



Software Images

This chapter describes how to install and upgrade software images, and introduces the file system. It includes the following sections:

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- [Software Upgrade Methods, page 10-3](#)
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About Software Images

Each switch is shipped with either a Cisco MDS SAN-OS operating system or with a Cisco FabricWare operating system for Cisco MDS 9000 Family switches. The Cisco FabricWare consists of a single system image. 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.

Dependent Factors

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

- Software images—The kickstart and system image files for Cisco MDS SAN-OS reside in directories or folders that can be accessed from the Cisco MDS 9000 Family switch prompt. The Cisco FabricWare image must reside in the volatile: file system.
- Image version—Each image file has a version.
- Flash disks on the Cisco SAN-OS switch—The bootflash: resides on the supervisor and the CompactFlash disk is inserted into the slot0: device.

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- Supervisor modules—There are single or dual supervisor modules. In the dual supervisor scenario, the standby supervisor module should be updated first.

Essential Upgrade Prerequisites

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

- Customer Service

Before performing any software upgrade, contact your respective customer service representative to review your software upgrade requirements and to provide recommendations based on your current operating environment.



Note If you purchased Cisco support through a Cisco reseller, contact the reseller directly. If you purchased support directly from Cisco Systems, contact Cisco Technical Support at this URL: <http://www.Cisco.com/warp/public/687/Directory/DirTAC.shtml>

- 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 are 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).

- Standby supervisor module bootflash: directory (see the).
- 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 10/100BASE-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.
- Ensure any standby supervisor modules are physically connected with a path to the remote servers.

- Images

- Ensure that the specified Cisco MDS SAN-OS system and kickstart images are 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.
- Retrieve images in one of two ways:
 - Locally—images are locally available on the switch.

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Remotely—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.

- Terminology

Table 10-1 summarizes terms used in this chapter with specific reference to the install and upgrade process.

Table 10-1 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 nondisruptive.	
install-type	reset	Resets the module.
	sw-reset	Resets the module immediately after switchover.
	rolling	Upgrades each module in sequence.
	copy-only	Updates the software for BIOS, loader, or bootrom.

Software Upgrade Methods

You can upgrade software without any disruptions using the Cisco MDS SAN-OS software designed for mission-critical high availability environments. To realize the benefits of nondisruptive upgrades on the Cisco MDS 9500 Directors, we highly recommend that you install dual supervisor modules.

You can upgrade any switch in the Cisco MDS 9000 Family using one of the following methods:

- Automatic - you can use the Fabric Manager Software Install Wizard for Cisco MDS SAN-OS switches as described in the [“Using the Software Install Wizard”](#) section on page 10-4.
- Manual - for information on manual upgrades, refer to the *Cisco MDS 9000 Family Configuration Guide* or the *Cisco MDS 9020 Switch Configuration Guide and Command Reference*.

In some cases, regardless of which process you use, the software upgrades may be disruptive. These exception scenarios can occur under the following conditions:

- A single supervisor system with kickstart or system image changes.
- A dual supervisor system with incompatible system software images.

Determining Compatibility

If the running image and the image you want to install are incompatible, the software reports the incompatibility. In some cases, you may decide to proceed with this installation. If the active and the standby supervisor modules run different versions of the image, both images may be HA compatible in some cases and incompatible in others.

Compatibility is established based on the image and configuration:

- Image incompatibility—The running image and the image to be installed are not compatible.
- Configuration incompatibility—There is a possible compatibility if certain features in the running image are turned off as they are not supported in the image to be installed. The image to be installed is considered incompatible with the running image if one of the following statements is true:

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- An incompatible feature is enabled in the image to be installed and it is not available in the running image and may cause the switch to move into an inconsistent state. In this case, the incompatibility is *strict*.
- An incompatible feature is enabled in the image to be installed and it is not available in the running image and does not cause the switch to move into an inconsistent state. In this case, the incompatibility is *loose*.

Recognizing Failure Cases

The following situations will cause the installation process to end:

- 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 installation procedure is performed on the standby supervisor module.
- If the fabric or switch is configured while the upgrade is in progress.
- If a module is removed 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.



Caution

Avoid ending the switch progress after starting the installation process. If the installation process has ended, be sure to verify the state of the switch at every stage, and wait 10 second before attempting to restart the installation process. If you restart the installation process before waiting 10 seconds, the process will not start and you will see an error message indicating that an installation is currently in progress.

Using the Software Install Wizard

You can use the Software Install Wizard to install Cisco SAN-OS images on supported switches.



Note

The Software Install Wizard does not support Cisco MDS 9020 Fabric Switch or Cisco FabricWare.



Note

Before you use this wizard, be sure the standby supervisor management port is connected.

To use the Software Install Wizard, follow these steps:

- Step 1** Open the Software Install Wizard by clicking on its icon in the toolbar (see [Figure 10-1](#)).

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Figure 10-1 Software Install Wizard Icon



You see the Software Install Wizard.

- Step 2** Select the switches you want to install images on. You must select at least one switch in order to proceed. When finished, click **Next**.
- Step 3** Optionally, check the **Skip Image Download** check box and click **Next** to use images that are already downloaded (the file is already on the bootflash). Proceed to [Step 7](#).
- Step 4** Click on the row under the System, Kickstart, Asm-sfn, or ssi columns to enter image URIs. You must specify at least one image for each switch in order to proceed.
- Step 5** Check the active (and standby, if applicable) bootflash on each switch to see if there is enough space for the new images. You can see this information in the Flash Space column.

This screen shows the active (and standby, if applicable) bootflash space on each switch, and shows the status (whether there is enough space for the new images). If any switch has insufficient space, you cannot proceed. Deselect the switch without enough bootflash by going back to the first screen and unchecking the check box for that switch.

- Step 6** Click **Next**. The Select Download Image page displays.
- Step 7** Double-click the table cell under System, Kickstart, Asm-sfn, or Ssi and select from a drop-down list of images available in bootflash on each switch. You must select at least one image for each switch to proceed.



Note There is no limit on the number of switches you can upgrade. However, the upgrade is a serial process; that is, only a single switch is upgraded at a time.

- Step 8** Click **Next**. The final verification page displays.
- Step 9** Optionally, check **Ignore version check results** to bypass a version check.



Note The version check provides information about the impact of the upgrade for each module on the switch. It also shows any HA-related incompatibilities that might result. You see a final dialog box at this stage, prompting you to confirm that this check should be performed. We recommend that you do not ignore the version check results.



Caution If **Ignore version check results** is checked, the upgrade will proceed even if the current switch version is newer than the version you are installing.

- Step 10** Click **Finish** to start the installation or click **Cancel** to leave the installation wizard without installing new images.

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**Note**

On hosts where the TFTP server cannot be started, a warning is displayed. The TFTP server may not start because an existing TFTP server is running or because access to the TFTP port 69 has been denied for security reasons (the default setting on linux). In these cases, you cannot transfer files from the local host to the switch.

**Note**

Before exiting the session, be sure the upgrade process is complete. The wizard will display a status as it goes along. Check the lower left-hand corner of the wizard for the status message **Upgrade Finished**. First, the wizard displays the message **Success** followed a few seconds later by **InProgress Polling**. Then the wizard displays a second message **Success** before displaying the final **Upgrade Finished**.

Upgrading from Cisco MDS SAN-OS 1.3(4a) to 2.0(1b)

To upgrade a switch from 1.3(4a) to 2.0(1b), use Device Manager to copy the image files to bootflash and then use FM to perform the upgrade procedure. This procedure assumes you are using Device Manager 1.3(4a) or higher.

To copy the image files from a server or PC to bootflash, follow these steps:

- Step 1** Start TFTP, FTP, SCP, or SFTP on the server or PC where you have the image files stored.
- Step 2** In Device Manager, select **Admin > Flash Files**. You see the bootflash directory listed for the supervisor's local partition, by default.
- Step 3** Select the device and partition from the dropdown lists for the directory containing the file you want to copy.
- Step 4** Click the **Copy** button to open the Copy dialog box.
- Step 5** Select the protocol you want to use to perform the copy procedure.
- Step 6** Enter the address of the source server.
- Step 7** If necessary, enter your remote username and password on that server.
- Step 8** Click the **...** button after the SourceName field to browse for the source file on your local PC or on the server, depending on the type of copy.
- Step 9** Enter the destination name for the file.

**Note**

If you are copying to Flash, the file name must be of the form
[device>:][<partition>:]<file>

where <device> is a value obtained from FlashDeviceName,
<partition> is obtained from FlashPartitionName
and <file> is any character string that does not have embedded colon characters.

- Step 10** Click **Apply**.

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To upgrade with Fabric Manager, you use the Software Install Wizard. Software upgrades may be disruptive under the following conditions:

- A single supervisor system with kickstart or system image changes.
- A dual supervisor system with incompatible system software images.

**Note**

Before you use the Software Install Wizard, be sure the standby supervisor management port is connected.

To use the Software Install Wizard, follow these steps:

- Step 1** Open the Software Install Wizard by clicking on its icon in the toolbar (see [Figure 10-1](#)).

Figure 10-2 Software Install Wizard Icon



You see the Software Install Wizard.

- Step 2** Select the switches from the list shown, for which you want to upgrade or install images.

You must select at least one switch in order to proceed. When finished, click **Next**.

- Step 3** Specify the new images to use for each switch model.

To use images that are already downloaded (the file is already on the bootflash), check the **Skip Image Download** checkbox.

- Step 4** Double-click the table cell under System, Kickstart, or Asm-sfn to see a dropdown list of images to choose from.

- Step 5** Select an image to use for the upgrade.

You must select at least one image for each switch to proceed.

**Note**

There is no limit on the number of switches you can upgrade. However, the upgrade is a serial process; that is, only a single switch is upgraded at a time.

- Step 6** Start the upgrade.

If you check **version check** before the upgrade process is started, a version check is done. This check provides information about the impact of the upgrade for each module on the switch. It also shows any HA-related incompatibilities that might result. You see a final dialog box at this stage, prompting you to confirm that this check should be performed.

**Caution**

If **version check** is enabled, the upgrade will proceed even if your version is newer than the version you are installing.

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Note

Before exiting the session, be sure the upgrade process is complete. The wizard will display a status as it goes along. Check the lower left-hand corner of the wizard for the status message **Upgrade Finished**. First, the wizard displays the message **Success** followed a few seconds later by **InProgress Polling**. Then the wizard displays a second message **Success** before displaying the final **Upgrade Finished**.

File System Manipulation

All switches in the Cisco MDS 9000 Family have one internal bootflash: that resides in the supervisor or switching module. You have access to two directories within the internal bootflash: file system.

- The volatile: directory provides temporary storage, and it is also the default. Files in temporary storage (volatile:) are erased when the switch reboots.
- The bootflash: (nonvolatile storage) directory provides permanent storage. Files in permanent storage (bootflash:) are preserved through reboots and power outages.

Cisco MDS 9500 Series directors contain an additional external CompactFlash referred to as the slot0: directory. The external CompactFlash, an optional device for MDS 9500 Series directors, can be used for storing software images, logs, and core dumps.

You can use Device Manager to perform the following functions to help you manage software image files and configuration files:

- [Listing the Files in a Directory, page 10-8](#)
- [Creating a Directory, page 10-8](#)
- [Deleting an Existing File or Directory, page 10-9](#)
- [Copying Files, page 10-9](#)
- [Performing Other File Manipulation Tasks, page 10-10](#)

Listing the Files in a Directory

To list the files in a directory using Device Manager, follow these steps:

-
- Step 1** Select **Admin > Flash Files**. By default, you see the bootflash: directory listed for the supervisor's local partition.
- Step 2** Select the device and partition from the drop-down lists for the directory you want to view. You see a list of files and directories.
-

Creating a Directory

To create a directory using Device Manager, follow these steps:

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-
- Step 1** Select **Admin > Flash Files**. By default, you see the bootflash: directory listed for the supervisor's local partition.
- Step 2** Select the device and partition from the drop-down lists for the directory where you want to create the new directory.
- Step 3** Click the ... button to create a new directory.
You see the Create New Directory dialog box.
- Step 4** Enter the name of the new directory, and click **OK**.
You see the new directory in the directory listing.



Tip Any directory saved in the volatile: file system is erased when the switch reboots.

Deleting an Existing File or Directory

To delete a file or directory using Device Manager, follow these steps:

-
- Step 1** Select **Admin > Flash Files**. By default, you see the bootflash: directory listed for the supervisor's local partition.
- Step 2** Select the device and partition from the drop-down lists for the directory containing the file or directory you want to delete.
- Step 3** Click to select the file or directory you want to delete.
- Step 4** Click the **Delete** button to delete the file or directory.



Caution If you specify a directory, the **delete** command deletes the entire directory and all of its contents.

Copying Files

To copy a file using Device Manager, follow these steps:

-
- Step 1** Select **Admin > Flash Files**. By default, you see the bootflash: directory listed for the supervisor's local partition.
- Step 2** Select the device and partition from the drop-down lists for the directory containing the file you want to copy.
- Step 3** Click the **Copy** button. You see the Copy dialog box.
- Step 4** Select the protocol you want to use to perform the copy procedure.
- Step 5** Enter the address of the source server (Flash to Flash copy only).

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Step 6 Click the ... button to browse for the source file on your local PC or on the server, depending on the type of copy.



Note If you are copying from Flash, the file name must be of the form [device:][<partition>:]<file>

where <device> is a value obtained from FlashDeviceName, <partition> is a value obtained from FlashPartitionName and <file> is the name of a file in Flash.

Step 7 Enter the destination name for the file.



Note If you are copying to Flash, the file name must be of the form [device:][<partition>:]<file>

where <device> is a value obtained from FlashDeviceName, <partition> is a value obtained from FlashPartitionName and <file> is any character string that does not have embedded colon characters.

Step 8 Click **Apply**.

Performing Other File Manipulation Tasks

To perform the following CLI-specific tasks, refer to the *Cisco MDS 9000 Family Configuration Guide*:

- Displaying file contents
- Displaying the last line in a file
- Saving output to a file
- Moving files
- Compressing and uncompressing files
- Executing commands specified in a script
- Setting the delay time