CHAPTER 13

Loading System Images, Software Images, and Configuration Files

This chapter describes how to load and maintain system images, software images, and configuration files.

- System images contain the system software.
- Configuration files contain commands entered to customize the switch function.

The instructions in this chapter describe copying system images from switches to network servers (and vice versa), displaying and comparing different configuration files, and listing the system software version running on the switch. It also explains how to manually load system images from ROM monitor so that you can successfully boot the switch when typical startup processes malfunction.

To benefit most from the instructions and organization of this chapter, your switch must contain a minimal configuration that allows you to interact with the system software. You can create a basic configuration file using the information in the chapter "Initially Configuring the LightStream 1010 ATM Switch."

For a complete description of the commands mentioned in this chapter, refer to the *LightStream 1010 ATM Switch Command Reference* publication.

System Image, Software Image, and Configuration File Load Task List

To load and maintain system images, software images, and configuration files needed for switch startup, complete the tasks in the following sections.

Note The organization of tasks assumes you have a minimal configuration that you want to modify.

The tasks in the first three sections are typical tasks for all switches. Perform the tasks in the remaining sections as needed for your particular switch environment.

- Retrieve System Images and Configuration Files
- Perform General Startup Tasks
- Store System Images and Configuration Files
- Configure a Switch as a Server
- Configure for Other Types of Servers
- Perform Startup Tasks

- Perform Switch Startup Tasks
- Configure the Remote Shell and Remote Copy Functions
- Manually Load a System Image from ROM Monitor

Retrieve System Images and Configuration Files

If you have a minimal configuration that allows you to interact with the system software, you can retrieve other system images and configuration files from a network server and modify them for use in your particular routing environment. This section describes tasks related to retrieving system images and configuration files for modification.

Retrieve System Images and Configuration File Task List

When retrieving system images and configuration files, perform the following tasks. The first two tasks are required; the remaining tasks are optional.

- Copy System Images from a Network Server to Flash Memory
- Copy Configuration Files from a Network Server to the Switch
- Change the Buffer Size for Loading Configuration Files
- Verify the Image in Flash Memory
- Display System Image and Configuration Information
- Reexecute the Configuration Commands in Startup Configuration
- Clear the Configuration Information

Copy System Images from a Network Server to Flash Memory

You can copy system images from a TFTP, rcp, or MOP server. The following sections describe these tasks:

- Copy from a Trivial File Transfer Protocol Server to Flash Memory
- Copy from an rcp Server to Flash Memory
- Copy Configuration Files from a Network Server to the Switch

Refer to the section “Cisco’s Implementation of Environment Variables” for an explanation of the Flash memory card that can be used.

Copy from a Trivial File Transfer Protocol Server to Flash Memory

To copy a system image from a trivial file transfer protocol (TFTP) server to Flash memory, complete the following tasks:

Task		Command
Step 1	Change directory to bootflash.	**cd bootflash:**
Step 2	Make a backup copy of the current system software image.	See the instructions in the section "Copy System Images from Flash Memory to a Network Server" later in this chapter.
Step 3	Copy a system image to Flash memory.	**copy tftp flash** **copy tftp** *file_id*
Step 4	When prompted, enter the IP address or domain name of the server.	*ip-address* or *name*
Step 5	If prompted, enter the filename of the server system image.	*filename*
Step 6	If prompted, enter the Flash memory device that is to receive the copy of the system image.	*device*

Note Be sure there is ample space available before copying a file to Flash memory. Use the **dir** command and compare the size of the file you want to copy to the amount of available Flash memory shown. If the space available is less than the space required by the file you want to copy, the copy process will continue, but the entire file will not be copied into Flash memory. The failure message "buffer overflow - *xxxx/xxxx*" will appear, where *xxxx/xxxx* is the number of bytes read in relation to the number of bytes available.

When you issue the **copy tftp flash** command, the system prompts you for the IP address or domain name of the TFTP server. This server can be another switch serving ROM or Flash system software images. The system then prompts you for the filename of the software image to copy.

For the **copy tftp flash** and **copy tftp** *file_id* commands, when there is free space available in Flash memory, you are given the option of erasing the existing Flash memory before writing onto it. If no free Flash memory space is available, or if the Flash memory has never been written to, the erase routine is required before new files can be copied. The system will inform you of these conditions and prompt you for a response.

The *file_id* argument of the **copy tftp** *file_id* command specifies a device and filename as the destination of the copy operation. You can omit the device, entering only **copy tftp** *filename*. When you omit the device, the system uses the current device specified by the **cd** command. You can choose **bootflash:**, **slot0:**, or **slot1:** as the Flash memory device.

Note Use the **pwd** command to display the current device.

If you attempt to copy a file into Flash memory that is already there, a prompt informs you that a file with the same name already exists. This file is "deleted" when you copy the new file into Flash. The first copy of the file still resides within Flash memory, but it is rendered unusable in favor of the

newest version, and is listed with the "deleted" tag when you use the **show flash** command. If you terminate the copy process, the newer file is marked "deleted" because the entire file was not copied and is not valid. In this case, the original file in Flash memory is valid and available to the system.

The following example shows how to use the **copy tftp flash** command to copy a system image named *ls1010-wi-m_1.1(1) from* Flash memory to a TFTP server. The filename *ls1010-wi-m_1.1(1)* must be entered in lowercase to match the file name in the example; the system is case sensitive. If more than one file of the same name is copied to Flash, regardless of case, the last file copied becomes the valid file.

```
Switch#copy flash tftp
Enter source file name: ls1010-wi-m_1.1(1)
Enter destination file name [ls1010-wi-m_1.1(1)]:
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Address or name of remote host [172.69.1.129]? 171.69.1.129
!
Switch#
```

A series of Cs indicates that a checksum verification of the image is occurring after the image is written to Flash memory.

The following example shows how to copy a system image named *ls1010-wi-m_1.1(1)* into the current Flash configuration in which a file named *ls1010-wi-m_1.1(1)* already exists:

```
Switch#copy tftp flash
Enter source file name: ls1010-wi-m_1.1(1)
Enter destination file name [ls1010-wi-m_1.1(1)]:
5746016 bytes available on device slot0, proceed? [confirm]y
Address or name of remote host [dirt.cisco.com]? 171.69.1.129
Accessing file "ls1010-wi-m_1.1(1)" on dirt.cisco.com ...FOUND
Loading ls1010-wi-m_1.1(1) from 171.69.1.129 (via Ethernet2/0/0): !!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 2247751/4495360 bytes]
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Switch#
```

The screen fills with exclamation points indicates the process is working. A series of Cs characters indicates that a checksum verification of the image is occurring after the image is written to Flash memory.

The following example copies the *switch-config* file from a TFTP server to the Flash memory card inserted in PCMCIA slot 0 of the ATM switch processor (ASP) card. The copied file has the name *backup-config*.

```
Switch#copy tftp:switch-confg slot0:backup-config
1244732 bytes available on device slot0, proceed? [confirm]y
Address or name of remote host [dirt.cisco.com]?
Accessing file "switch-confg" on dirt.cisco.com ...FOUND
Loading switch-confg from 171.69.1.129 (via Ethernet2/0/0): !!
[OK - 5204/10240 bytes]

Switch#
```

You can copy normal or compressed images to Flash memory. You can produce a compressed system image on any UNIX platform using the **compress** command. Refer to your UNIX platform's documentation for the exact usage of the **compress** command.

The following example shows how to copy a system image named *ls1010-wi-m_1.1(1)* into the current Flash configuration:

```
Switch#pwd
bootflash
Switch#copy tftp flash
Enter source file name: ls1010-wi-m_1.1(1)
Enter destination file name [ls1010-wi-m_1.1(1)]:
7602048 bytes available on device bootflash, proceed? [confirm]y
Address or name of remote host [dirt.cisco.com]?
Accessing file "ls1010-wi-m_1.1(1)" on dirt.cisco.com ...FOUND
Loading ls1010-wi-m_1.1(1) from 171.69.1.129 (via Ethernet2/0/0): !!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 2247751/4495360 bytes]
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
```

The screen fills with exclamation points indicates the process is working. A series of Cs characters indicates that a checksum verification of the image is occurring after the image is written to Flash memory. The last line in the sample configuration indicates that the copy was successful.

The **dir** command confirms that the file transfer was successful as in the following example:

```
Switch#dir
-#- -length- -----date/time------ name
1   2247751  May 03 1996 14:32:10 ls1010-wi-m_1.1(1)

5354296 bytes available (2247880 bytes used)
Switch#
```

Copy from an rcp Server to Flash Memory

You can copy a system image from an rcp network server to Flash memory. For the rcp command to execute properly, an account must be defined on the network server for the remote username. You can override the default remote username sent on the rcp copy request by configuring the remote username. For example, if the system image resides in the home directory of a user on the server, you can specify that user’s name as the remote username. The rcp protocol implementation copies the system image from the remote server relative to the directory of the remote username if the remote server has a directory structure, as do UNIX systems.

To copy a system image from an rcp server to Flash memory, complete the following tasks:

Tasks		Command
Step 1	Make a backup copy of the current system software image.	See the instructions in the section "Copy System Images from Flash Memory to a Network Server" later in this chapter.
Step 2	Enter configuration mode from the terminal. This step is required only if you override the default remote username (see Step 3).	**configure terminal**
Step 3	Specify the remote username.	**ip rcmd remote-username** *username*
Step 4	Exit configuration mode.	**^Z**
Step 5	Copy the system image from an rcp server to Flash memory.	**copy rcp flash** **copy rcp** *file_id*
Step 6	When prompted, enter the IP address or domain name of the network server.	*ip-address* or *name*
Step 7	When prompted, enter the filename of the server system image to be copied.	*filename*

The **copy** command automatically displays the Flash memory directory, including the amount of free space. If the file being downloaded to Flash memory is an uncompressed system image, the **copy** command automatically determines the size of the file being downloaded and validates it with the space available in Flash memory.

When you issue the **copy rcp flash** or **copy rcp** *file_id* command, the system prompts you for the IP address or domain name of the server. This server can be another switch serving Flash system software images. The system then prompts you for the filename of the software image to copy. With the **copy rcp flash** command, the system also prompts you to name the system image file that will reside in Flash memory once the copy is complete. You can use the filename of the source file, or you can choose another name.

When free space is available in Flash memory, you are given the option of erasing the existing Flash memory before writing onto it. If no free Flash memory space is available, or if the Flash memory has never been written to, the format routine is required before new files can be copied. The system informs you of these conditions and prompts you for a response. If you accept the erasure, the system prompts you again to confirm before erasing. Note that the Flash memory is erased at the factory before shipment.

If you attempt to copy a file into Flash memory that is already there, a prompt informs you that a file with the same name already exists. The older file is "deleted" when you copy the new file into Flash. The first copy of the file still resides within Flash memory, but it is rendered unusable in favor of the newest version, and is listed with the "deleted" tag when you use the **show flash** command. If you terminate the copy process, the newer file is marked "deleted" because the entire file was not copied. In this case, the original file in Flash memory is valid and available to the system.

The following example shows how to copy a system image named *mysysim1* from the *netadmin1* directory on the remote server named *SERVER1.CISCO.COM* with an IP address of 171.69.1.129 to the switch's Flash memory. To ensure that enough Flash memory is available to accommodate the system image to be copied, the switch software allows you to erase the contents of Flash memory first.

```
Switch1# configure terminal
Switch1(config)# ip rcmd remote-username netadmin1
^Z
Switch#copy rcp flash
Enter source file name: ls1010-wi-m_1.1(1)
Enter destination file name [ls1010-wi-m_1.1(1)]:
3498136 bytes available on device slot0, proceed? [confirm]y
Address or name of remote host [server1.cisco.com]?

Connected to 171.69.1.129
Loading 2247751 byte file ls1010-wi-m_1.1(1):
Connected to 171.69.1.129
Loading 2247751 byte file ls1010-wi-m_1.1(1): !!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!! [OK]
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Switch#
```

The screen fills with exclamation points indicates the process is working.

Note If you enter **n** after the "proceed?" prompt, the copy process stops. If you enter **y** and confirm the copy, the copying routine begins. Be sure to have ample Flash memory space before entering **y** at the proceed prompt.

The following example uses the **copy rcp** *file_id* command to copy the *switch-image* file from a network server using rcp to the Flash memory card inserted in PCMCIA slot 0 of the ASP card:

```
Switch1# configure terminal
Switch1(config)# ip rcmd remote-username netadmin1
^Z
Switch1# copy rcp slot0:switch-image
```

You can copy normal or compressed images to Flash memory. You can produce a compressed system image on any UNIX platform using the **compress** command. Refer to your UNIX platform's documentation for the exact usage of the **compress** command.

Copy Configuration Files from a Network Server to the Switch

You can also copy configuration files from a TFTP server or an rcp server to the switch. You might use this process to restore a configuration file to the switch if you have backed up the file to a server. If you replace a switch and want to use the configuration file that you created for the original switch, you can restore that file instead of recreating it. You can also use this process to copy to the switch a different configuration that is stored on a network server.

The following sections describe these tasks:

- Copy from a TFTP Server to the Switch
- Copy from an rcp Server to the Switch

Copy from a TFTP Server to the Switch

You can copy a configuration file from a TFTP server to the running configuration or to the startup configuration. When you copy a configuration file to the running configuration, you copy to and run the file from RAM.

When you copy a configuration file to the startup configuration, you copy it to the nonvolatile random-access memory (NVRAM). When you copy a file to the startup configuration, you copy the file to a location specified by the CONFIG_FILE environment variable.

To copy a configuration file from a TFTP server to the switch, complete the following tasks:

Task		Command
Step 1	Copy a file from a TFTP server to the switch.	**copy tftp running-config** or **copy tftp startup-config**
Step 2	When prompted, enter the IP address or domain name of the server.	*ip-address* or *name*
Step 3	If prompted, enter the filename of the server system image.	*filename*

Copy from an rcp Server to the Switch

You can copy a configuration file from an rcp server to the local switch. As with TFTP, you can copy the configuration file to the running configuration or to the startup configuration. When you copy a configuration file to the running configuration, you copy to and run the file from RAM.

To copy a configuration file to the startup configuration, you copy it to NVRAM. When you copy a file to the startup configuration, you copy the file to a location specified by the CONFIG_FILE environment variable.

The rcp protocol requires that a client send the remote username on each rcp request to a network server. When you issue a request to copy a configuration file from an rcp network server, the switch sends a default remote username unless you override the default by configuring a remote username. As the default value of the remote username, the switch software sends the remote username associated with the current TTY process, if that name is valid. If the TTY username is invalid, the switch software uses the switch host name as both the remote and local usernames. You can also specify the path of an existing directory along with the remote username.

For the rcp copy request to execute successfully, an account must be defined on the network server for the remote username. If you copy the configuration file from a personal computer used as a file server, the remote host computer must support the remote shell protocol.

Copy a Configuration File to the Running Configuration

You can copy a configuration file from an rcp server to the running configuration.

A host configuration file contains commands that apply to one network server in particular. A network configuration file contains commands that apply to all network servers on a network.

To copy a configuration file from an rcp server to the running configuration, perform the following tasks:

Task		Command
Step 1	Enter configuration mode from the terminal. This step is required only if you override the default remote username (see Step 2).	**configure terminal**
Step 2	Specify the remote username. This step is optional, but recommended.	**ip rcmd remote-username** *username*
Step 3	Exit configuration mode.	**^Z**
Step 4	Using rcp, copy the configuration file from a network server to the switch's running memory.	**copy rcp running-config**
Step 5	When prompted, enter the IP address of the server.	*ip-address*
Step 6	When prompted, enter the name of the configuration file.	*filename*

The following example copies a host configuration file named *host1-confg* from the *netadmin1* directory on the remote server with an IP address of 131.108.101.101, and loads and runs that file on the switch:

```
Switch# configure terminal
Switch(config)# ip rcmd remote-username netadmin1
^Z
Switch# copy rcp running-config
Host or network configuration file [host]?
Address of remote host [255.255.255.255]? 131.108.101.101
Name of configuration file [Switch-confg]? host1-confg
Configure using host1-confg from 131.108.101.101? [confirm]
Connected to 131.108.101.101
Loading 1112 byte file host1-confg:![OK]
Switch#
%SYS-5-CONFIG: Configured from host1-config by rcp from 131.108.101.101
Switch#
```

Copy a Configuration File to the Startup Configuration

You can retrieve the commands stored in a configuration file on a server and write them to the startup configuration.

A host configuration file contains commands that apply to one network server in particular. A network configuration file contains commands that apply to all network servers on a network.

To copy a configuration file from an rcp server to the startup configuration, perform the following tasks:

Task		Command
Step 1	Enter configuration mode from the terminal. This step is required only if you override the default remote username (see Step 2).	**configure terminal**
Step 2	Specify the remote username. This step is optional, but recommended.	**ip rcmd remote-username** *username*
Step 3	Exit configuration mode.	**^Z**
Step 4	Using rcp, copy the configuration file from a network server to the switch's startup configuration.	**copy rcp startup-config**
Step 5	When prompted, enter the IP address of the network server.	*ip-address*
Step 6	When prompted, enter the name of the configuration file.	*filename*

On the LightStream 1010 ATM switch, the **copy rcp startup-config** command copies the configuration file from the network server to the configuration file pointed to by the CONFIG_FILE environment variable. If you want to write the configuration file from the server to NVRAM on the switch, be sure to set the CONFIG_FILE environment variable to NVRAM. Refer to the "Download the CONFIG_FILE Environment Variable Configuration" section in this chapter for instructions on setting the CONFIG_FILE environment variable with the **boot config** command.

The following example specifies a remote username of *netadmin1*. Then it copies a host configuration file *host2-confg* from the *netadmin1* directory on the remote server with an IP address of 171.69.1.129 to the switch's NVRAM.

```
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#ip rcmd remote-username netadmin1
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console
Switch#Switch#copy host2-confg rcp
Remote host []? dirt
Name of configuration file to write [switch-confg]?
Write file switch-confg on host 171.69.1.129? [confirm]
Writing switch-confg !! [OK]
Switch#copy rcp startup-config
Address of remote host [255.255.255.255]? 171.69.1.129
Name of configuration file [switch-confg]?
Configure using switch-confg from 171.69.1.129? [confirm]

Connected to 171.69.1.129
Loading 5393 byte file switch-confg: !! [OK]

Warning: distilled config is not generated
[OK]
Switch#
%SYS-5-CONFIG_NV: Non-volatile store configured from switch-confg by console rcp
 from 171.69.1.129
Switch#
```

Change the Buffer Size for Loading Configuration Files

The buffer that holds the configuration commands is generally the size of NVRAM. Complex configurations might need a larger configuration file buffer size. To change the buffer size, complete the following tasks:

Task		Command
Step 1	Enter configuration mode from the terminal.	**configure terminal**
Step 2	Change the buffer size to use for booting a host or network configuration file from a network server.	**boot buffersize** *bytes*
Step 3	Exit configuration mode.	**^Z**
Step 4	Save the configuration file to your startup configuration. This step saves the configuration to the location specified by the CONFIG_FILE environment variable.	**copy running-config startup-config**

In the following example, the buffer size is set to 50000 bytes:

```
Switch1# configure terminal
Switch1(config)# boot buffersize 50000
^Z
Switch1# copy running-config startup-config
```

Verify the Image in Flash Memory

Before booting from Flash memory, verify that the checksum of the image in Flash memory matches the checksum listed in the README file that was distributed with the system software image. The checksum of the image in Flash memory is displayed at the bottom of the screen when you issue the **copy tftp flash**, **copy rcp flash**, or **copy rcp bootflash** commands. The README file was copied to the network server automatically when you installed the system software image on the server.

Caution If the checksum value does not match the value in the README file, do not reboot the switch. Instead, issue the copy request and compare the checksums again. If the checksum is repeatedly wrong, copy the original system software image back into Flash memory *before* you reboot the switch from Flash memory. If you have a corrupted image in Flash memory and try to boot from Flash, the switch will start the system image contained in ROM (assuming booting from a network server is not configured). If ROM does not contain a fully functional system image, the switch will not function and must be reconfigured through a direct console port connection.

Display System Image and Configuration Information

Perform the following tasks in EXEC mode to display information about system software, system image files, and configuration files:

Task	Command
List the system software release version, configuration register setting, and so on.	**show version**
List the contents of the BOOT environment variable, the name of the configuration file pointed to by the CONFIG_FILE environment variable, and the contents of the BOOTLDR environment variable.	**show boot**
List the startup configuration information. The CONFIG_FILE environment variable points to the startup configuration.	**show startup-config**
List the configuration information stored in a specified file.	**show file** *device*:*filename*
List the configuration information in running memory.	**show running-config**
List information about Flash memory, including system image filenames and amounts of memory used and remaining.	**show flash**
List information about Flash memory, including system image filenames, amounts of memory used and remaining, and Flash partitions.	**show flash** [**all** | **chips** | **detailed** | **err** | **partition** *number* [**all** | **chips** | **detailed** | **err**] | **summary**] **show flash** [**all | chips | filesys**] [*device***:**]

Refer to the *LightStream 1010 ATM Switch Command Reference* for examples of these commands.

You can also use the **o** command in ROM monitor mode to list the configuration register settings.

Reexecute the Configuration Commands in Startup Configuration

On the LightStream 1010 ATM switch, you can reexecute the configuration commands stored in NVRAM. The same command allows you to reexecute the configuration specified by the CONFIG_FILE environment variable.

To reexecute the commands located in the startup configuration, complete the following task in privileged EXEC mode:

Task	Command
Reexecute the configuration commands located in NVRAM. or Configure the switch to reexecute the configuration specified by the CONFIG_FILE environment.	**configure memory**

Clear the Configuration Information

To clear the contents of your startup configuration, perform the following task in EXEC mode:

Task	Command
Clear the contents of your startup configuration. This command erases the configuration specified by the CONFIG_FILE environment variable.	**erase startup-config**

On the LightStream 1010 ATM switch, when you use the **erase startup-config** command, the switch erases or deletes the configuration pointed to by the CONFIG_FILE environment variable. If this variable points to NVRAM, the switch erases NVRAM. If the CONFIG_FILE environment variable specifies a Flash memory device and configuration filename, the switch deletes the configuration file. That is, the switch marks the file as "deleted," rather than erasing it. This feature allows you to recover a "deleted" file. Refer to the "Manage Flash Files" section for more information on recovering deleted files.

To erase a saved configuration from a specific Flash device on a LightStream 1010 ATM switch, complete the following task in EXEC mode:

Task	Command
Erase or delete a specified configuration file on a specified Flash device.	**erase** [*device***:**]*filename* or **delete** [*device***:**]*filename*

As with the **erase startup-config** command, when you erase or delete a specific file, the system marks the file as deleted, allowing you to later recover a "deleted" file. If you omit the device, the switch uses the default device specified by the **cd** command.

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

Note On the LightStream 1010 ATM switch the **erase** [*device***:**]*filename* command differs from the **erase flash** command. The **erase** [*device***:**]*filename* command erases a specified file located in internal Flash memory or on the Flash memory card inserted in the PCMCIA slot. The **erase flash** command erases internal Flash memory.

The following example erases the *myconfig* file from a Flash memory card inserted in PCMCIA slot 0 of the ASP card:

```
Switch# erase slot0:myconfig
```

The following example deletes the *myconfig* file from a Flash memory card inserted in PCMCIA slot 0 of the ASP card:

```
Switch# delete slot0:myconfig
```

Perform General Startup Tasks

When modifying your switching environment, you perform some general startup tasks. For example, to modify a configuration file, you enter configuration mode. You also modify the configuration register boot field to tell the switch if and how to load a system image upon startup. Also, instead of using the default system image and configuration file to start up, you can specify a particular system image and configuration file that the switch uses to start up.

General Startup Task List

General startup tasks include the following:

- Enter Configuration Mode and Select a Configuration Source
- Modify the Configuration Register Boot Field
- Specify the Startup System Image
- Specify the Startup Configuration File

Enter Configuration Mode and Select a Configuration Source

To enter configuration mode, enter the **configure** command at the privileged EXEC prompt. The switch responds with the following prompt asking you to specify the terminal or memory, or a file stored on a network server (network) as the source of configuration commands:

```
Configuring from terminal, memory, or network [terminal]?
```

Each of these methods is described in the following sections:

- Configure the Switch from the Terminal
- Configure the Switch from Memory
- Configure the Switch from the Network
- Copy a Configuration File Directly to the Startup Configuration

The switch accepts one configuration command per line. You can enter as many configuration commands as you want.

You can add comments to a configuration file describing the commands you have entered. Precede a comment with an exclamation point (!). Because comments are *not* stored in NVRAM or in the active copy of the configuration file, comments do not appear when you list the active configuration with the **show running-config** EXEC command. Also, when the startup configuration is NVRAM, comments do not show up when you list the startup configuration with the **show startup-config** EXEC command. Comments are stripped out of the configuration file when it is loaded onto the switch. However, you can list the comments in configuration files stored on a TFTP, rcp, or MOP server.

Configure the Switch from the Terminal

When you configure the switch from the terminal, the switch executes the commands you enter at the system prompts. To configure the switch from the terminal, complete the following tasks:

Task		Command
Step 1	Enter configuration mode and select the terminal option.	**configure terminal**
Step 2	Enter the necessary configuration commands.	See the appropriate chapter for specific configuration commands.
Step 3	Quit configuration mode.	**^Z**
Step 4	Save the configuration file to your startup configuration. This step saves the configuration to the location specified by the CONFIG_FILE environment variable.	**copy running-config startup-config**

In the following example, the switch is configured from the terminal. The comment "The following command provides the switch host name" identifies the purpose of the next command line. The **hostname** command changes the switch name from *switch1* to *switch2*. By pressing **Ctrl**-**Z** (**^Z**), the user quits configuration mode. Finally, the **copy running-config startup-config** command saves the current configuration to the startup configuration.

```
Switch1# configure terminal
Switch1(config)# !The following command provides the switch host name.
Switch1(config)# hostname switch2
^Z
Switch2# copy running-config startup-config
```

When the startup configuration is NVRAM, it stores the current configuration information in text format as configuration commands, *recording only nondefault settings*. The memory is checksummed to guard against corrupted data.

The switch startup software always checks for configuration information in NVRAM. If NVRAM holds valid configuration commands, the switch executes the commands automatically at startup. If the switch detects a problem with NVRAM or the configuration it contains, it enters **setup** mode and prompts for configuration. Problems can include a bad checksum for the information in NVRAM or the absence of critical configuration information. Refer to the chapter "Initially Configuring the LightStream 1010 ATM Switch" for more information on the autoconfiguration facility.

The switch startup software uses the configuration pointed to by the CONFIG_FILE environment variable to start up. When the CONFIG_FILE environment variable does not exist or is null (such as at first-time startup), the switch uses NVRAM as the default startup device. When the switch uses NVRAM to start up and the system detects a problem with NVRAM or the configuration it contains, the switch enters **setup** mode. Refer to the chapter "Initially Configuring the LightStream 1010 ATM Switch" for more information on the autoconfiguration facility. For more information on environment variables, refer to the "Cisco's Implementation of Environment Variables" section in this chapter.

Configure the Switch from Memory

You can configure the switch to execute the commands located in NVRAM or the same command configures the switch to execute the configuration specified by the CONFIG_FILE environment variable.

To configure the switch to execute the commands located in NVRAM or to execute the configuration specified by the CONFIG_FILE environment variable, complete the following task in privileged EXEC mode:

Task	Command
Configure the switch to execute the commands located in NVRAM. or Configure the switch to execute the configuration specified by the CONFIG_FILE environment variable.	**configure memory**

Configure the Switch from the Network

You can configure the switch by retrieving and modifying a configuration file stored on one of your network servers. To do so, complete the following tasks:

Task		Command
Step 1	Enter configuration mode with the network option.	**copy rcp running-config** or **copy tftp running-config**
Step 2	At the system prompt, select a network or host configuration file. The network configuration file contains commands that apply to all network servers and terminal servers on the network. The host configuration file contains commands that apply to one network server in particular.	**host** or **network**
Step 3	At the system prompt, enter the optional IP address of the remote host from which you are retrieving the configuration file.	*ip-address*
Step 4	At the system prompt, enter the name of the configuration file or accept the default name.	*filename*
Step 5	Confirm the configuration filename that the system supplies.	**y**

In the following example, the switch is configured from the file *backup-config* at IP address 171.69.1.129:

```
Switch#copy tftp running-config
Host or network configuration file [host]?
Address of remote host [255.255.255.255]? 171.69.1.129
Name of configuration file [switch-confg]? backup-confg
Configure using backup-confg from 171.69.1.129? [confirm]y
Switch#
%SYS-5-CONFIG: Configured from backup-confg by console tftp from 171.69.1.129
Switch#
```

Copy a Configuration File Directly to the Startup Configuration

You can copy a configuration file directly to your startup configuration without affecting the running configuration. This task loads a configuration file directly into NVRAM without affecting the running configuration or this task loads a configuration file directly into the location specified by the CONFIG_FILE environment variable without affecting the running configuration. If the CONFIG_FILE environment variable specifies NVRAM, the command functions as on all other platforms.

To copy a configuration file directly to the startup configuration, perform the following task in EXEC mode:

Task	Command
Load a configuration file directly into NVRAM or directly into the location specified by the CONFIG_FILE environment variable.	**copy rcp startup-config** or **copy tftp startup-config**

Modify the Configuration Register Boot Field

The configuration register boot field determines whether or not the switch loads an operating system image, and if so, where it obtains this system image. The following sections describe the switch's process for using the configuration register boot field, your process for setting this field, and the tasks you must perform to modify the configuration register boot field.

How the Switch Uses the Boot Field

The lowest four bits of the 16-bit configuration register (bits 3, 2, 1, and 0) form the boot field. The following boot field values determine if the switch loads an operating system and where the switch obtains the system image:

- When the entire boot field equals 0-0-0-0, the switch does not load a system image. Instead, the switch enters ROM monitor or "maintenance" mode from which you can enter ROM monitor commands to manually load a system image.
- When the entire boot field equals a value between 0-0-1-0 and 1-1-1-1, the switch loads the system image specified by **boot system** commands in the startup configuration file. When the startup configuration file does not contain **boot system** commands, the switch loads a default system image stored on a network server.

When loading a default system image from a network server, the switch uses the configuration register settings to determine the default system image filename for booting from a network server. The switch forms the default boot filename by starting with the word *cisco* and then appending the octal equivalent of the boot field number in the configuration register, followed by a hyphen (-) and the processor type name (cisco *nn-cpu*). See the appropriate hardware installation guide for details on the configuration register and default filename.

Set the Boot Field

You must correctly set the configuration register boot field to ensure that your switch loads the operating system image as you intend. See Table 13-1.

Table 13-1 Configuration Register Boot Field Description

Configuration Register	Break Enabled/Disabled[1]	Description
0x000	Enabled	Boot manually.
0x001	Enabled	Boot from ROM.
0x002 through 0x00F	Enabled	Boot from the default filename specified “nn” in boot system configuration.
0x100	Disabled	Boot manually.
0x101	Disabled	Boot from ROM.
0x102 through 0x10F	Disabled	Boot from the default filename specified “nn” in boot system configuration.

1. Enabled allows a hardware break during the first 30 seconds.

To set the boot field, follow this general procedure:

Step 1 Obtain the current configuration register setting. This setting is a hexadecimal value.

Step 2 Modify the current configuration register setting to reflect the way in which you want the switch to load a system image. To do so, change the least significant hexadecimal digit to one of the following:

- 0 to load the system image manually using the **boot** command in ROM monitor mode.
- 1 to load the system image from boot ROMs.
- 2—F to load the system image from **boot system** commands in the startup configuration file or from a default system image stored on a network server.

For example, if the current configuration register setting is 0x101 and you want to load a system image from **boot system** commands in the startup configuration file, you would change the configuration register setting to 0x102.

Step 3 Reboot the switch to make your changes to the configuration register take effect.

Perform the Boot Field Modification Tasks

You modify the boot field from either the hardware configuration register or the software configuration register, depending on the platform.

Use the hardware configuration register to modify the boot field of a LightStream 1010 ATM switch.

To modify the software configuration register boot field, complete the following tasks:

Task		Command
Step 1	Obtain the current configuration register setting.	**show version**
Step 2	Enter configuration mode, selecting the terminal option.	**configure terminal**
Step 3	Modify the existing configuration register setting to reflect the way in which you want the switch to load a system image.	**config-register** *value*
Step 4	Exit configuration mode.	**^Z**
Step 5	Reboot the switch to make your changes take effect.	**reload**

Use the **show version** EXEC command to display the current configuration register setting. In ROM monitor mode, use the **o** command to list the value of the configuration register boot field.

In the following example, the **show version** command indicates that the current configuration register is set so that the switch does not automatically load an operating system image. Instead, it enters ROM monitor mode and waits for user-entered ROM monitor commands. The new setting instructs the switch to load a system image from commands in the startup configuration file or from a default system image stored on a network server.

```
Switch#show version
Cisco Internetwork Operating System Software
IOS (tm) IISP Software (LS1010-WI-M), Version 11.1(1)
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Wed 10-Apr-96 06:11 by
Image text-base: 0x600108C0, data-base: 0x602E8000

ROM: System Bootstrap, Version 11.1(1)

Switch uptime is 18 minutes
System restarted by reload
System image file is "ls1010-wi-m_1.1(1)", booted via tftp from 171.69.1.12
9

cisco ASP1 (R4600) processor with 16384K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
1 Ethernet/IEEE 802.3 interface.
20 ATM network interfaces.
125K bytes of non-volatile configuration memory.

8192K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x0

Switch1# reload
```

Specify the Startup System Image

You can enter multiple boot commands in the startup configuration file or in the BOOT environment variable to provide backup methods for loading a system image onto the switch. There are three ways to load a system image:

- From Flash memory—Flash memory allows you to copy new system images without changing erasable programmable read-only memory (EPROM) ICs. Information stored in Flash memory is not vulnerable to network failures that might occur when loading system images from servers.
- From a network server—In case Flash memory becomes corrupted, specifying a system image to be loaded from a network server using TFTP, rcp, or MOP provides a backup boot method for the switch. You can specify a bootstrap image to be loaded from a network server using TFTP or rcp.

You can enter the different types of boot commands in any order in the startup configuration file or in the BOOT environment variable. If you enter multiple boot commands, the switch tries them in the order they are entered.

Load from Flash Memory

Use the following sections to configure your LightStream 1010 ATM switch to boot from Flash memory. Depending on the hardware platform, Flash memory might be available as EPROMs, single in-line memory modules (SIMMs), or Flash memory cards. Check the appropriate hardware installation and maintenance guide for information about types of Flash memory available on a specific platform.

In the LightStream 1010 ATM switch, Flash memory is located on the ATM switch processor (ASP) card or a Flash memory card inserted in the PCMCIA slots (slot 0 or slot 1). You can store or boot software images in Flash memory as necessary. Flash memory can reduce the effects of network failure by reducing dependency on files that can only be accessed over the network.

Note Booting from ROM is faster than booting from Flash memory. However, if you are booting from a network server, Flash memory is faster and more reliable.

What You Can Do from Flash Memory

Flash memory allows you to do the following:

- Copy the system image to Flash memory using TFTP.
- Copy the system image to Flash memory using rcp.
- Copy a bootstrap image to Flash memory using TFTP or rcp.
- Boot a switch from Flash memory either automatically or manually.
- Copy the Flash memory image to a network server using TFTP or rcp.
- Copy the Flash memory bootstrap image to a network server using TFTP or rcp.

Flash Memory Features

Flash memory features include the following:

- Flash memory can be remotely loaded with multiple system software images through TFTP or rcp transfers (one transfer for each file loaded).
- On the LightStream 1010 ATM switch, 8MB of internal Flash memory storage are provided. Additionally, you can order an optional Flash memory card. Note that the internal Flash and the Flash memory card cannot be used as a contiguous bank of Flash memory.
- You can boot a switch manually or automatically from a system software image stored in Flash memory or you can boot from a network server using TFTP or rcp.
- Flash memory provides write protection against accidental erasing or reprogramming.

Security Precautions

Take the following precautions when loading from Flash memory:

- Flash memory provides write protection against accidental erasing or reprogramming. The write-protect jumper, located next to the Flash components can be removed to prevent reprogramming of internal Flash memory and the Flash memory card inserted in the PCMCIA slot. You must install the jumper when programming is required.
- Flash memory cards contain a write protect switch that you can use to protect data. You must set the switch to *unprotected* to write data to the Flash memory card.
- The system image stored in Flash memory can be changed only from privileged EXEC level on the console terminal.

Flash Memory Configuration Process

To configure your LightStream 1010 ATM switch to boot from Flash memory using a bootstrap image, follow this general procedure:

Step 1 Copy the bootstrap image into Flash memory using rcp or TFTP. See the “Perform Switch Startup Tasks” section for more information on performing this step.

Step 2 Configure your system to automatically boot from Flash memory. You might need to change the configuration register value. See the “Modify the Configuration Register Boot Field” section for more information on modifying the configuration register.

Step 3 Save your configurations.

Step 4 Reboot your system to ensure that all is working as expected.

Flash Memory Configuration Process

For the LightStream 1010 ATM switch, the configuration process is similar to the previous two processes, except you can specify the Flash device that contains the rxboot image. When you receive your LightStream 1010 ATM switch from the factory, ROM contains the rxboot image. You can change the location of this image to a Flash memory card inserted in a PCMCIA slot. To specify the rxboot image Flash device, you set the BOOTLDR environment variable.

Note When no BOOTLDR environment variable exists, the default rxboot image is the first image file in bootflash.

The configuration process is as follows:

Step 1 Set the BOOTLDR environment variable if you want to change the location of the rxboot image that ROM uses for booting.

Step 2 Optionally, use rcp or TFTP to update the system image that resides in internal Flash memory or on one of the Flash memory cards inserted in a PCMCIA slot. Performing this step allows you to update a degraded system image with one that is not degraded.

Step 3 Configure your system to automatically boot from the desired file in Flash memory. You might need to change the configuration register value. See the "Modify the Configuration Register Boot Field" section for more information on modifying the configuration register.

Step 4 Save your configurations.

Step 5 Power-cycle and reboot your system to ensure that all is working as expected.

Perform Flash Memory Configuration Tasks

Flash memory configuration tasks discussed in this section include the following:

- Set the BOOTLDR Environment Variable
- Configure the Switch to Automatically Boot from an Image in Flash Memory

Set the BOOTLDR Environment Variable

To set the BOOTLDR environment variable on your LightStream 1010 ATM switch, perform the following tasks, beginning in privileged EXEC mode:

Task		Command
Step 1	Verify that internal Flash or bootflash contains the rxboot image.	**dir** [**/all** | **/deleted**] [**/long**] [*device***:**][*filename*]
Step 2	Enter the configuration mode from the terminal.	**configure terminal**
Step 3	Set the BOOTLDR environment variable to specify the Flash device and filename of the rxboot image. This step modifies the runtime BOOTLDR environment variable.	**boot bootldr** *device***:***filename*
Step 4	Exit configuration mode.	**^Z**
Step 5	Save this runtime BOOTLDR environment variable to your startup configuration.	**copy running-config startup-config**
Step 6	Optionally, verify the contents of the BOOTLDR environment variable.	**show boot**

The following example sets the BOOTLDR environment to change the location of the rxboot image from internal Flash to slot 0.

```
Switch# dir bootflash:
-#- -length- -----date/time------ name
1   620      May 04 1995 26:22:04 rsp-boot-m
2   620      May 24 1995 21:38:14 config2

7993896 bytes available (1496 bytes used)
Switch# configure terminal
Switch (config)# boot bootldr slot0:rsp-boot-m
^Z
Switch# copy running-config startup-config
[ok]
Switch# show boot
BOOT variable = slot0:ls1010-wi-m_1.1(1),1;
CONFIG_FILE variable =
Current CONFIG_FILE variable = nvram:
BOOTLDR variable =
Configuration register is 0x0

Switch#
```

Configure the Switch to Automatically Boot from an Image in Flash Memory

To configure a switch to automatically boot from an image in Flash memory, perform the following tasks:

Task		Command
Step 1	Enter configuration mode from the terminal.	**configure terminal**
Step 2	Enter the filename of an image stored in Flash memory.	**boot system** [*filename*] **boot system bootflash:**[*filename*] **boot system slot0:**[*filename*] **boot system slot1:**[*filename*]
Step 3	Set the configuration register to enable loading of the system image from Flash memory.	**config-register** *value*[1]
Step 4	Exit configuration mode.	**^Z**
Step 5	Save the configuration file to your startup configuration. This step saves the configuration to the location specified by the CONFIG_FILE environment variable.	**copy running-config startup-config**
Step 6	Optionally, verify the contents of the startup configuration.	**show startup-config**
Step 7	Power-cycle and reboot the system to ensure that all works as expected.	**reload**

1. Refer to the *LightStream 1010 ATM Switch Command Reference* publication.

If you enter more than one image filename, the switch tries them in the order entered.

If a filename already appears in the configuration file and you want to specify a new filename, remove the existing filename with the **no boot system flash** *filename* command.

Note The **no boot system** configuration command disables all **boot system** configuration commands regardless of argument. Specifying the **flash** keyword or the *filename* argument with the **no boot system** command disables only the commands specified by these arguments.

The following example shows how to configure the switch to automatically boot from an image in Flash memory:

```
Switch# configure terminal
Switch (config)# boot system flash ls1010-wi-m_1.058.bin.Z
Switch (config)# config-register 0x1000
^Z
Switch# copy running-config startup-config
[ok]
Switch# reload
[confirm] y

%SYS-5-RELOAD: Reload requested
booting /tftpboot/ls1010-wi-m_1.058.bin.Z 171.69.1.129
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Uncompressing file:  ###########################################################
################################################################################
################################################################################
################################################################################
################################################################################
################################################################################
######################################


Loading network-confg from 171.69.1.129 (via Ethernet2/0/0): !
[OK - 86/128975 bytes]

%SYS-5-CONFIG: Configured from network-confg by console tftp from 171.69.1.129
Loading /tftpboot/Switch-confg from 171.69.1.129 (via Ethernet2/0/0): !
[OK - 962/128975 bytes]

%SYS-4-CONFIG_NEWER: Configurations from version 11.1 may not be correctly understood.
%SYS-5-CONFIG: Configured from /tftpboot/Switch-confg by console tftp from 171.69.1.129
Loading ls1010-wi-m_1.058.bin.Z from 171.69.1.129 (via Ethernet
2/0/0): !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 2200823/7554184 bytes]

Uncompressing file:  ###########################################################
################################################################################
################################################################################
################################################################################
################################################################################
################################################################################
##############################################################################

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```
Software clause at DFARS sec. 252.227-7013.

           cisco Systems, Inc.
           170 West Tasman Drive
           San Jose, California 95134-1706



Cisco Internetwork Operating System Software
IOS (tm) IISP Software (LS1010-WI-M), Version 11.1(1.058), MAINTENANCE INTERIM S
OFTWARE
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Wed 06-Mar-96 05:37 by
Image text-base: 0x600108B0, data-base: 0x602D8000

cisco ASP1 (R4600) processor with 16384K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
1 Ethernet/IEEE 802.3 interface.
8 ATM network interfaces.
125K bytes of non-volatile configuration memory.

8192K bytes of Flash internal SIMM (Sector size 256K).
Loading network-confg from 171.69.1.129 (via Ethernet2/0/0): !
[OK - 86/128975 bytes]

Loading /tftpboot/Switch-confg from 171.69.1.129 (via Ethernet2/0/0): !
[OK - 962/128975 bytes]



Press RETURN to get started!


%LINEPROTO-5-UPDOWN: Line protocol on Interface ATM2/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet2/0/0, changed state toup

<information Deleted>

%SYS-5-RESTART: System restarted --
Cisco Internetwork Operating System Software
IOS (tm) IISP Software (LS1010-WI-M), Version 11.1(1)
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Wed 06-Mar-96 05:37 by
Switch>
```

Once you have successfully configured Flash memory, you might want to configure the system with the **no boot system flash** command to revert to booting from ROM or from bootflash. You might want to revert to booting from ROM or bootflash if you do not yet need this functionality, if you choose to boot from a network server, or if you do not have the proper image in Flash memory.

Load from a Network Server

You can configure the switch to load a system image from a network server using TFTP or rcp to copy the system image file.

To do so, you must set the configuration register boot field to the correct value. See the “Modify the Configuration Register Boot Field” section.

If you do not boot from a network server using MOP and you do not specify either TFTP or rcp, by default the system image that you specify is booted from a network server via TFTP.

Note If you are using a Sun workstation as a network server and TFTP to transfer the file, set up the workstation to enable verification and generation of User Datagram Protocol (UDP) checksums. See the Sun documentation for details.

For increased performance and reliability, use rcp to boot a system image from a network server. The rcp implementation uses the Transmission Control Protocol (TCP), which ensures reliable delivery of data.

You cannot explicitly specify a remote username when you issue the boot command. Instead, the switch's host name is used. If the remote server has a directory structure, as do UNIX systems, and you boot the switch from a network server using rcp, the LightStream 1010 software searches for the system image on the server relative to the directory of the remote username.

You can also boot from a compressed image on a network server. One reason to use a compressed image is to ensure that there is enough memory available for storage.

If there is not enough room in memory to boot a regular image from a network server, you can produce a compressed software image on any UNIX platform using the **compress** command. Refer to your UNIX platform's documentation for the exact usage of the **compress** command.

To specify the loading of a system image from a network server, complete the following tasks:

Task		Command
Step 1	Enter configuration mode from the terminal.	**configure terminal**
Step 2	Specify the system image file to be booted from a network server using rcp, or TFTP.	**boot system** [**rcp** | **tftp**] *filename* [*ip-address*]
Step 3	Set the configuration register to enable loading of the system image from a network server.	**config-register** *value*[1]
Step 4	Exit configuration mode.	**^Z**
Step 5	Save the configuration file to your startup configuration. This step saves the configuration to the location specified by the CONFIG_FILE environment variable.	**copy running-config startup-config**

1. Refer to the *LightStream 1010 ATM Switch Command Reference* publication.

In the following example, the switch uses rcp to boot from the *testme5.tester* system image file on a network server at IP address 131.108.0.1:

```
Switch1# configure terminal
Switch1(config)# boot system rcp testme5.tester 131.108.0.1
Switch (config)# config-register 0x010F
^Z
Switch1# copy running-config startup-config
```

Use a Fault-Tolerant Booting Strategy

Occasionally network failures make booting from a network server impossible. To lessen the effects of network failure, consider the following booting strategy. After Flash is installed and configured, you might want to configure the switch to boot in the following order:

1. Boot an image from Flash.
2. Boot an image from a system file on a network server.
3. Boot from ROM image.

This boot order provides the most fault-tolerant booting strategy. Perform the following tasks to allow the switch to boot first from Flash, then from a system file from a network server, and finally from ROM:

Task		Command
Step 1	Enter configuration mode from the terminal.	**configure terminal**
Step 2	Configure the switch to boot from Flash memory.	**boot system** [*filename*] **boot system flash:**[*filename*] **boot system slot0:**[*filename*] **boot system slot1:**[*filename*]
Step 3	Configure the switch to boot from a system filename.	**boot system** [**rcp** | **tftp**] *filename* [*ip-address*]
Step 4	Set the configuration register to enable loading of the system image from a network server or Flash.	**config-register** *value* [1]
Step 5	Exit configuration mode.	**^Z**
Step 6	Save the configuration file to your startup configuration. This step saves the configuration to the location specified by the CONFIG_FILE environment variable.	**copy running-config startup-config**

1. Refer to the "Modify the Configuration Register Boot Field" section for more information on systems that can use this command to modify the software configuration register.

The following example illustrates the order of the commands needed to implement this strategy. In the example, the switch is configured to first boot an internal Flash image called *gsxx*. Should that image fail, the switch will boot the configuration file *ls1010xx* from a network server.

```
Switch# configure terminal
Switch(config)# boot system flash ls1010xx
Switch(config)# boot system ls1010xx 131.131.101.101
Switch(config)# config-register 0x010F
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console
Switch# copy running-config startup-config
[ok]
```

Using this strategy, a switch has three alternative sources from which to boot. These alternative sources help lessen the negative effects of a failure on network or file server from which the system image is copied.

Specify the Startup Configuration File

Configuration files can be stored on network servers. You can configure the switch to automatically request and receive two configuration files from the network server at startup:

- Network configuration file
- Host configuration file

The first file the server attempts to load is the network configuration file. This file contains information that is shared among several switches. For example, it can be used to provide mapping between IP addresses and host names.

The second file the server attempts to load is the host configuration file. This file contains commands that apply to one switch in particular. Both the network and host configuration files must reside on a network server reachable via TFTP, rcp, or MOP, and they must be readable.

You can specify an ordered list of network configuration and host configuration filenames. The switch scans this list until it successfully loads the appropriate network or host configuration file.

In addition to storing configuration files on network servers, with the LightStream 1010 ATM switch, you can store configuration files in NVRAM and on Flash memory cards. The CONFIG_FILE environment variable specifies the device and filename of the configuration file to use during initialization. For more information on environment variables, refer to the "Cisco's Implementation of Environment Variables" section in this chapter.

You can set the CONFIG_FILE environment variable to specify the startup configuration.

Specify the Startup Configuration File Task List

To specify a startup configuration file, perform *either* the first two tasks *or* the third task:

- Download the Network Configuration File
- Download the Host Configuration File
- Download the CONFIG_FILE Environment Variable Configuration

Download the Network Configuration File

To configure the switch to download a network configuration file from a server at startup, complete the following tasks:

Task		Command
Step 1	Enter configuration mode from the terminal.	**configure terminal**
Step 2	Enter the network configuration filename to download a file using TFTP, rcp, or MOP.	**boot network** [**tftp** | **rcp**] *filename* [*ip-address*]
Step 3	Enable the switch to automatically load the network file upon restart.	**service config**
Step 4	Exit configuration mode.	**^Z**
Step 5	Save the configuration file to your startup configuration. This step saves the configuration to the location specified by the CONFIG_FILE environment variable.	**copy running-config startup-config**

For Step 2, if you do not specify a network configuration filename, the switch uses the default filename *network-confg*. If you omit both the **tftp** and the **rcp** keywords, the switch assumes that you are using TFTP to transfer the file and that the server whose IP address you specify supports TFTP.

If you configure the switch to download the network configuration file from a network server using rcp and the server has a directory structure as do UNIX systems, the switch software searches for the system image on the server relative to the directory of the remote username. The switch host name is used as the remote username.

You can specify more than one network configuration file. The switch tries them in order until it loads one successfully. This procedure can be useful for keeping files with different configuration information loaded on a network server.

Download the Host Configuration File

To configure the switch to download a host configuration file from a server at startup, complete the following tasks. Step 2 is optional. If you do not specify a host configuration filename, the switch uses its own name to form a host configuration filename by converting the switch name to all lowercase letters, removing all domain information, and appending *-confg*. If no host name information is available, the switch uses the default host configuration filename *switch-confg*.

Task		Command
Step 1	Enter configuration mode from the terminal.	**configure terminal**
Step 2	Optionally, enter the host configuration filename to be downloaded using rcp or TFTP.	**boot host** [**tftp** | **rcp**] *filename* [*ip-address*]
Step 3	Enable the switch to automatically load the host file upon restart.	**service config**
Step 4	Exit configuration mode.	**^Z**
Step 5	Save the configuration file to your startup configuration. On most platforms, this step saves the configuration to NVRAM. This step saves the configuration to the location specified by the CONFIG_FILE environment variable.	**copy running-config startup-config**
Step 6	Reset the switch with the new configuration information.	**reload**

You can specify more than one host configuration file. The switch tries them in order until it loads one successfully. This procedure can be useful for keeping files with different configuration information loaded on a network server.

In the following example, the switch is configured to boot from the host configuration file *hostfile1* and from the network configuration file *networkfile1*:

```
Switch# configure terminal
Switch(config)# boot host hostfile1
Switch(config)# boot network networkfile1
Switch(config)# service config
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console
Switch# copy running-config startup-config
```

If the network server fails to load a configuration file during startup, it tries again every 10 minutes (the default setting) until a host provides the requested files. With each failed attempt, the network server displays a message on the console terminal. If the network server is unable to load the specified file, it displays the following message:

```
Booting host-confg... [timed out]
```

The switch uses the NVRAM configuration during initialization when the CONFIG_FILE environment variable does not exist or when it is null (such as at first-time startup). If the switch detects a problem with NVRAM or the configuration it contains, the switch enters the autoconfiguration mode. Refer to the chapter "Initially Configuring the LightStream 1010 ATM Switch."

Download the CONFIG_FILE Environment Variable Configuration

In addition to loading startup configuration files from a server, on the LightStream 1010 ATM switch you can configure the switch to load a startup configuration file specified by the CONFIG_FILE environment variable. To do so, complete the following tasks, beginning in EXEC mode:

Task		Command
Step 1	Copy the configuration file to the device from which the switch will load the file upon restart.	**copy** **copy flash** **copy running-config** **copy startup-config** **copy tftp**
Step 2	Enter configuration mode from the terminal.	**configure terminal**
Step 3	Set the CONFIG_FILE environment variable. This step modifies the runtime CONFIG_FILE environment variable.	**boot config** *device*:*filename*
Step 4	Exit configuration mode.	**^Z**
Step 5	Save this runtime CONFIG_FILE environment variable to your startup configuration.	**copy running-config startup-config**
Step 6	Optionally, verify the contents of the CONFIG_FILE environment variable.	**show boot**

When saving the runtime CONFIG_FILE environment variable to the startup configuration, the switch saves a complete version of the configuration file to the location specified by the CONFIG_FILE environment variable and a distilled version to NVRAM. A distilled version is one that does not contain access list information. If NVRAM contains a complete configuration file, the switch prompts you to confirm your overwrite of the complete version with the distilled version. If NVRAM contains a distilled configuration, the switch does not prompt you for confirmation and proceeds with overwriting the existing distilled configuration file in NVRAM.

The following example copies the running configuration file to the first PCMCIA slot of the ASP card in a LightStream 1010 ATM switch. This configuration is then used as the startup configuration when the system is restarted.

```
Switch# copy running-config slot0:config2
Building configuration...

Switch#dir
-#- -length- -----date/time------ name
1   5204     May 03 1996 14:07:35 backup-config
2   5393     May 03 1996 15:32:57 startup-config
3   2247751  May 04 1996 12:08:51 ls1010-wi-m_1.1(1)
4   2247751  May 04 1996 13:25:14 test
5   5376     May 04 1996 13:54:23 config2

3483272 bytes available (4512120 bytes used)
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#boot config slot0:config2
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console
Switch#copy running-config startup-config
Building configuration...
[OK]
Switch#
Switch#show boot
BOOT variable = slot0:rhino/ls1010-wi-m_1.1(1),1;ls1010-wi-m_1.1(1),1;
CONFIG_FILE variable = slot0:config2
Current CONFIG_FILE variable = slot0:config2
BOOTLDR variable =
Configuration register is 0x000

Switch#
```

Store System Images and Configuration Files

After modifying and saving your routing environment's unique configurations, you might want to store them on a network server. You can use these network server copies of system images and configuration files as backup copies.

Store System Images and Configuration Files Task List

To store system images and configuration files, perform the following tasks:

- Copy System Images from Flash Memory to a Network Server
- Copy Configuration Files from the Switch to a Network Server

Copy System Images from Flash Memory to a Network Server

You can copy system images from Flash memory to a TFTP server or to an rcp server. You can use this server copy of the system image as a backup copy, or you can use it to verify that the copy in Flash is the same as the original file on disk. The following sections describe these tasks:

- Copy from Flash Memory to a TFTP Server
- Copy from Flash Memory to an rcp Server

Copy from Flash Memory to a TFTP Server

You can copy a system image to a TFTP network server. In some implementations of TFTP, you must first create a "dummy" file on the TFTP server and give it read, write, and execute permissions before copying a file over it. Refer to your TFTP documentation for more information.

To copy a system image to a TFTP network server, perform the following task in EXEC mode:

Task		Command
Step 1	(Optional) If you do not already know it, learn the exact spelling of the system image filename in Flash memory. On the LightStream 1010 ATM switch, you can learn the spelling of the system image filename on a specified Flash memory device.	**show flash all** **show flash** [*device***:**]
Step 2	Copy the system image from Flash memory to a TFTP server. You can copy the system image from a specified Flash memory device to a TFTP server.	**copy flash tftp** or **copy** *file_id* **tftp**
Step 3	When prompted, enter the IP address or domain name of the TFTP server.	*ip-address* or *name*
Step 4	When prompted, enter the filename of the system image in Flash memory.	*filename*

The following example uses the **show flash all** command to learn the name of the system image file and the **copy flash tftp** command to copy the system image to a TFTP server. The name of the system image file (ls1010-wi-m_1.1(1)) is listed near the beginning of the **show flash all** output.

```
Switch# show flash all

Switch#show flash all
-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time------ name
1   .. FFFFFFFF 129EECA3 214D4   13   5204     May 03 1996 14:07:35 backup-config
2   .. 1        AE9B32B  22A68   14   5393     May 03 1996 15:32:57 startup-config
3   .. FFFFFFFF E9D05582 247730  23   2247751  May 04 1996 12:08:51 ls1010-wi-m_1.1(1)
4   .. FFFFFFFF E9D05582 46C3F8  4    2247751  May 04 1996 13:25:14 test

3488776 bytes available (4506616 bytes used)

-------- F I L E   S Y S T E M   S T A T U S --------
  Device Number = 0
DEVICE INFO BLOCK:
  Magic Number          = 6887635   File System Vers = 10000    (1.0)
  Length                = 800000    Sector Size      = 20000
  Programming Algorithm = 4         Erased State     = FFFFFFFF
  File System Offset    = 20000     Length = 7A0000
  MONLIB Offset         = 100       Length = A570
  Bad Sector Map Offset = 1FFF8     Length = 8
  Squeeze Log Offset    = 7C0000    Length = 20000
  Squeeze Buffer Offset = 7E0000    Length = 20000
  Num Spare Sectors     = 0
    Spares:
STATUS INFO:

<Information Deleted>

USAGE INFO:
  Bytes Used     = 44C3F8  Bytes Available = 353C08
  Bad Sectors    = 0       Spared Sectors  = 0
  OK Files       = 4       Bytes = 44C1F8
  Deleted Files  = 0       Bytes = 0
```

```
  Files w/Errors = 0       Bytes = 0

Switch#
Switch#copy flash tftp
Enter source file name: ls1010-wi-m_1.1(1)
Enter destination file name [ls1010-wi-m_1.1(1)]: backup-image
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Address or name of remote host [dirt.cisco.com]? 171.69.1.129
!
Switch#
```

A series of “C” characters indicates that a checksum verification of the image is occurring and the exclamation point indicates that the copy process is occurring. To stop the copy process, press **Ctrl**-^.

The following example uses the **show flash** [*device***:**] command to display the name of the system image file to copy. In the example, the Flash memory device containing the system image is the bottom.

PCMCIA slot. The file to copy is *test*. The example uses the **copy** *file_id* **tftp** command, to copy *test* to a TFTP server.

```
Switch#show flash slot0:
-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time------ name
1   .. FFFFFFFF 129EECA3 214D4   13   5204     May 03 1996 14:07:35 backup-config
2   .. 1        AE9B32B  22A68   14   5393     May 03 1996 15:32:57 startup-config
3   .. FFFFFFFF E9D05582 247730  23   2247751  May 04 1996 12:08:51 ls1010-wi-m_1.1(1)
4   .. FFFFFFFF E9D05582 46C3F8  4    2247751  May 04 1996 13:25:14 test

3488776 bytes available (4506616 bytes used)
Switch#copy slot0:test tftp
Enter destination file name [test]:
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Address or name of remote host [dirt.cisco.com]? 171.69.1.129
!
Switch#
```

A series of “C” characters indicates that a checksum verification of the image is occurring and the exclamation point indicates that the copy process is occurring.

Once you have configured Flash memory, you might want to configure the system (using the **configure terminal** command) with the **no boot system flash** configuration command to revert to booting from ROM. For example, you might want to revert to booting from ROM if you do not yet need this functionality, if you choose to boot from a network server, or if you do not have the proper image in Flash memory. After you enter the **no boot system flash** command, use the **copy running-config startup-config** command to save the new configuration command to the startup configuration.

This procedure on the LightStream 1010 ATM switch also requires changing the processor’s configuration register. Refer to the “Modify the Configuration Register Boot Field” section for instructions.

Copy from Flash Memory to an rcp Server

You can also copy a system image from Flash memory to an rcp network server.

The rcp protocol requires that a client send the remote username on each rcp request to the server. When you copy an image from Flash memory to a network server using rcp, the switch software sends the remote username associated with the current TTY (terminal) process, if that name is valid. If the TTY remote username is invalid, the switch software uses the switch host name as both the remote and local usernames.

Note For Cisco, TTYs are commonly used in communication servers. The concept of TTY originated with UNIX. For UNIX systems, each physical device is represented in the file system. Terminals are called *TTY devices*, which stands for *teletype*, the original UNIX terminal.

You can configure a different remote username to be sent to the server. If the network server has a directory structure, as do UNIX systems, the rcp protocol implementation writes the system image relative to the directory associated with the remote username on the network server.

For the rcp command to execute properly, an account must be defined on the destination server for the remote username.

To stop the copy process, press **Ctrl**-^.

If you copy the system image to a personal computer used as a file server, the computer must support the rcp protocol.

To copy the system image from Flash memory to a network server, perform the following tasks:

Task		Command
Step 1	(Optional) If you do not already know it, learn the exact spelling of the system image filename in Flash memory. On the LightStream 1010 ATM switch, you can learn the spelling of the system image filename on a specified Flash memory device.	**show flash all** **show flash** [*device***:**]
Step 2	Enter configuration mode from the terminal. This step is required only if you are going to override the default remote username in the next step.	**configure terminal**
Step 3	Specify the remote username. This step is optional, but recommended.	**ip rcmd remote-username** *username*
Step 4	Exit configuration mode.	**^Z**
Step 5	Using rcp, copy the system image in Flash memory to a network server.	**copy flash rcp** **copy** *file_id* **rcp**
Step 6	When prompted, enter the IP address or domain name of the rcp server.	*ip-address* or *name*
Step 7	When prompted, enter the filename of the system image in Flash memory.	*filename*

The following example copies the system image *ls1010-wi-m_1.1(1)* to a network server using rcp:

```
Switch# configure terminal
Switch(config)# ip rcmd remote-username netadmin2
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console
Switch#copy flash rcp
Enter source file name: ls1010-wi-m_1.1(1)
Enter destination file name [ls1010-wi-m_1.1(1)]:
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Address or name of remote host [dirt.cisco.com]? 171.69.1.129
Writing ls1010-wi-m_1.1(1) !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Switch#
```

The following example copies a system image file called *ls1010-wi-m_1.1(1)* from the bottom PCMCIA slot on the LightStream 1010 to a network server using rcp:

```
Switch# configure terminal
Switch(config)# ip rcmd remote-username netadmin2
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console
Switch#copy slot0:ls1010-wi-m_1.1(1) rcp
Enter destination file name [ls1010-wi-m_1.1(1)]:
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Address or name of remote host []? 171.69.1.129
Writing ls1010-wi-m_1.1(1) !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

The screen fills with exclamation points indicate the process is working.

Copy Configuration Files from the Switch to a Network Server

You can copy configuration files from the switch to a TFTP server or rcp server. You might do this task to back up a current configuration file to a server before changing its contents, thereby allowing you to later restore the original configuration file from the server. The following sections describe these tasks:

- Copy from the Switch to a TFTP Server
- Copy from the Switch to an rcp Server

Copy from the Switch to a TFTP Server

Usually, the configuration file that you copy to must already exist on the TFTP server and be globally writable before the TFTP server allows you to write to it.

To store configuration information on a TFTP network server, complete the following tasks in the EXEC mode:

Task		Command
Step 1	Specify that the running or startup configuration file be stored on a network server.	**copy running-config tftp** or **copy startup-config tftp**
Step 2	Enter the IP address of the network server.	*ip-address*
Step 3	Enter the name of the configuration file to store on the server.	*filename*
Step 4	Confirm the entry.	**y**

The command prompts you for the destination host's address and a filename, as the following example illustrates.

The following example copies a configuration file from a switch to a server:

```
Switch#copy running-config tftp
Remote host []? 171.69.1.129
Name of configuration file to write [switch-confg]? backup-confg
Write file backup-confg on host 171.69.1.129? [confirm]y
Building configuration...

Writing backup-confg !!! [OK]
Switch#
```

Copy from the Switch to an rcp Server

You can use rcp to copy configuration files from the local switch to a network server. You can copy a running configuration file or a startup configuration file to the server.

The rcp protocol requires that a client send the remote username on each rcp request to a server. When you issue a command to copy a configuration file from the switch to a server using rcp, the switch sends a default remote username unless you override the default by configuring a remote username. As the default value of the remote username, the switch software sends the remote username associated with the current TTY (terminal) process, if that name is valid.

Note For UNIX systems, each physical device is represented in the file system. Terminals are called *TTY devices*, which stands for *teletype*, the original UNIX terminal.

If the TTY remote username is invalid, the switch software uses the switch host name as both the remote and local usernames. If the server has a directory structure, as do UNIX systems, the rcp protocol implementation writes the configuration file relative to the directory associated with the remote username on the server.

For the rcp copy request to execute successfully, an account must be defined on the network server for the remote username.

If you copy the configuration file to a personal computer used as a file server, the computer must support rcp.

To copy a startup configuration file or a running configuration file from the switch to an rcp server, use one of following tasks:

- Copy a Running Configuration File to an rcp Server
- Copy a Startup Configuration File to an rcp Server

Copy a Running Configuration File to an rcp Server

You can copy the running configuration file to an rcp server. The copied file can serve as a backup configuration file.

To store a running configuration file on a server, complete the following tasks:

Task		Command
Step 1	Enter configuration mode from the terminal. This step is required only if you override the default remote username (see Step 2).	**configure terminal**
Step 2	Specify the remote username. This step is optional, but recommended.	**ip rcmd remote-username** *username*
Step 3	Specify that the switch's running configuration file be stored on a network server.	**copy running-config rcp**
Step 4	Enter the IP address of the network server.	*ip-address*
Step 5	Enter the name of the configuration file to store on the server.	*filename*
Step 6	Confirm the entry.	**y**

The following example copies the running configuration file named *Switch-confg* to the *netadmin1* directory on the remote host with an IP address of 171.69.1.129:

```
Switch# configure terminal
Switch(config)# ip rcmd remote-username netadmin2
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console
Switch# copy running-config rcp
Remote host []? 171.69.1.129
Name of configuration file to write [switch-confg]?
Write file switch-confg on host 171.69.1.129? [confirm]y
Building configuration...

Writing switch-confg !! [OK]
Switch#
```

Copy a Startup Configuration File to an rcp Server

You can copy the contents of the startup configuration file to an rcp server. The copied file can serve as a backup configuration file.

To copy a startup configuration file to a network server using rcp, complete the following tasks:

Task		Command
Step 1	Enter configuration mode from the terminal. This step is required only if you override the default remote username (see Step 2).	**configure terminal**
Step 2	Specify the remote username. This step is optional, but recommended.	**ip rcmd remote-username** *username*
Step 3	Specify that the startup configuration file be copied to an rcp server. This step copies the configuration file specified by the CONFIG_FILE environment variable to an rcp server.	**copy startup-config rcp**
Step 4	Enter the IP address of the network server.	*ip-address*
Step 5	Enter the name of the configuration file to store on the server.	*filename*
Step 6	Confirm the entry.	**y**

The following example shows how to store a startup configuration file on a server by using rcp to copy the file:

```
Switch# configure terminal
Switch(config)# ip rcmd remote-username netadmin2
Switch(config)#^Z
Switch#
%SYS-5-CONFIG_I: Configured from console by console
Switch# copy startup-config rcp
Remote host []? 171.69.1.129
Name of configuration file to write [switch-confg]?
Write file switch-confg on host 171.69.1.129? [confirm]y
Writing switch-confg !! [OK]
Switch#
```

Configure a Switch as a Server

It is too costly and inefficient to have a dedicated server on every network segment. However, when you do not have a server on every segment, your network operations can incur enormous time delays across network segments. You can configure a switch as a server to cut costs and time delays in your network.

Typically, the switch configured as a server serves operating system images from its Flash memory to other switches. You can also configure the switch to respond to other types of service requests, such as Reverse Address Resolution Protocol (RARP) requests.

Configure a Switch as a Server Task List

To configure the switch as a server, perform any of the following tasks. The tasks are not mutually exclusive.

- Configure a Switch as a TFTP Server
- Configure Flash Memory as a TFTP Server

Configure a Switch as a TFTP Server

As a TFTP server host, the switch responds to TFTP Read Request messages by sending a copy of the system image contained in ROM or one of the system images contained in Flash memory to the requesting host. The TFTP Read Request message must use one of the filename that is specified in the switch's configuration.

To specify TFTP server operation for a switch, complete the following tasks:

Task		Command
Step 1	Enter configuration mode from the terminal.	**configure terminal**
Step 2	Specify TFTP server operation.	**tftp-server rom alias** *filename1* [*access-list-number*] **tftp-server flash** *device*:*filename*
Step 3	Exit configuration mode.	**^Z**
Step 4	Save the configuration file to your startup configuration. This step saves the configuration to the location specified by the CONFIG_FILE environment variable.	**copy running-config startup-config**

The TFTP session can sometimes fail. TFTP generates the following special characters to help you determine why a TFTP session fails:

- An "E" character indicates that the TFTP server received an erroneous packet.
- An "O" character indicates that the TFTP server received an out-of-sequence packet.
- A period (.) indicates a timeout.

The transfer session might still succeed even if TFTP generates these characters, but the output is useful for diagnosing the transfer failure.

In the following example, the system uses TFTP to send a copy of the Flash memory file *version-1.03* in response to a TFTP Read Request for that file. The requesting host is checked against access list 22.

```
Switch(config)#tftp-server flash version-1.03 22
```

In the following example, the system uses TFTP to send a copy of the ROM image *ls1010-m_1.101* in response to a TFTP Read Request for the *ls1010-m_1.101* file:

```
Switch(config)#tftp-server rom alias ls1010-m_1.101
```

Configure Flash Memory as a TFTP Server

Flash memory can be used as a TFTP file server for other switches on the network. This feature allows you to boot a remote switch with an image that resides in the Flash server memory.

The LightStream 1010 ATM switch allows you to specify one of the different Flash memory devices as the TFTP server. You can specify its internal Flash (**bootflash:**) or one of the two PCMCIA slots (**slot0:**, **slot1:**) as the TFTP server.

In the description that follows, one switch is referred to as the *Flash server*, and all other switches are referred to as *client switches*. Example configurations for the Flash server and client switches include commands as necessary.

Configure Flash Memory as a TFTP Server Task List

To configure Flash memory as a TFTP server, perform the following tasks:

- Perform Prerequisite Tasks
- Configure the Flash Server
- Configure the Client Switch

Perform Prerequisite Tasks

The Flash server and client switch must be able to reach each other before the TFTP function can be implemented. Verify this connection by pinging between the Flash server and client switch (in either direction) with the **ping** command.

An example use of the **ping** command is as follows:

```
Switch#ping 131.152.1.129

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 131.152.1.129, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
Switch#
```

In this example, the Internet Protocol (IP) address of 131.152.1.129 belongs to the client switch. Connectivity is indicated by a series of exclamation points (!), while a series of periods (.) plus *[timed out]* or *[failed]* indicates no connection. If the connection fails, reconfigure the interface, check the physical connection between the Flash server and client switch, and ping again.

After you verify the connection, ensure that a TFTP-bootable image is present in Flash memory. This is the system software image the client switch will boot. Note the name of this software image so you can verify it after the first client boot.

Note The filename used must represent a software image that is present in Flash memory. If no image resides in Flash memory, the client switch will boot the server's ROM image as a default.

Caution For full functionality, the software residing in the Flash memory must be the same type as the ROM software installed on the client switch. For example, if the server has X.25 software, and the client does not have X.25 software in ROM, the client will not have X.25 capabilities after booting from the server's Flash memory.

Configure the Flash Server

Perform the following task to configure the Flash server:

Task		Command
Step 1	Enter configuration mode from the terminal.	**configure terminal**
Step 2	Specify the TFTP server operation for a switch.	**tftp-server flash** *device*:*filename*

The following example configures the Flash server. This example gives the filename of the software image in the Flash server and one access list (labeled *1*). The access list must include the network where the client switch resides. Thus, in the example, the network 131.108.101.0 and any client switches on it are permitted access to the Flash server filename *ls1010-m_1.9.17*.

```
Server# configure terminal
Enter configuration commands, one per line.
Edit with DELETE, CRTL/W, and CRTL/U; end with CTRL/Z
Server(config)# tftp-server flash ls1010-m_1.9.17 1
Server(config)# access-list 1 permit 131.108.101.0 0.0.0.255
^Z
Server# copy running-config startup-config
[ok]
Server#
```

Configure the Client Switch

Configure the client switch to first load a system image from the Flash server. As a backup, configure the client switch to then load its own ROM image if the load from a Flash server fails.

Task		Command
Step 1	Enter configuration mode from the terminal.	**configure terminal**
Step 2	Remove all previous **boot system** statements from the configuration file.	**no boot system**
Step 3	Specify that the client switch load a system image from the Flash server.	**boot system** [**rcp** | **tftp**] *filename* [*ip-address*]
Step 4	Set the configuration register to enable the client switch to load a system image from a network server.	**config-register** *value*[1]
Step 5	Exit configuration mode.	**^Z**
Step 6	Save the configuration file to your startup configuration. This step saves the configuration to the location specified by the CONFIG_FILE environment variable.	**copy running-config startup-config**
Step 7	Reload the switch to make your changes take effect.	**reload**

1. Refer to the *LightStream 1010 ATM Switch Command Reference* publication.

Caution Using the **no boot system** command, as in the following example, will invalidate *all* other boot system commands currently in the client switch system configuration. Before proceeding, determine whether the system configuration stored in the client switch should first be saved (uploaded) to a TFTP file server so you have a backup copy.

The following example shows how to use these commands:

```
Client# configure terminal
Enter configuration commands, one per line.
Edit with DELETE, CRTL/W, and CRTL/U; end with CTRL/Z
Client(config)# no boot system
Client(config)# boot system ls1010-m_1.9.17 131.131.111.111
Client(config)# boot system rom
Client(config)# config-register 0x010F
^Z
Client# copy running-config startup-config
[ok]
Server# reload
```

In this example, the **no boot system** command invalidates all other **boot system** commands currently in the configuration memory, and any **boot system** commands entered after this command will be executed first. The second command, **boot system** *filename address*, tells the client switch to look for the file *ls1010-m_1.9.17* in the (Flash) server with an IP address of 131.131.111.111. Failing this, the client switch will boot from its system ROM in response to the **boot system rom** command, which is included as a backup in case of a network problem. The **copy running-config startup-config** command copies the configuration to NVRAM to the location specified by the CONFIG_FILE environment variable, and the **reload** command boots the system.

Caution The system software (*ls1010-m_1.9.17* in the example) to be booted from the Flash server (131.131.111.111 in the example) must reside in Flash memory on the server. If it is not in Flash memory, the client switch will boot the Flash server's system ROM.

Use the **show version** command on the client switch to verify that the software image booted from the Flash server is the image present in Flash memory. To do so, perform the following task:

Task	Command
Verify that the software image booted from the Flash server is the image present in Flash memory of the client switch.	**show version**

The following is a sample output of the **show version** command:

```
Switch>show version
Cisco Internetwork Operating System Software
IOS (tm) IISP Software (LS1010-WI-M), Version 11.1(1)
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Wed 10-Apr-96 06:11 by
Image text-base: 0x600108C0, data-base: 0x602E8000

ROM: System Bootstrap, Version 11.1(1)

Switch uptime is 18 minutes
System restarted by reload
System image file is (1)", booted via tftp from 171.69.1.12
9

cisco ASP1 (R4600) processor with 16384K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
1 Ethernet/IEEE 802.3 interface.
20 ATM network interfaces.
125K bytes of non-volatile configuration memory.

8192K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).
Configuration register is 0x0

Switch>
```

The important information in this example is contained in the second line “IOS (tm)...” which shows the version of the operating system in the client switch’s RAM. The second “ROM: ....” line shows the filename of the system image loaded from the Flash server.

Note If no bootable image is present in the Flash server memory when the client server is booted, the version currently running (the first line of the **show version** output) is the system ROM version of the Flash server by default.

Verify that the software shown in the first line of the **show version** output is the software residing in the Flash server memory.

Configure for Other Types of Servers

You can configure the switch to work with various types of servers. Specifically, you can configure the switch to forward different types of service requests.

Configure for Other Types of Servers Task List

You can configure the switch to forward extended BOOTP requests over asynchronous interfaces.

Specify Asynchronous Interface Extended BOOTP Requests

The Boot Protocol (BOOTP) server for asynchronous interfaces supports the extended BOOTP requests specified in RFC 1084. The following command is helpful in conjunction with using the auxiliary port as an asynchronous interface.

To configure extended BOOTP requests for asynchronous interfaces, perform the following task in global configuration mode:

Task	Command
Configure extended BOOTP requests for asynchronous interfaces.	**async-bootp** *tag* [:*hostname*] *data*

You can display the extended BOOTP requests by performing the following task in EXEC mode:

Task	Command
Show parameters for BOOTP requests.	**show async-bootp**

Perform Startup Tasks

The tasks in this section are optional.

Startup Task List

You can perform the following optional startup tasks for your LightStream 1010 ATM switch:

- Copy a File into a Flash
- Configure the Switch to Automatically Boot from Internal Flash Memory

Copy a File into a Flash

To download a file into a Flash, perform one of the following tasks in EXEC mode:

Task	Command
Download a file from a TFTP server into a Flash partition.	**copy tftp flash**
Download a file from an rcp server into a Flash partition.	**copy rcp flash**

Configure the Switch to Automatically Boot from Internal Flash Memory

To configure the switch to boot automatically from internal Flash, perform one of the following tasks in global configuration mode:

Task	Command
Boot the specified file from the first partition.	**boot system flash** *filename*

The result of booting a relocatable image from Flash depends on where and how the image was downloaded into Flash memory. Table 13-2 describes the various ways an image might be downloaded and the corresponding results of booting from Flash memory.

Table 13-2 Downloading an Image and Booting from Flash

Method of Downloading	Result of Booting from Flash
The image was downloaded as the first file by a nonrelocatable image.	The image will execute in place from Flash memory, like a run-from-Flash image.
The image was downloaded not as the first file by a nonrelocatable image.	The nonrelocatable image will not relocate the image before storage in Flash memory. This image will not be booted.
The image was downloaded as the first file by a relocatable image.	The image will execute in place from Flash memory, like a run-from-Flash image.
The image was downloaded not as the first file by a relocatable image.	The relocatable image relocates the image before storage in Flash memory. Hence, the image will execute in place from Flash memory, like any other run-from-Flash image.

Understand Additional LightStream 1010 ATM Switch Features

The following sections describe additional LightStream 1010 features:

- Copy a Boot Image
- Verify a Boot Image Checksum
- Erase Boot Flash Memory

Copy a Boot Image

You can copy a boot image from an rcp, TFTP, or MOP server to boot Flash memory. You can also copy the boot image from the boot Flash memory to an rcp or TFTP server.

To copy a boot image from a TFTP or rcp server to boot Flash memory, perform the following task in EXEC mode:

Task	Command
Copy a boot image from an TFTP or rcp server to boot Flash memory.	**copy tftp bootflash** or **copy rcp bootflash**

To copy a boot image from boot Flash memory to an rcp or TFTP server, perform the following task in EXEC mode:

Task	Command
Copy a boot image from boot Flash memory to an rcp or TFTP server.	**copy bootflash** {**rcp** | **tftp**}

Verify a Boot Image Checksum

To verify the checksum of a boot image in boot Flash memory, perform the following task in EXEC mode:

Task	Command
Verify the checksum of a boot image.	**verify bootflash**

Erase Boot Flash Memory

To erase the contents of boot Flash memory, perform the following task at the EXEC prompt:

Task	Command
Erase boot Flash memory.	**erase bootflash**

Perform Switch Startup Tasks

This section describes Cisco's implementation of environment variables on the LightStream 1010 ATM switch. Additionally, the section discusses startup tasks pertaining to these high-end switches.

Cisco's Implementation of Environment Variables

You can use Flash memory cards in the Personal Computer Memory Card International Association (PCMCIA) Flash memory card slots on your LightStream 1010 ATM switch. The ASP card contains two PCMCIA slots.

These Flash memory cards can store executable images and configuration files. The switch can now boot images and load configuration files from Flash memory cards as well as from internal flash, NVRAM, and the network.

Because the switch can boot images and load configuration files from several locations, these systems use special ROM monitor environment variables to specify the location and filename of images and configuration files that the switch is to use for various functions. These special environment variables are as follows:

- BOOT
- BOOTLDR
- CONFIG_FILE

BOOT Environment Variable

The BOOT environment variable specifies a list of bootable images on various devices. Valid devices are internal flash (**bootflash:**), the first PCMCIA slot (**slot0:**), the second PCMCIA slot (**slot1:**), and **tftp**. Once you save the BOOT environment variable to your startup configuration, the switch checks the variable upon startup to determine the device and filename of the image to boot.

The switch tries to boot the first image in the BOOT environment variable list. If the switch is unsuccessful at booting that image, it tries to boot the next image specified in the list. The switch tries each image in the list until it successfully boots. If the switch cannot boot any image in the BOOT environment variable list, then the switch attempts to boot the ROM image.

If an entry in the BOOT environment variable list does not specify a device, the switch assumes the device is **tftp**. If an entry in the BOOT environment variable list specifies an invalid device, the switch skips that entry.

BOOTLDR Environment Variable

The BOOTLDR environment specifies the flash device and filename containing the rxboot image that the ROM monitor uses. The valid devices are **bootflash:**, **slot0:**, and **slot1:**.

This environment variable allows you to have several rxboot images. Moreover, you can instruct the ROM monitor to use a specific rxboot image without having to switch out ROMs. Once you save the BOOTLDR environment variable to your startup configuration, the switch checks the variable upon startup to determine which rxboot image to use.

CONFIG_FILE Environment Variable

The CONFIG_FILE environment variable specifies the device and filename of the configuration file to use for initialization (startup). Valid devices are **flash:**, **nvram:**, and **slot0:**. The valid devices are **bootflash:**, **slot0:**, and **slot1:**. Once you save the CONFIG_FILE environment variable to your startup configuration, the switch checks the variable upon startup to determine the location and filename of the configuration file to use for initialization.

The switch uses the NVRAM configuration during initialization when the CONFIG_FILE environment variable does not exist or when it is null (such as at first-time startup). If the switch detects a problem with NVRAM or the configuration it contains, the switch enters the autoconfiguration mode. Refer to the chapter "Initially Configuring the LightStream 1010 ATM Switch."

Control Environment Variables

Although the ROM monitor controls environment variables, you can create, modify, or view them with certain system image commands. To create or modify the BOOT, BOOTLDR, and CONFIG_FILE environment variables, use the **boot system**, **boot bootldr**, and **boot config** system image commands, respectively.

Note When you use these three global configuration commands, you affect only the running configuration. You must save the environment variable settings to your startup configuration to place the information under ROM monitor control and for the environment variables to function as expected. Use the **copy running-config startup-config** command to save the environment variables from your running configuration to your startup configuration.

You can view the contents of the BOOT, BOOTLDR, and the CONFIG_FILE environment variables by issuing the **show boot** command. This command displays the settings for these variables as they exist in the startup configuration as well as in the running configuration if a running configuration setting differs from a startup configuration setting.

Use the **show startup-config** command to display the contents of the configuration file pointed to by the CONFIG_FILE environment variable.

For complete information on the commands presented in this section, refer to the *LightStream 1010 ATM Switch Command Reference* publication.

Startup Task List

Perform the following startup tasks. The first task is required if you are using a new PCMCIA Flash memory card. All other tasks are optional.

- Format Flash Memory
- Manage Flash Files
- Load and Display Software Images

Format Flash Memory

You must format a new Flash memory card before using it in a PCMCIA slot.

Flash memory cards have sectors that can fail. You can reserve certain Flash memory sectors as "spares" for use when other sectors fail. Use the **format** command to specify between 0 and 16 sectors as spares. If you reserve a small number of spare sectors for emergencies, you do not waste space because you can use most of the Flash memory card. If you specify zero spare sectors and some sectors fail, you must reformat the Flash memory card and thereby erase all existing data.

The system requires a monlib file for the format operation. The monlib file is the ROM monitor library. The ROM monitor uses the monlib file to access files in the Flash file system. The system software contains the monlib file.

Format Flash Memory Process

Caution The following formatting procedure erases all information in Flash memory. To prevent the loss of important data, proceed carefully.

Use the following procedure to format Flash memory. If you are formatting bootflash, you can skip the first step. If you are formatting a Flash memory card, complete both steps.

Step 1 Insert the new Flash memory card into a PCMCIA slot. Refer to instructions on maintaining the switch and replacing PCMCIA cards in your switch's hardware documentation for instructions on performing this step.

Step 2 Format Flash memory.

To format Flash memory, complete the following task in EXEC mode:

Task	Command
Format Flash memory.	**format** [**spare** *spare-number*] *device1***:** [[*device2***:**][*monlib-filename*]]

The following example shows the **format** command that formats a Flash memory card inserted in PCMCIA slot 0.

```
Switch# format slot0:
Running config file on this device, proceed? [confirm]y
All sectors will be erased, proceed? [confirm]y
Enter volume id (up to 31 characters):
Formatting sector 1 (erasing)
Format device slot0 completed
```

When the switch returns you to the EXEC prompt, the new Flash memory card is successfully formatted and ready for use.

Recover from Locked Blocks

You also format a Flash memory card to recover from locked blocks. A locked block of Flash memory occurs when power is lost or a Flash memory card is unplugged during a write or erase operation. When a block of Flash memory is locked, it cannot be written to or erased, and the operation will consistently fail at a particular block location. The only way to recover from locked blocks is by reformatting the Flash memory card with the **format** command.

Caution Formatting a Flash memory card to recover from locked blocks will cause existing data to be lost.

Manage Flash Files

You must manage files on as many as three different Flash memory devices. To help you manage your Flash files, you can

- Set the System Default Flash Device
- Display the Current Default Flash Device
- Show a List of Files on a Flash Device
- Delete Files on a Flash Device
- Recover Deleted Files on a Flash Device
- Permanently Delete Files on a Flash Device

Set the System Default Flash Device

You can specify the Flash device that the system uses as the default device. Setting the default Flash device allows you to omit an optional *device***:** argument from related commands. For all EXEC commands that have an optional *device***:** argument, the system uses the device specified by the **cd** command when you omit the optional *device***:** argument. For example, the **dir** command contains an optional *device***:** argument and displays a list of files on a Flash memory device.

To specify a default Flash device, complete the following task from EXEC mode:

Task	Command
Set a default Flash memory device.	**cd** *device***:**

The following example sets the default device to the Flash memory card inserted in PCMCIA slot 0 of the ASP card:

```
cd slot0:
```

Display the Current Default Flash Device

You may want to show the current setting of the **cd** command to see which device is the current default Flash device. To display the current default Flash device specified by the **cd** command, complete the following task from EXEC mode:

Task	Command
Display the current Flash memory device.	**pwd**

The following example shows that the present working device specified by the **cd** command is slot 0 of the ASP card:

```
Switch>pwd
slot0
Switch>
```

The following example uses the **cd** command to change the present working device to bootflash and then uses the **pwd** command to display that present working device:

```
Switch>cd bootflash:
Switch>pwd
bootflash
Switch>
```

Show a List of Files on a Flash Device

You may want to view a list of the contents of a Flash memory device before manipulating its contents. For example, before copying a new configuration file to a Flash device, you may want to verify that the device 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. You can check the contents of a Flash device with the **dir** EXEC command.

To show a list of files on a specified Flash device, complete the following task from EXEC mode:

Task	Command
Display a list of files on a Flash memory device.	**dir** [**/all** | **/deleted**] [**/long**] [*device***:**][*filename*]

The following example instructs the switch to list undeleted files for the default device specified by the **cd** command. Notice that the switch displays the information in short format because no keywords are used:

```
Switch#dir
-#- -length- -----date/time------ name
1   620      May 4  1993 21:38:04 config1
2   620      May 4  1993 21:38:14 config2

7993896 bytes available (1496 bytes used)
```

The following example displays the long version of the same device:

```
Switch#dir /long
-#- ED --type-- --crc--- -seek-- nlen -length- -----date/time------ name
1   .. 1        37CEC52E 202EC   7    620      May 4  1993 21:38:04 config1
2   .. 1        37CEC52E 205D8   7    620      May 4  1993 21:38:14 config2

7993896 bytes available (1496 bytes used)
```

Delete Files on a Flash Device

When you no longer need a file on a Flash memory device, you can delete it.

To delete a file from a specified Flash device, complete the following task from EXEC mode:

Task	Command
Delete a file from a Flash memory device.	**delete** [*device***:**]*filename* or **erase** [*device***:**]*filename*

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

If you attempt to delete the configuration 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. When you delete a file, the switch simply marks the file as deleted, but does not erase the file. This feature allows you to recover a "deleted" file, as discussed in the following section.

The following example deletes the *myconfig* file from a Flash memory card inserted in PCMCIA slot 0 of the ASP card:

```
Switch#delete slot0:myconfig
```

The following example erases the *myconfig* file from a Flash memory card inserted in PCMCIA slot 0 of the ASP card:

```
Switch#erase slot0:myconfig
```

Recover Deleted Files on a Flash 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.

Note You can use the **undelete** command only on the Flash memory card inserted in the PCMCIA slot (**slot0:**) of the ASP card. You cannot use this command on the internal Flash memory.

To undelete a deleted file on a Flash memory device, complete the following task from EXEC mode:

Task	Command
Undelete a deleted file on a Flash memory device.	**undelete** *index* [*device***:**]

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 *Switch-config*. You undelete by index to indicate which of the many *switch-config* files from the list to undelete. Use the **dir** command 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, you first delete the existing file and then undelete the file you want. For example, if you had an undeleted version of the *switch-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 *switch-config* file and then undelete the previous *switch-config* file by index. You can undelete a file as long as the file has not been permanently erased via the **squeeze** command. You can delete and undelete a file up to 15 times.

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

```
Switch#dir
-#- -length- -----date/time------ name
2   5393     May 03 1996 15:32:57 startup-config
3   2247751  May 04 1996 12:08:51 ls1010-wi-m_1.1(1)

5736656 bytes available (2258736 bytes used)
Switch#undelete 1
Switch#dir
-#- -length- -----date/time------ name
1   5204     May 03 1996 14:07:35 backup-config
2   5393     May 03 1996 15:32:57 startup-config
3   2247751  May 04 1996 12:08:51 ls1010-wi-m_1.1(1)

5736656 bytes available (2258736 bytes used)
Switch#
```

Permanently Delete Files on a Flash 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 **show flash** command.

Note You can use the **squeeze** command only on the Flash memory card inserted in the PCMCIA slot (**slot0:**) of the ASP card. You cannot use this command on the internal Flash memory.

To permanently delete files on a Flash memory device, complete the following task from privileged EXCE mode:

Task	Command
Permanently delete all deleted files on a Flash memory card.	**squeeze** *device***:**

When you issue the **squeeze** command, the switch 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.

Load and Display Software Images

You can also load and display software images, as described in the following section "Load Software Images Over the Network."

Load Software Images Over the Network

Each ASP has a writable control store (WCS) which stores software. You can load updated software onto the WCS from the onboard ROM or from Flash memory on the ASP card. You can load updated software onto the WCS from bootflash or a Flash memory card inserted in one of the PCMCIA slots of the ASP card.

With this feature, you can update software without having physical access to the switch, and you can load new software without rebooting the system.

To load software from Flash, complete the following tasks:

Task		Command
Step 1	Copy software files into Flash.	**copy tftp flash** or **copy tftp** *file_id* See the section "Copy System Images from a Network Server to Flash Memory" in this chapter for more information about how to copy TFTP images to Flash memory.
Step 2	Exit configuration mode.	**^Z**
Step 3	Retain new configuration information when the system is rebooted.	**copy running-config startup-config**

If an error occurs when you are attempting to download software, the system loads the default system software image. The default software image is bundled with the system software.

These configuration commands are implemented following one of three events:

- The system is booted.
- A card is inserted or removed.
- The configuration command **reload** is issued.

After you have entered a software configuration command and one of these events has taken place, all cards are reset, loaded with software from the appropriate sources, tested, and enabled for operation.

To signal to the system that all software configuration commands have been entered and the processor cards should be reloaded, complete the following task in interface configuration mode:

Task	Command
Notify the system that all software configuration commands have been entered and the processor cards should be reloaded.	**reload**

If Flash memory is busy because a card is being removed or inserted, or a **software reload** command is executed while Flash is locked, the files will not be available and the onboard ROM software will be loaded. Issue another **software reload** command when Flash memory is available, and the proper software will be loaded. The **show flash** command will show if another user or process has locked Flash memory.

The **software reload** command should not be used while Flash is in use. For example, do not use this command when a **copy tftp flash** or **show flash** command is active.

The **software reload** command is automatically added to your running configuration when you issue a software command that changes the system's default behavior of loading all processors from ROM.

Configure the Remote Shell and Remote Copy Functions

You can optionally configure your switch for remote shell (rsh) and remote copy (rcp) functions. This feature allows you to execute commands on remote switches and to remotely copy system images and configuration files to and from a network server or a switch.

Cisco's Implementation of rsh and rcp

One of the first attempts to use the network as a resource in the UNIX community resulted in the design and implementation of the remote shell protocol, which included the remote shell (rsh) and remote copy (rcp) functions. Rsh and rcp give users the ability to execute commands remotely and copy files to and from a file system residing on a remote host or server on the network. Cisco's implementation of rsh and rcp interoperates with standard implementations.

Using rsh

From the switch, you can use rsh to execute commands on remote systems to which you have access. When you issue the rsh command, a shell is started on the remote system. The shell allows you to execute commands on the remote system without having to log in to the target host.

You need not connect to the system or switch and then disconnect after you execute a command if you use rsh. For example, you can use rsh to remotely look at the status of other switches without connecting to the target switch, executing the command, and then disconnecting from the switch. This capability is useful for looking at statistics on many different switches.

Maintaining rsh Security

To gain access to a remote system running rsh, such as a UNIX host, an entry must exist in the system's *.rhosts* file or its equivalent identifying you as a trusted user who is authorized to execute commands remotely on the system. On UNIX systems, the *.rhosts* file identifies trusted users who can remotely execute commands on the system.

You can enable rsh support on a Cisco switch to allow users on remote systems to execute commands on the switch. However, our implementation of rsh does not support an *.rhosts* file. Instead, you configure a local authentication database to control access to the switch by users attempting to execute commands remotely using rsh. A local authentication database is similar in concept and use to a UNIX *.rhosts* file. Each entry that you configure in the authentication database identifies the local user, the remote host, and the remote user.

Using rcp

The rcp copy commands rely on the rsh server (or daemon) on the remote system. To copy files using rcp, you need not create a server for file distribution, as you do with TFTP. You need only to have access to a server that supports the remote shell (rsh). (Most UNIX systems support rsh.) Because you are copying a file from one place to another, you must have read permission on the source file and write permission on the destination file. If the destination file does not exist, rcp creates it for you.

Although our rcp implementation emulates the behavior of the UNIX rcp implementation—copying files among systems on the network—our command syntax differs from the UNIX rcp command syntax. Our rcp support offers a set of copy commands that use rcp as the transport mechanism. These rcp copy commands are similar in style to our TFTP copy commands, but they offer an alternative that provides faster performance and reliable delivery of data. These improvements are possible because the rcp transport mechanism is built on and uses the Transmission Control Protocol/Internet Protocol (TCP/IP) stack, which is connection-oriented. You can use rcp commands to copy system images and configuration files from the switch to a network server, and vice versa.

You can also enable rcp support on the switch to allow users on remote systems to copy files to and from the switch.

Configure for rsh and rcp Task List

To configure the switch for rsh and rcp, perform the following tasks:

- Configure a Switch to Support Incoming rcp Requests and rsh Commands
- Configure the Remote Username for rcp Requests
- Remotely Execute Commands Using rsh

Configure a Switch to Support Incoming rcp Requests and rsh Commands

You configure a local authentication database to control access to the switch by remote users. To allow remote users to execute rcp or rsh commands on the switch, configure entries for those users in the switch's authentication database.

Each entry configured in the authentication database identifies the local user, the remote host, and the remote user. You can specify the switch host name as the local username. To be allowed to remotely execute commands on the switch, the remote user must specify all three values—the local username, the remote host name, and the remote username—and therefore must be able to identify the local username. For rsh users, you can also grant a user permission to execute privileged EXEC commands remotely.

To make the local username available to remote users, you must communicate the username to the network administrator or the remote user. To allow a remote user to execute a command on the switch, our rcp implementation requires that the local username sent by the remote user match the local username configured in the database entry.

The switch software uses Domain Naming System (DNS) to authenticate the remote host's name and address. Because DNS can return several valid IP addresses for a host name, the switch software checks the address of the requesting client against all IP addresses for the named host returned by DNS. If the address sent by the requester is considered invalid, because if it does not match any address listed with DNS for the host name, then the switch software rejects the remote command execution request.

Note that if no DNS servers are configured for the switch, then the switch cannot authenticate the host in this manner. In this case, the switch software sends a broadcast request to attempt to gain access to DNS services on another server. If DNS services are not available, you must use the **no ip domain-lookup** command to disable the switch's attempt to gain access to a DNS server by sending a broadcast request.

If DNS services are not available and, therefore, you bypass the DNS security check, the switch software accepts the request to remotely execute a command *only if* all three values sent with the request match exactly the values configured for an entry in the local authentication file.

If DNS is enabled but you do not want to use DNS for rcmd (remote command) queries, use the **no ip rcmd domain-lookup** command.

To ensure security, the switch is *not* enabled to support rcp requests from remote users by default. When the switch is not enabled to support rcp, the authorization database has no effect.

Configure a Switch to Support Incoming rcp Requests and rsh Commands Task List

To configure the switch to allow users on remote systems to copy files to and from the switch and execute commands on the switch, perform the tasks in either of the first sections and, if desired, the task in the third section:

- Configure the Switch to Accept rcp Requests from Remote Users
- Configure the Switch to Allow Remote Users to Execute Commands Using rsh
- Turn Off DNS Lookups for rcp and rsh

Configure the Switch to Accept rcp Requests from Remote Users

To configure the switch to support incoming rcp requests, complete the following tasks:

Task		Command
Step 1	Enter configuration mode from the terminal.	**configure terminal**
Step 2	Create an entry in the local authentication database for each remote user who is allowed to execute rcp commands on the switch.	**ip rcmd remote-host** *local-username* {*ip-address* | *host*} *remote-username*
Step 3	Enable the switch to support incoming rcp requests.	**ip rcmd rcp-enable**

To disable the switch from supporting incoming rcp requests, use the **no ip rcmd rcp-enable** command.

Note When the switch's support for incoming rcp requests is disabled, you can still use the rcp commands to copy images from remote servers. The switch's support for incoming rcp requests is distinct from its ability to handle outgoing rcp requests.

The following example shows how to add two entries for remote users to the switch's authentication database and then enable the switch to support remote copy requests from remote users. The users, named *netadmin1* on the remote host at IP address 131.108.15.55 and *netadmin3* on the remote host at IP address 131.108.101.101, are both allowed to connect to the switch and remotely execute rcp commands on it after the switch is enabled to support rcp. Both authentication database entries give the switch's host name *Switch1* as the local username. The fourth command enables the switch to support rcp requests from remote users.

```
Switch#configure terminal
Switch(config)#ip rcmd remote-host Switch1 131.108.15.55 netadmin1
Switch(config)#ip rcmd remote-host Switch1 131.108.101.101 netadmin3
Switch(config)#ip rcmd rcp-enable
```

Configure the Switch to Allow Remote Users to Execute Commands Using rsh

To configure the switch as an rsh server, complete the following tasks:

Task		Command
Step 1	Enter configuration mode from the terminal.	**configure terminal**
Step 2	Create an entry in the local authentication database for each remote user who is allowed to execute rsh commands on the switch.	**ip rcmd remote-host** *local-username* {*ip-address* | *host*} *remote-username* [**enable**]
Step 3	Enable the switch to support incoming rsh commands.	**ip rcmd rsh-enable**

To disable the switch from supporting incoming rsh commands, use the **no ip rcmd rsh-enable** command.

Note When the switch is disabled, you can still issue an rsh command to be executed on other switches that support the rsh protocol and on UNIX hosts on the network.

The following example shows how to add two entries for remote users to the switch's authentication database, and enable the switch to support rsh commands from remote users. The users, named *rmtnetad1* and *netadmin4*, are both on the remote host at IP address 131.108.101.101. Although both users are on the same remote host, you must include a unique entry for each user. Both users are allowed to connect to the switch and remotely execute rsh commands on it after the switch is enabled for rsh. The user named *netadmin4* is allowed to execute privileged EXEC mode commands on the switch. Both authentication database entries give the switch's host name *Switch1* as the local username. The fourth command enables the switch to support rsh commands issued by remote users.

```
Switch#configure terminal
Switch(config)#ip rcmd remote-host Switch1 131.108.101.101 rmtnetad1
Switch(config)#ip rcmd remote-host Switch1 131.108.101.101 netadmin4 enable
Switch(config)#ip rcmd rsh-enable
```

Turn Off DNS Lookups for rcp and rsh

To bypass the DNS security check when DNS services are configured but not available, perform the following task in global configuration mode:

Task	Command
Bypass the DNS security check.	**no ip rcmd domain-lookup**

The switch software accepts the request to remotely execute a command only if all three values sent with the request match exactly the values configured for an entry in the local authentication file.

Configure the Remote Username for rcp Requests

From the switch, you can use rcp to remotely copy files to and from network servers and hosts if those systems support rcp. You do not need to configure the switch to issue rcp requests from the switch using rcp. However, to prepare to use rcp from the switch for remote copying, you can perform an optional configuration process to specify the remote username to be sent on each rcp request.

The rcp protocol requires that a client send the remote username on an rcp request. By default, the switch software sends the remote username associated with the current TTY (terminal) process, if that name is valid, for rcp commands.

Note For Cisco, TTYs are commonly used in communications servers. The concept of TTY originated with UNIX. For UNIX systems, each physical device is represented in the file system. Terminals are called *TTY devices*, which stands for *teletype*, the original UNIX terminal.

If the username for the current TTY process is not valid, the switch software sends the host name as the remote username. For boot commands using rcp, the switch software sends the switch host name by default. You cannot explicitly configure the remote username.

If the remote server has a directory structure, as do UNIX systems, rcp performs its copy operations along the following lines:

- When copying from the remote server, rcp searches for the system image or configuration file to be copied relative to the directory of the remote username.
- When copying to the remote server, rcp writes the system image or configuration file to be copied relative to the directory of the remote username.
- When booting an image, rcp searches for the image file on the remote server relative to the directory of the remote username.

To override the default remote username sent on rcp requests, complete the following tasks starting in privileged EXEC mode:

Task		Command
Step 1	Enter configuration mode from the terminal.	**configure terminal**
Step 2	Specify the remote username.	**ip rcmd remote-username** *username*

To remove the remote username and return to the default value, use the **no ip rcmd remote-username** command.

Remotely Execute Commands Using rsh

You can use rsh to execute commands remotely on network servers that support the remote shell protocol. To use this command, the *.rhosts* files on the network server must include an entry that permits you to remotely execute commands on that host.

If the remote server has a directory structure, as do UNIX systems, the rsh command that you issue is remotely executed from the directory of the account for the remote user that you specify through the **/user** *username* keyword and argument pair.

If you do not specify the **/user** keyword and argument, the switch sends a default remote username. As the default value of the remote username, the switch software sends the remote username associated with the current TTY process, if that name is valid. If the TTY remote username is invalid, the switch software uses the switch host name as the both the remote and local usernames.

To execute a command remotely on a network server using rsh, perform the following tasks in privileged EXEC mode:

Task		Command
Step 1	Enter privileged EXEC mode.	**enable** [*password*][1]
Step 2	Enter the rsh command to be executed remotely.	**rsh** {*ip-address* | *host*} [**/user** *username*] *remote-command*

1. This command is documented in the *LightStream 1010 ATM Switch Command Reference* publication.

The following example shows how to execute a command remotely using rsh:

```
Switch> enable
Switch# rsh mysys.cisco.com /u sharon ls -a
.
..
.alias
.cshrc
.emacs
.exrc
.history
.login
.mailrc
.newsrc
.oldnewsrc
.rhosts
.twmrc
.xsession
jazz
Switch#
```

Manually Load a System Image from ROM Monitor

If your switch does not find a valid system image, or if its configuration file is corrupted at startup, and the configuration register is set to enter ROM monitor mode, the system might enter ROM monitor mode. From this mode, you can manually load a system image from Flash memory, from a network server file, or from ROM.

You can also enter ROM monitor mode by restarting the switch and then pressing the **Break** key during the first 60 seconds of startup.

Manually Boot from Flash memory

To manually boot from Flash memory, complete the following tasks:

Task		Command
Step 1	Restart the switch.	**reload**
Step 2	Press the **Break** key during the first 60 seconds while the system is starting up.	Break
Step 3	Manually boot the switch from Flash.	**boot** *device***:**[*filename*]

In the following example, the switch is manually booted from Flash memory. Because the optional *filename* argument is absent, the first file in Flash memory is loaded.

```
>boot
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Uncompressing file:  ###########################################################
################################################################################
################################################################################
################################################################################
################################################################################
################################################################################
################################################################################
#########

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cisco ASP1 (R4600) processor with 16384K bytes of memory.
R4600 processor, Implementation 32, Revision 2.0
Last reset from power-on
1 Ethernet/IEEE 802.3 interface.
16 ATM network interfaces.
125K bytes of non-volatile configuration memory.

8192K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).


hello
%LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0/0, changed state to up


<Information Deleted>
```

```
%LINK-3-UPDOWN: Interface ATM1/1/2, changed state to down
%LINK-3-UPDOWN: Interface ATM1/1/3, changed state to down
%SYS-5-RESTART: System restarted --
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Switch>
```

In the following example, the **boot bootflash** command is used with the filename *ls1010-m_1*—the name of the file that is loaded:

```
> boot bootflash ls1010-m_1
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Uncompressing file:  ###########################################################
################################################################################
################################################################################
################################################################################
################################################################################
################################################################################
################################################################################
#########

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8192K bytes of Flash PCMCIA card at slot 0 (Sector size 128K).
8192K bytes of Flash internal SIMM (Sector size 256K).


hello
%LINEPROTO-5-UPDOWN: Line protocol on Interface ATM0/0/0, changed state to up


<Information Deleted>
```

```
%LINK-3-UPDOWN: Interface ATM1/1/2, changed state to down
%LINK-3-UPDOWN: Interface ATM1/1/3, changed state to down
%SYS-5-RESTART: System restarted --
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Switch>
```

Manually Boot from a Network File

To manually boot from a network file, complete the following tasks in EXEC mode:

Task		Command
Step 1	Restart the switch.	**reload**
Step 2	Press the **Break** key during the first 60 seconds while the system is starting up.	Break
Step 3	Manually boot the switch from a network file.	**boot** *filename* [*ip-address*]

In the following example, the switch is manually booted from the network file *network1*:

```
>boot network1
```

Manually Boot from ROM

To manually boot the switch from ROM, complete the following steps in EXEC mode:

Task		Command
Step 1	Restart the switch.	**reload**
Step 2	Press the **Break** key during the first 60 seconds while the system is starting up.	Break
Step 3	Manually boot the switch from ROM.	**boot**

In the following example, the switch is manually booted from ROM:

```
>boot
```

Use the System Image Instead of Reloading

To return to EXEC mode from the ROM monitor to use the system image instead of reloading, perform the following task in ROM monitor mode:

Task	Command
Return to EXEC mode to use the system image.	**continue**