subnet mask for the switch, and press **Enter**.

```
loader> ip address 172.16.1.2 255.255.255.0
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
```

Step 3   Enter the IP address of the default gateway, and press **Enter**.

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

Step 4   Boot the kickstart image file from the required TFTP server, and press **Enter**.

```
loader> boot tftp://172.16.10.100/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.
WARNING: image sync is going to be disabled after a loader netboot
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.

Step 5   Copy the system and kickstart images again.

```
switch(boot)# copy tftp://172.16.10.100/system-img bootflash:system-img
Trying to connect to tftp server......

switch(boot)# copy tftp://172.16.10.100/system-img bootflash:kickstart-img
Trying to connect to tftp server......
```

Step 6   Follow the procedure specified in the "Recovery from the switch(boot)# Prompt" section on page 5-36.

Recovery from the switch(boot)# Prompt

To recover a system image using the kickstart image for a switch with a single supervisor module, follow these steps:

Step 1   Follow this step if you issued a **init system** command. Otherwise, skip to Step 2.

    a.   Change to configuration mode and configure the IP address of the switch's mgmt0 interface.

```
switch(boot)# config t
switch(boot)(config)# interface mgmt0
```

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

```
switch(boot)(config-mgmt0)# ip address 172.16.1.2 255.255.255.0
```

Step 2   Issue the **no shut** command to enable the interface on the switch, and press **Enter**.

```
switch(boot)(config-mgmt0)# no shut
```

Step 3   Follow this step if you issued a **init system** command. Otherwise, skip to Step 4.

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

```
switch(boot)(config-mgmt0)# ip default-gateway 172.16.1.1
```

Step 4   Exit to EXEC mode.

```
switch(boot)(config-mgmt0)# end
```

Step 5   Copy the system image from the required TFTP server, and press **Enter**.

```
switch(boot)# copy tftp://172.16.10.100/system-img bootflash:system-img
Trying to connect to tftp server......
```

Step 6   Copy the kickstart image from the required TFTP server, and press the **Enter** key.

```
switch(boot)# copy tftp://172.16.10.100/system-img bootflash:kickstart-img
Trying to connect to tftp server......
```

Step 7   Verify that the system and kickstart image files are copied to your bootflash: directory.

```
switch(boot)# dir bootflash:
40295206      Aug 05 15:23:51 1980  ilc1.bin
12456448      Jul 30 23:05:28 1980  kickstart-image1
12288         Jun 23 14:58:44 1980  lost+found/
27602159      Jul 30 23:05:16 1980  system-image1
```

```
12447232    Aug 05 15:08:30 1980  kickstart-image2
28364853    Aug 05 15:11:57 1980  system-image2

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

Step 8   Load the system image from the bootflash: directory:

```
switch(boot)# load bootflash:system-image
Uncompressing system image: bootflash:/system-image
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC

MDS Switch
Would you like to enter the initial configuration mode? (yes/no): yes
```

See the "Initial Setup Routine" section on page 3-2.

✎
Note   If you enter **no** at this point, you will return to the `switch#` login prompt, and you must manually configure the switch.

Recognizing Error States

If you see the error messages displayed in Figure 5-7 or Figure 5-8, follow the procedure specified in the "Recovery Using BIOS Setup" section on page 5-32.

Figure 5-7   Error State if Powered On and Ctrl-C is Entered

Figure 5-8   Error State if Powered On and Esc is Pressed
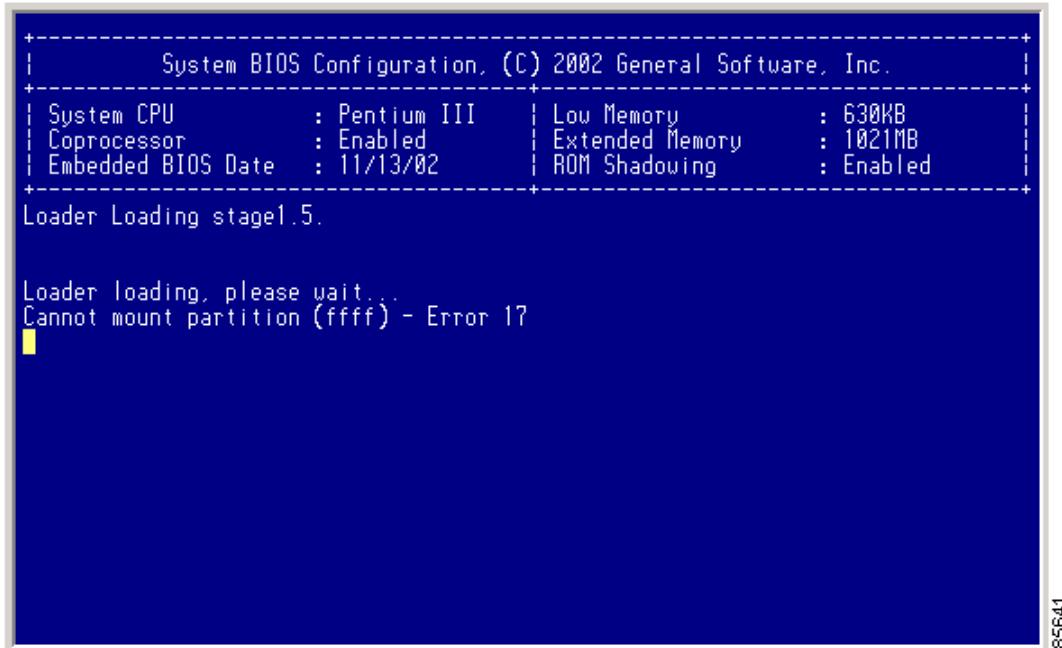
Recovery for Switches with Dual Supervisor Modules

If one supervisor module is functioning and the other is not, boot the functioning supervisor module. Then use the booted supervisor module to bring up the supervisor module that is stuck. Issue the **reload module** *slot* **force-dnld** command (after you log into the switch) where *slot* is the slot number of the stuck supervisor module.

If both supervisor modules are not functioning, treat it like a single supervisor module recovery. First recover the image on one supervisor module and then follow the single supervisor recovery process.

Note   If the **auto-sync** option is disabled, the supervisor modules will not synchronize automatically. In this case, enable the **auto-sync** option to allow the switch to automatically process the **reload module** *slot* **force-dnld** command and synchronize the image. Once the synchronization is complete, disable this option again.

Maintaining Supervisor Modules

This section includes general information about replacing and using supervisor modules effectively.

Replacing a Faulty Supervisor Module

The **auto-sync** option is disabled by default. If you are replacing a faulty supervisor module, ensure that the **auto-sync option** is enabled so the software versions on both modules synchronize automatically.

To replace a faulty supervisor module in a Cisco MDS 9500 Series switch, follow these steps:

Step 1 Create a backup of your existing configuration file, if required (see the "Saving the Configuration" section on page 3-26).

Step 2 Use the **show auto-sync** command in EXEC mode to verify if this option is enabled.

If the **system auto-sync** command is disabled (default), enable this option by continuing with Step 3.

If the **system auto-sync** command is already enabled, skip to Step 4.

Step 3 Change to configuration mode and enable the **auto-sync** option.

```
switch# config t
switch(config)# system auto-sync image
```

Step 4 Replace the faulty supervisor module as specified in the *Cisco MDS 9500 Series Hardware Installation Guide*.

Step 5 Wait till the new supervisor module is online and then ensure that the synchronization was successful using the **show system auto-sync** command.

```
switch(config)# do show system auto-sync
administratively enabled
auto-sync successfully completed
```

Step 6 Disable the **auto-sync** option on the active supervisor module.

```
switch(config)# no system auto-sync image
```

Step 7 Exit to the EXEC mode.

```
switch(config)# exit
```

Standby Supervisor Boot Alert

If a standby supervisor module fails to boot, the active supervisor module detects that conditions and generates a Call Home event and a SYSLOG message approximately 3 to 6 minutes after the standby supervisor module moves to the `loader>` prompt. The following SYSLOG error message is issued:

```
%DAEMON-2-SYSTEM_MSG:Standby supervisor failed to boot up.
```

This error message is also generated if one of the following situations apply:

- you remain at the `loader>` prompt for an extended period of time, or
- you do not set the boot variables appropriately.

Default Factory Settings

Table 5-3 lists the default settings for all Cisco MDS 9000 Family switches.

Table 5-3   ***Default Factory Settings***

Parameters	Default
auto-sync image option	Disabled
Kickstart image	No image is specified
System image	No image is specified