



Using the Cisco IOS Integrated File System

The Cisco IOS File System (IFS) feature provides a single interface to all the file systems available on your routing device, including the following:

- Flash memory file systems
- Network file systems (TFTP, rcp, and FTP)
- Any other endpoint for reading or writing data (such as NVRAM, the running configuration, ROM, raw system memory, system bundled microcode, Xmodem, Flash load helper log, modems, and BRI multiplexing device [mux] interfaces)
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Finding Feature Information

Your software release may not support all the features documented in this module. For the latest feature information and caveats, see the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the Feature Information Table at the end of this document.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Prerequisites for Cisco IOS Integrated File System

- You should have at least a basic familiarity with the Cisco IOS environment and the command-line interface.

- You should have at least a minimal configuration running on your system.

Restrictions for Cisco IOS Integrated File System

- You must have your network up and running, with Cisco IOS Release 12.2 or a later release installed.
- Some of the Cisco IOS configuration commands are only available on certain router platforms, and the command syntax may vary on different platforms.

Information About Cisco IOS Integrated File System

Overview of the IFS

Display and Classify Files

With IFS, all files can be viewed and classified (image, text file, and so on), including files on remote servers. For example, you may want to determine the size and type of an image on a remote server before you copy it to ensure that it is a valid image. You can also display a configuration file on a remote server to verify that it is the correct configuration file before you load the file on the router.

Platform-Independent Commands

With IFS, the file system user interface is no longer platform-specific. Commands have the same syntax, regardless of which platform is used. Thus, you can use the same commands for all of your routers.

However, not all commands are supported on all platforms and file systems. Because different types of file systems support different operations, certain commands are not available for all file systems. Platforms will support commands for the file systems they use.

Minimal Prompting for Commands

IFS minimizes the required prompting for many commands, such as the **copy** EXEC command. You can enter all of the required information in the command line, rather than needing to provide information when the system prompts you for it. For example, if you want to copy a file to an FTP server, on a single line you can specify the specific location on the router of the source file, the specific location of the destination file on the FTP server, and the username and password to use when connecting to the FTP server. However, to have the router prompt you for the needed information, you can still enter the minimal form of the command.

Depending on the current configuration of the **fileprompt** global configuration command and the type of command you entered, the router may prompt you for confirmation, even if you have provided all the information in the command. In these cases, the default value will be the value entered in the command. Press Return to confirm the values.

Create and Navigate Directories

With IFS, you can navigate to different directories and list the files in a directory. On newer platforms, you can create subdirectories in Flash memory or on a disk.

URL Specification for Locating Files

The new file system interface uses Uniform Resource Locators (URLs) to specify the location of a file. URLs are commonly used to specify files or locations on the World Wide Web. However, on Cisco routers, they can now be used to specify the location of files on the router or remote file servers.

On Cisco routers, use URLs in commands to specify the location of the file or directory. For example, if you want to copy a file from one location to another, use the **copy***source-url***destination-url** EXEC command.

The format of URLs used by the routers can vary from the format you may be used to using. There are also a variety of formats that can be used, based on the location of the file.

Files on a Network Server

To specify a file on a network server, use one of the following forms:

- **ftp:** [[// [username[:password@location] /directory] /filename
- **rcp:** [[// [username@location] /directory] /filename
- **tftp:** [[//location] /directory] /filename

The *location* can be an IP address or a host name. The *username* variable, if specified, overrides the username specified by the **iprcmdremote-username** or **ipftpusername** global configuration command. The *password* overrides the password specified by the **ipftppassword** global configuration command.

The file path (directory and filename) is specified relative to the directory used for file transfers. For example, on UNIX file servers, TFTP pathnames start in the /tftpboot directory, and rcp and FTP paths start in the home directory associated with the username.

The following example specifies the file named c7200-j-mz.112-current on the TFTP server named myserver.cisco.com. The file is located in the directory named /tftpboot/master.

```
tftp://myserver.cisco.com/master/c7200-j-mz.112-current
```

The following example specifies the file named mill-config on the server named enterprise.cisco.com. The router uses the username liberty and the password secret to access this server via FTP.

```
ftp://liberty:secret@enterprise.cisco.com/mill-config
```

Local Files

Use the *prefix:directory/filenamesyntax* to specify a file located on the router. You can use this form to specify a file in Flash memory or NVRAM.

For example, **nvrाम:startup-config** specifies the startup configuration in NVRAM, and **flash:configs/backup-config** specifies the file named backup-config in the configs directory of Flash memory.

When referring to a file system instead of a file, use the *prefix:* form. This form specifies the file system itself, rather than a file in the file system. Use this form to issue commands on file systems themselves, such as commands to list the files in a file system or to format the file system.

For example, slot0: can indicate the first Personal Computer Memory Card Industry Association (PCMCIA) Flash memory card in slot 0.

URL Prefixes

The URL prefix specifies the file system. The list of available file systems differs by platform and operation. Refer to your product documentation or use the **showfilesystems EXEC** command to determine which prefixes are available on your platform. File system prefixes are listed in the table below.

Table 1: File System Prefixes

Prefix	File System
bootflash:	Boot Flash memory.
disk0:	Rotating media.
flash:	Flash memory. This prefix is available on all platforms. For platforms that do not have a device named flash:, the prefix flash: is aliased to slot0:. Therefore, you can use the prefix flash: to refer to the main Flash memory storage area on all platforms.
flh:	Flash load helper log files.
ftp:	FTP network server.
null:	Null destination for copies. You can copy a remote file to null to determine its size.
nvram:	NVRAM.
rcp:	Remote copy protocol network server.
slavebootflash:	Internal Flash memory on a slave RSP card of a router configured for high system availability (HSA).
slavenvram:	NVRAM on a slave Route/Switch Processor (RSP) card of a router configured for HSA.
slaveslot0:	First PCMCIA card on a slave RSP card of a router configured for HSA.
slaveslot1:	Second PCMCIA card on a slave RSP card of a router configured for HSA.
slot0:	First PCMCIA Flash memory card.

Prefix	File System
slot1:	Second PCMCIA Flash memory card.
system:	Contains the system memory, including the running configuration.
tftp:	TFTP network server.
xmodem:	Obtain the file from a network machine using the Xmodem protocol.
ymodem:	Obtain the file from a network machine using the Ymodem protocol.

**Note**

Maintenance Operation Protocol (MOP) servers are no longer supported as file systems.

In all commands, the colon is required after the file system name. However, commands that did not require the colon previously will continue to be supported, although they will not be available in the context-sensitive help.

URL Prefix for Partitioned Devices

For partitioned devices, the URL prefix includes the partition number. The syntax is *device:partition-number:* for the prefix on a partitioned device.

For example, `flash:2:` refers to the second partition in Flash memory.

URL Component Lengths

The table below lists the maximum lengths in characters of the different URL components.

Table 2: URL Component Lengths

Component	Length (Number of Characters)
Prefix	31
Username	15
Password	15
Hostname	31
Directory	63
Filename	63

URLs in Commands

Depending on which command you are using, different file systems are available. Some file systems can only serve as a source for files, not a destination. For example, you cannot copy to another machine using Xmodem. Other operations, such as **format** and **erase**, are only supported by certain file systems on certain platforms.

The following sections describe the use of for using URLs in commands:

File Systems Supporting a Command

Use the context-sensitive help to determine which file systems can be used for a particular command. In the following example, the context-sensitive help displays which file systems can be used as sources for the **copy EXEC** command. The output will vary based on the platform.

```
Router# copy ?
/erase      Erase destination file system.
bootflash:  Copy from bootflash: file system
flash:      Copy from flash: file system
ftp:        Copy from ftp: file system
null:       Copy from null: file system
nvram:      Copy from nvram: file system
rcp:        Copy from rcp: file system
system:     Copy from system: file system
tftp:       Copy from tftp: file system
```

Default File System

For most commands, if no file system is specified, the file is assumed to be in the default directory, as specified by the **cd** command.

```
Router# pwd
slot0:
Router# dir
Directory of slot0:/

 1 -rw-      4720148   Aug 29 1997 17:49:36 hampton/nitro/c7200-j-mz
 2 -rw-      4767328   Oct 01 1997 18:42:53 c7200-js-mz
 5 -rw-         639   Oct 02 1997 12:09:32 foo
 7 -rw-         639   Oct 02 1997 12:37:13 the_time

20578304 bytes total (3104544 bytes free)
Router# cd nvram:
Router# dir
Directory of nvram:/

 1 -rw-          2725           <no date> startup-config
 2 ----           0           <no date> private-config
 3 -rw-          2725           <no date> underlying-config

129016 bytes total (126291 bytes free)
```

Tab Completion

You can use tab completion to reduce the number of characters you need to type for a command. Type the first few characters of the filename, and press the Tab key. If the characters are unique to a filename, the router will complete the filename for you. Continue entering the command as normal and press Return to execute the command.

In the following example, the router completes the filename `startup-config` because it is the only file in the `nvr` file system that starts with “s”:

```
Router# show file info nvr:s<tab>
Router# show file info nvr:startup-config<Enter>
```

If you use tab completion without specifying any characters, the router uses the first file in the file system.

```
Router# show file info nvr:<tab>
Router# show file info nvr:private-config<Enter>
```

List of Files in a File System

For many commands, you can get a listing of the files in a file system on the router by using the context-sensitive help. In the following example, the router lists the files in NVRAM:

```
Router# show file info nvr:?
nvr:private-config nvr:startup-config nvr:underlying-config
```

Remote File System Management

On remote file systems (file systems on FTP, rcp, or TFTP servers) you can perform the following tasks:

- View the contents of a file with the **more** EXEC command.
- Copy files to or from the router using the **copy** EXEC command.
- Display information about a file using the **showfileinformation** EXEC command.



Note You cannot delete files on remote systems.

NVRAM File System Management

On most platforms, NVRAM contains the startup configuration. On Class A Flash file system platforms, the `CONFIG_FILE` environment variable specifies the location of the startup configuration. However, the file URL `nvr:startup-config` always specifies the startup configuration, regardless of the `CONFIG_FILE` environment variable.

You can display the startup-config (with the **morenvr:startup-config** EXEC command), replace the startup config with a new configuration file (with the **copysource-urlnvr:startup-config** EXEC command), save the startup configuration to another location (with the **copynvr:startup-configdestination-url** EXEC

command), and erase the contents of NVRAM (with the **erasenvram:EXEC** command). The **erasenvram:** command also deletes the startup configuration if another location is specified by the CONFIG_FILE variable.

System File System Management

The “system” file system contains the system memory and the current running configuration. You can display the current configuration (with the **showrunning-config** or **moresystem:running-config** EXEC command), save the current configuration to another location (with the **copysystem:running-configdestination-url** EXEC command), and add configuration commands to the current configuration (with the **copysource-urlsystem:running-config** EXEC command).

Flash Memory File System Types

Cisco platforms use one of the following three different Flash memory file system types:

- [Class A Flash File Systems](#)
- [Managing Files on Class B Flash File Systems](#)
- [Managing Files on Class C Flash File Systems](#)

The methods used for erasing, deleting, and recovering files depend on the class of the Flash file system. Some commands are supported on only one or two file system types. The command reference documentation notes commands that are not supported on all file system types.

See the table below to determine which Flash memory file system type your platform uses.

Table 3: Flash Memory File System Types

Type	Platforms
Class A	Cisco 7000 series (including the Cisco 7500 series), Cisco 12000 Gigabit Switch Router (GSR), LS1010
Class B	Cisco 1003, Cisco 1004, Cisco 1005, Cisco 2500 series, Cisco 3600 series, Cisco 4000 series, Cisco AS5200
Class C	Cisco MC3810, disk0 of SC3640

Class A Flash File Systems

On Class A Flash file systems, you can delete individual files using the **delete** EXEC command and later recover these files with the **undelete** EXEC command. The **delete** command marks the files as “deleted,” but the files still take up space in Flash memory. To permanently delete the files, use the **squeeze** EXEC command. The **squeeze** command removes all of the files marked “deleted” from the specified Flash memory device. These files can no longer be recovered. To erase all of the files on a Flash device, use the **format** EXEC command.

Class B Flash File Systems

On Class B Flash file systems, you can delete individual files with the **delete** EXEC command. The **delete** command marks the file as “deleted.” The file is still present in Flash memory and takes up space. To recover the file, use the **undelete** EXEC command. To reclaim any space in Flash memory, you must erase the entire Flash file system with the **erase** EXEC command.

Class C Flash File Systems

On Class C Flash memory file systems, you can delete individual files with the **delete** EXEC command. Files cannot be reclaimed once they have been deleted. Instead, the Flash file system space is reclaimed dynamically. To erase all of the files in Flash, use the **format** EXEC command.

How to Manage Cisco IOS Integrated File Systems

Listing Available File Systems

Not all file systems are supported on every platform. To list the file systems available on your platform, complete the task in this section:

Command	Purpose
<p style="text-align: center;">show file systems</p> <pre>Router> show file systems</pre>	<p>Lists the file systems available on your platform. This command also displays information about each file system.</p>

Setting the Default File System

To set a default file system, complete the task in this section:

Command	Purpose
<pre> cd filesystem : Router> cd slot0: </pre>	<p>Sets a default Flash memory device.</p> <p>Note You can specify the file system or directory that the system uses as the default file system. Setting the default file system allows you to omit an optional <i>filesystem:</i> argument from related commands. For all EXEC commands that have an optional <i>filesystem:</i> argument, the system uses the file system specified by the cd EXEC command when you omit the optional <i>filesystem:</i> argument. For example, the dirEXEC command contains an optional <i>filesystem:</i> argument and displays a list of files on the file system.</p>

Examples

The following example sets the default file system to the Flash memory card inserted in slot 0:

```
cd slot0:
```

Displaying the Current Default File System

To display the current default file system, as specified by the **cd** EXEC command, complete the task in this section:

Command	Purpose
<pre> pwd Router> pwd </pre>	<p>Displays the current file system.</p>

Examples

The following example shows that the default file system is slot 0:

```
Router> pwd
slot0:
```

The following example uses the **cd** command to change the default file system to system and then uses the **pwd** command to verify that the default file system was changed:

```
Router> cd system:

Router> pwd
system:
```

Displaying Information About Files on a File System

To display information about files on a file system, complete the tasks in this section:

SUMMARY STEPS

1. **enable**
2. **dir** [/all] [filesystem:][filename]
3. **show file systems**
4. **show file information** file-url
5. **show file descriptors**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	dir [/all] [filesystem:][filename] Example: Router# dir /all	Displays a list of files on a file system.
Step 3	show file systems Example: Router# show file system	Displays detailed information about each of the files on a file system.
Step 4	show file information file-url Example: Router# show file system 10.1.1.1	Displays information about a specific file.

	Command or Action	Purpose
Step 5	show file descriptors Example: Router# show file descriptors	Displays a list of open file descriptors.

Displaying a File

Examples

The following example compares the different commands used to display information about files for the PCMCIA card in the first slot. Notice that deleted files appear in the **dir/all** command output but not in the **dir** command output.

```
Router# dir slot0:
Directory of slot0:/

 1 -rw-      4720148   Aug 29 1997 17:49:36 hampton/nitro/c7200-j-mz
 2 -rw-      4767328   Oct 01 1997 18:42:53 c7200-js-mz
 5 -rw-         639    Oct 02 1997 12:09:32 foo
 7 -rw-         639    Oct 02 1997 12:37:13 the_time

20578304 bytes total (3104544 bytes free)
Router# dir /all slot0:
Directory of slot0:/

 1 -rw-      4720148   Aug 29 1997 17:49:36 hampton/nitro/c7200-j-mz
 2 -rw-      4767328   Oct 01 1997 18:42:53 c7200-js-mz
 3 -rw-      7982828   Oct 01 1997 18:48:14 [rsp-jsv-mz]
 4 -rw-         639    Oct 02 1997 12:09:17 [the_time]
 5 -rw-         639    Oct 02 1997 12:09:32 foo
 6 -rw-         639    Oct 02 1997 12:37:01 [the_time]
 7 -rw-         639    Oct 02 1997 12:37:13 the_time

20578304 bytes total (3104544 bytes free)
Router# show slot0:
-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time----- name
 1  .. unknown 317FBA1B 4A0694 24 4720148 Aug 29 1997 17:49:36 hampton/nitz
 2  .. unknown 9237F3FF 92C574 11 4767328 Oct 01 1997 18:42:53 c7200-js-mz
 3  .D unknown 71AB01F1 10C94E0 10 7982828 Oct 01 1997 18:48:14 rsp-jsv-mz
 4  .D unknown 96DACD45 10C97E0 8 639 Oct 02 1997 12:09:17 the_time
 5  .. unknown 96DACD45 10C9AE0 3 639 Oct 02 1997 12:09:32 foo
 6  .D unknown 96DACD45 10C9DE0 8 639 Oct 02 1997 12:37:01 the_time
 7  .. unknown 96DACD45 10CA0E0 8 639 Oct 02 1997 12:37:13 the_time

3104544 bytes available (17473760 bytes used)
```

Troubleshooting Tips

You can display a list of the contents of a file system before manipulating its contents. For example, before copying a new configuration file to Flash memory, you may want to verify that the file system does not already contain a configuration file with the same name. Similarly, before copying a Flash configuration file to another location, you may want to verify its filename for use in another command.

Displaying a File

To display the contents of any readable file, including a file on a remote file system, complete the task in this section:

SUMMARY STEPS

1. **enable**
2. **more** [ascii | binary | ebcdic | tftp] *file-location*

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	more [ascii binary ebcdic tftp] <i>file-location</i> Example: Router# more tftp://serverA/hampton/savedconfig	Displays the specified file.

Examples

The following example displays the contents of a configuration file on a TFTP server:

```
Router# more tftp://serverA/hampton/savedconfig
!
! Saved configuration on server
!
version 11.3
service timestamps log datetime localtime
service linenumber
service udp-small-servers
service pt-vty-logging
!
end
```

Managing Files on a Class A Flash File Systems

Deleting Files on a Flash Memory Device

To delete a file from a specified Flash memory device, complete the task in this section:

SUMMARY STEPS

1. **enable**
2. **delete** *[device:]filename*

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	delete <i>[device:]filename</i> Example: Router# delete slot0:myconfig	Deletes a file from a Flash memory device. Note When you no longer need a file on a Flash memory device, you can delete it. When you delete a file, the router simply marks the file as deleted, but it does not erase the file. This feature allows you to recover a deleted file, as discussed in the following section. You may want to recover a “deleted” image or configuration file if the new image or configuration file becomes corrupted.

Recovering Deleted Files on a Flash Memory Device**Examples**

The following example deletes the file named myconfig from a Flash memory card inserted in slot 0:

```
delete slot0:myconfig
```

Troubleshooting Tips

If you omit the device, the router uses the default device specified by the **cd** EXEC command.

If you attempt to delete the file specified by the CONFIG_FILE or BOOTLDR environment variable, the system prompts you to confirm the deletion. Also, if you attempt to delete the last valid system image specified in the BOOT environment variable, the system prompts you to confirm the deletion.

Recovering Deleted Files on a Flash Memory Device

You can undelete a deleted file. For example, you may want to revert to a previous configuration file because the current one is corrupt. To undelete a deleted file on a Flash memory device, complete the tasks in this section:

SUMMARY STEPS

1. **enable**
2. **dir /all** [*filesystem:*]
3. **undelete index** [*filesystem:*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	dir /all [<i>filesystem:</i>] Example: Router# dir /all	Determines the index of the deleted file.
Step 3	undelete index [<i>filesystem:</i>] Example: Router# undelete 1 slot 0:	Restores a deleted file on a Flash memory device.

Examples

The following example recovers the deleted file whose index number is 1 to the Flash memory card inserted in slot 0:

```
undelete 1 slot0:
```

Troubleshooting Tips

You must undelete a file by its index because you can have multiple deleted files with the same name. For example, the “deleted” list could contain multiple configuration files with the name router-config. You undelete by index to indicate which of the many router-config files from the list to undelete. Use the **dir** command with the **/all** option to learn the index number of the file you want to undelete.

You cannot undelete a file if a valid file with the same name exists. Instead, first delete the existing file and then undelete the file you want. For example, if you had a file with the name router-config and you wanted to use a file with the same name that you had previously deleted, you cannot simply undelete the previous version by index. You must first delete the existing router-config file and then undelete the previous router-config file by index. You can undelete a file as long as the file has not been permanently erased with the **squeeze** EXEC command. You can delete and undelete a file up to 15 times.

Permanently Deleting Files on a Flash Memory Device

When a Flash memory device is full, you may need to rearrange the files so that the space used by the deleted files can be reclaimed. To determine whether a Flash memory device is full, use the **dirEXEC** command. To permanently delete files on a Flash memory device, complete the task in this section:

SUMMARY STEPS

1. **enable**
2. **squeeze *filesystem*** :

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	squeeze <i>filesystem</i> : Example: Router# squeeze slot1:	Permanently deletes all files marked “deleted” on a Flash memory device. Note On Cisco 2600 and 3600 series routers, the entire flash file system needs to be erased once before the squeeze command can be used. After being erased once, the squeeze command should operate properly on the flash file system for the rest of the flash file system’s history.

Troubleshooting Tips

When you issue the **squeeze** command, the router copies all valid files to the beginning of Flash memory and erases all files marked “deleted.” At this point, you cannot recover deleted files, and you can now write to the reclaimed Flash memory space.



Note The squeeze operation can take as long as several minutes because it can involve erasing and rewriting almost an entire Flash memory space.

Permanently Deleting Files on a Cisco 2600 or 3600 Router

To erase an entire flash file system on a Cisco 2600 or 3600 series router, complete the tasks in this section:

SUMMARY STEPS

1. **enable**
2. **no partition** *flash-filesystem:*
3. **erase** *filesystem* :

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	no partition <i>flash-filesystem:</i> Example: Router# no partition <i>flash-filesystem:</i>	Removes all partitions on the specified flash file system. Note The reason for removing partitions is to ensure that the entire flash file system is erased. The squeeze command can be used in a flash file system with partitions after the flash file system is erased once.
Step 3	erase <i>filesystem</i> : Example: Router# erase slot1:	Erases all of the file on the specified flash file system.

Examples

In the following example, the image named c7200-js-mz is deleted and undeleted. Note that the deleted file does not appear in the output for the first **dir** EXEC command, but it appears in the output for the **dir/all** EXEC command.

```
Router# delete slot1:
Delete filename []? c7200-js-mz
Delete slot1:c7200-js-mz? [confirm]
Router# dir slot1:
Directory of slot1:/

No such file

20578304 bytes total (15754684 bytes free)
Router# dir /all slot1:
Directory of slot1:/

 1  -rw-      4823492   Dec 17 1997 13:21:53  [c7200-js-mz]

20578304 bytes total (15754684 bytes free)
Router# undelete 1 slot1:
Router# dir slot1:
Directory of slot1:/

 1  -rw-      4823492   Dec 17 1997 13:21:53  c7200-js-mz
```

```
20578304 bytes total (15754684 bytes free)
```

In the following example, the image is deleted. In order to reclaim the space taken up by the deleted file, the **squeeze** EXEC command is issued.

```
Router# delete slot1:c7200-js-mz
Delete filename [c7200-js-mz]?
Delete slot1:c7200-js-mz? [confirm]
Router# squeeze slot1:
All deleted files will be removed. Continue? [confirm]
Squeeze operation may take a while. Continue? [confirm]
Erasing squeeze log
Squeeze of slot1: complete
Router# dir /all slot1:
Directory of slot1:/
No such file
20578304 bytes total (20578304 bytes free)
```

Troubleshooting Tips

To recompute and verify the checksum of a file in Flash memory on a Class A Flash file system, use the **verify** EXEC command.

Managing Files on Class B Flash File Systems

Deleting Files on a Flash Memory Device

When you no longer need a file on a Flash memory device, you can delete it. When you delete a file, the router simply marks the file as deleted, but it does not erase the file. This feature allows you to recover a deleted file, as discussed in the following section. You may want to recover a “deleted” image or configuration file if the new image or configuration file becomes corrupted. To delete a file from a specified Flash memory device, complete the task in this section:

SUMMARY STEPS

1. **enable**
2. **delete** [*device:*]*filename*

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	delete [<i>device:</i>] <i>filename</i>	Deletes a file from a Flash memory device.

	Command or Action	Purpose
	Example: <pre>Router# delete slot0:myconfig</pre>	Note If you omit the device, the router uses the default device specified by the cd EXEC command. The following example deletes the file named myconfig from a Flash memory card inserted in slot 0: deleteslot0:myconfig

Recovering Deleted Files on a Flash Memory Device

You can undelete a deleted file. For example, you may want to revert to a previous configuration file because the current one is corrupt. To undelete a deleted file on a Flash memory device, complete the tasks in this section:

SUMMARY STEPS

1. **enable**
2. **dir /all** [*filesystem:*]
3. **undelete index** [*filesystem:*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: <pre>Router> enable</pre>	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	dir /all [<i>filesystem:</i>] Example: <pre>Router# dir /all</pre>	Determines the index of the deleted file.
Step 3	undelete index [<i>filesystem:</i>] Example: <pre>Router# undelete 1 slot 0:</pre>	Undeletes a deleted file on a Flash memory device.

Examples

The following example recovers the deleted file whose index number is 1 to the Flash memory card inserted in slot 0:

```
undelete 1 slot0:
```

Troubleshooting Tips

You must undelete a file by its index because you can have multiple deleted files with the same name. For example, the “deleted” list could contain multiple configuration files with the name router-config. You undelete by index to indicate which of the many router-config files from the list to undelete. Use the **dir** command with the **/all** option to learn the index number of the file you want to undelete.

You cannot undelete a file if a valid (undeleted) one with the same name exists. Instead, first delete the existing file and then undelete the file you want. For example, if you had an undeleted version of the router-config file and you wanted to use a previous, deleted version instead, you cannot simply undelete the previous version by index. You must first delete the existing router-config file and then undelete the previous router-config file by index. You can undelete a file as long as the file system has not been permanently erased with the **erase EXEC** command. You can delete and undelete a file up to 15 times.

Erasing Flash Memory

To erase a Flash memory device, use the following command in EXEC mode:

SUMMARY STEPS

1. **enable**
2. **erase *filesystem* :**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	erase <i>filesystem</i> : Example: Router# erase flash:2	Erases the Flash file system. Note In order to reclaim any space taken up by files in Flash memory, you must erase the entire file system using the eraseflash: or erasebootflash: EXEC command. These commands reclaim all of the space in Flash memory, erasing all files, deleted or not, in the process. Once erased, these files cannot be recovered. Before erasing Flash memory, save any files you want to keep in another location (an FTP server, for example). Copy the files back to Flash memory after you have erased the device.

Examples

The following example erases all files in the second partition in Flash memory:

```
Router# erase flash:2
System flash directory, partition 2:
File Length Name/status
  1 1711088 dirt/gate/c1600-i-mz
[1711152 bytes used, 15066064 available, 16777216 total]
Erase flash device, partition 2? [confirm]
Are you sure? [yes/no]: yes
Erasing device... eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee ..erased
```

Troubleshooting Tips

To recompute and verify the checksum of a file in Flash memory on a Class B Flash file system, use the **verify EXEC** command.

Managing Files on Class C Flash File Systems

Deleting Files on a Flash Memory Device

To delete a file from a specified Flash device, complete the task in this section:

SUMMARY STEPS

1. **enable**
2. **delete** [*device:*]*filename*

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	delete [<i>device:</i>] <i>filename</i> Example: Router# delete slot0:myconfig	Deletes a file from a Flash memory device. Note When you no longer need a file on a Flash memory device, you can delete it. When you delete a file on a Class C file system, the file is deleted permanently. The router reclaims the space dynamically.

Examples

The following example permanently deletes the file named myconfig from a Flash memory card inserted in slot 0:

```
delete slot0:myconfig
```

Troubleshooting Tips

If you omit the device, the router uses the default device specified by the **cd** EXEC command.

If you attempt to delete the file specified by the CONFIG_FILE or BOOTLDR environment variable, the system prompts you to confirm the deletion. Also, if you attempt to delete the last valid system image specified in the BOOT environment variable, the system prompts you to confirm the deletion.

Formatting Flash

To format a Class C Flash file system, complete the task in this section:

SUMMARY STEPS

1. **enable**
2. **format** *filesystem*

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	format <i>filesystem</i> Example: Router# format flash:1	Formats a Flash file system. Note If you format a Flash device, all of the files are erased and cannot be recovered.

Troubleshooting Tips

On Class C Flash file systems, you can create a new directory with the **mkdir** EXEC command. To remove a directory from a Flash file system, use the **rmdir** EXEC command.

On Class C Flash file systems, you can rename a file using the **rename** EXEC command.

On Class C Flash file systems, you can check a file system for damage and repair any problems using the **fsck** EXEC command.

Configuration Examples for Cisco IOS Integrated File System

Example startup and NVRAM configuration

The following example displays the startup configuration:

```

nnm3640-2# more nvram:startup-config
Using 2279 out of 129016 bytes
!
! Last configuration change at 10:57:25 PST Wed Apr 22 1998
! NVRAM config last updated at 10:57:27 PST Wed Apr 22 1998
!
version 11.3
service timestamps log datetime localtime
service linenumber
service udp-small-servers
service pt-vty-logging
...
end

```

The following example displays the contents of the NVRAM file system on a Class A Flash file system platform. The file named startup-config is the current startup configuration file, in physical NVRAM or in Flash memory. If the file is located in a Flash memory file system, this entry is a symbolic link to the actual file. The file named underlying-config is always the NVRAM version of the configuration.

```

Router# dir nvram:
Directory of nvram:/

 1  -rw-          2703          <no date>  startup-config
 2  ----           5          <no date>  private-config
 3  -rw-          2703          <no date>  underlying-config

129016 bytes total (126313 bytes free)

```

Example System File System

The following example changes to the “system” file system, displays the contents of the file system, and displays the running configuration:

```

Router# cd ?
bootflash: Directory name
flash:     Directory name
lex:       Directory name
modem:     Directory name
null:      Directory name
nvram:     Directory name
system:    Directory name
vfc:       Directory name
<cr>

Router# cd system:?
system:memory system:running-config system:ucode system:vfiles
Router# cd system:
Router# dir
Directory of system:/
 6  dr-x           0          <no date>  memory
 1  -rw-          7786  Apr 22 2001 03:41:39  running-config
No space information available
nnm3640-2# more system:running-config
!
! No configuration change since last restart

```

```

!
version 12.2
service timestamps log datetime localtime
service linenumber
service udp-small-servers
service pt-vty-logging
!
.
.
.
end

```

On some platforms, the system file system contains microcode in its ucode directory, as follows:

```

Router# dir system:/ucode
Directory of system:/ucode/

 21  -r--      22900          <no date>  aip20-13
 18  -r--      32724          <no date>  eip20-3
 25  -r--     123130          <no date>  feip20-6
 19  -r--      25610          <no date>  fip20-1
 22  -r--       7742          <no date>  fsip20-7
 23  -r--      17130          <no date>  hip20-1
 24  -r--      36450          <no date>  mip22-2
 29  -r--     154752          <no date>  posip20-0
 28  -r--      704688          <no date>  rsp220-0
 20  -r--      33529          <no date>  trip20-1
 26  -r--      939130          <no date>  vip22-20
 27  -r--     1107862          <no date>  vip222-20

No space information available

```