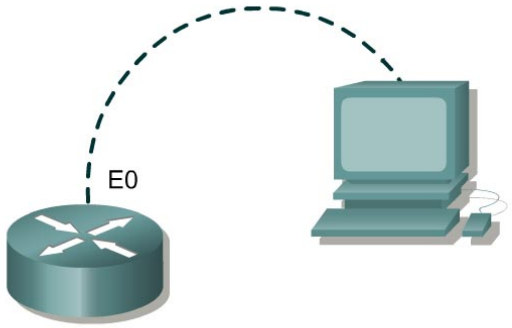
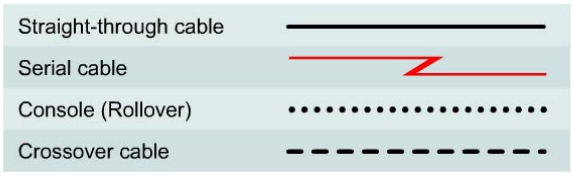
Lab 5.2.5 Managing IOS Images with TFTP – Instructor Version 2500



Router designation	Router name	Fast Ethernet 0 address	Subnet mask all addresses
Router 1	GAD	192.168.14.1	255.255.255.0



Objective

- Backup a copy of a router IOS from flash to a TFTP server.
- Reload the backup IOS software image from a TFTP server into flash on a router.

Background/Preparation

For recovery purposes it is important to keep backup copies of router IOS images. These can be stored in a central location such as a TFTP server and retrieved if necessary.

Setup a network as displayed in the figure. Any router that meets the interface requirements may be used. Possible routers include 800, 1600, 1700, 2500, 2600 routers, or a combination. Refer to the chart at the end of the lab to correctly identify the interface identifiers to be used based on the equipment in the lab. The configuration output used in this lab is produced from 1721 series routers. Any other router used may produce slightly different output.

Start a HyperTerminal session as performed in the Establishing a HyperTerminal session lab.

Step 1 Configure the GAD router

a. Using the table at the beginning of the lab, configure the router hostname and Ethernet interface. If there are any difficulties configuring hostname, refer to the Configuring Router Passwords lab. If there are any difficulties configuring the interface, refer to the Configuring Host Tables lab.

b. Verify the router configuration by performing a **`show running-config`**. Correct any configuration errors and verify.

Step 2 Configure the workstation

A workstation with the TFTP server software must be available for this lab. There are a number of good freeware and shareware TFTP servers available by searching the Internet for "TFTP server". This Lab uses the Cisco TFTP server. Verify that the software is available. If not, ask your instructor for assistance.

Configure the TFTP Host as follows:

IP Address	192.168.14.2
IP subnet mask	255.255.255.0
Default gateway	192.168.14.1

Confirm that the host has accepted the new IP settings with the **winipcfg** command (Windows 9x) or the **ipconfig** command (Windows NT/2000/XP).

Step 3 Collect information to document the router

The answers may vary.

a. Issue the **show version** command.

b. What is the current value of the config-register? 0x 2102

c. How much flash memory does this router have? 16MB

d. Is there at least 4mb (4096K) of flash? Yes (This lab requires at least 4Mb flash!)

e. What is the version number of boot ROM? 11.0(10c)

f. Is the boot ROM version 5.2 or later? Yes (This lab requires 5.2 or later)

Step 4 Collect more information to document the router

The answers may vary.

a. Issue the **show flash** command.

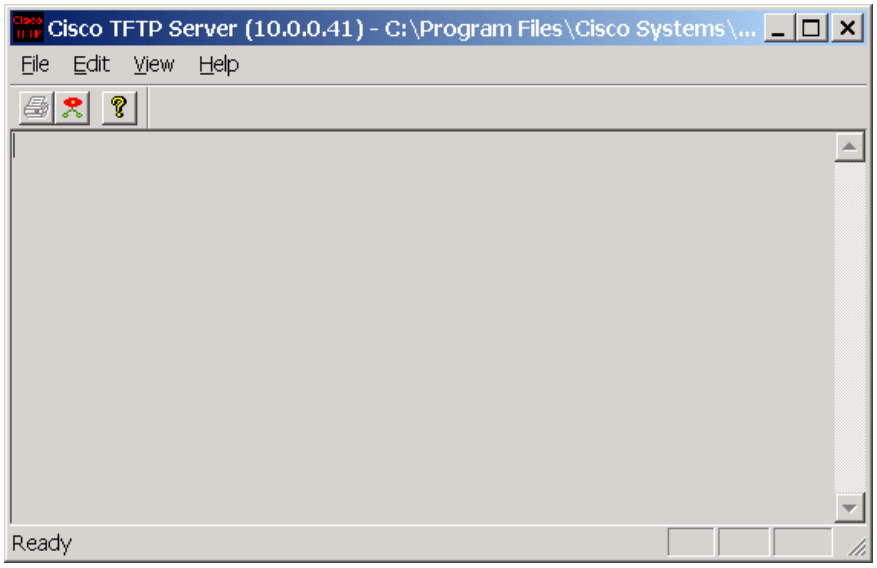
b. Is there a file already stored in flash? Yes

c. If so, what is the exact name of that file? c2500-i-l.121-18.bin

d. How much of flash is available or unused? 8753692_available

Step 5 Start and configure the Cisco TFTP Server

Start the TFTP server.



Step 6 Verify connectivity

Ping the TFTP server from the Gadsden router.

If the ping fails, review host and router configurations to resolve the problem.

Step 7 Copy IOS to TFTP server

a. Before copying the files, verify that the TFTP server is running.

b. What is the IP address of the TFTP server? 192.168.14.2

c. From the console session, enter **`show flash`**.

d. What is the name and length of the Cisco IOS image stored in flash?

c2500-i-l.121-18.bin and 8023460

e. What attributes can be identified from codes in the Cisco IOS filename?

Hardware platform, feature set, file format, and version number

Step 8 Copy the IOS image to the TFTP server

a. From the console session in the privileged EXEC mode, enter the **`copy flash tftp`** command. At the prompt enter the IP address of the TFTP server. Filenames will vary based on IOS and platform. The filename for your system was reported in Step 4:

```
GAD#copy flash tftp
Source filename []? flash:c1700-y-mz.122-11.T.bin
Address or name of remote host []? 192.168.14.2
Destination filename [c1700-y-mz.122-11.T.bin]? y
```

After entering this command and answering the process requests, the student should see the following output on the console. The process may take a few minutes depending on the size of the image. Do not interrupt this process.

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
4284648 bytes copied in 34.012 secs (125975 bytes/sec)
```

Step 9 Verify the transfer to the TFTP server

a. Check the TFTP server log file by clicking **View** > **Log File**. The output should resemble the following output:

```
Mon Sep 16 14:10:08 2003: Receiving 'c1700-y-mz.122-11.T.bin' in binary
mode
Mon Sep 16 14:11:14 2003: Successful.
```

b. Verify the flash image size in the TFTP server directory. To locate it, click on **View** > **Options**. This will show the TFTP server root directory. It should be similar to the following, unless the default directories were changed:

```
C:\Program Files\Cisco Systems\Cisco TFTP Server
```

If not using the Cisco TFTP server consult the supplied documentation for default TFTP server root directory.

c. Locate this directory using Windows Explorer or My Computer. Look at the detail listing of the file. The file length in the **`show flash`** command should be the same file size as the file stored on the TFTP server. If the file sizes are not identical, check with the instructor.

Step 10 Copy the IOS image from the TFTP server

a. Now that the IOS is backed up, the image must be tested and the IOS restored to the router. Ping the TFTP server IP address. When prompted for "Destination filename" use the file name from Step 7.

b. Record the IP address of the TFTP server. 192.168.14.2

c. Copy from the privileged EXEC prompt.

```
GAD#copy tftp flash
Address or name of remote host []?192.168.14.2
Source filename []?c1700-y-mz.122-11.T.bin
Destination filename [c1700-y-mz.122-11.T.bin]? [Enter]
%Warning:There is a file already existing with this name
Do you want to over write? [confirm]
Accessing tftp://192.168.14.2/c1700-y-mz.122-11.T.bin...
Erase flash: before copying? [confirm][Enter]
Erasing the flash filesystem will remove all files! Continue?
[confirm][Enter]
Erasing device...
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
...erased
Erase of flash: complete
Loading c1700-y-mz.122-11.T.bin from 192.168.14.2 (via
FastEthernet0):!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 4284648 bytes]

Verifying checksum...  OK (0x9C8A)
4284648 bytes copied in 26.584 secs (555739 bytes/sec)
```

d. The router may prompt to erase flash. Will the image fit in available flash? Yes

e. If the flash is erased, what happened on the router console screen as it was doing so?

Lines of “e”s will popup as the flash module is being erased.

f. What is the size of the file being loaded? 4284648 bytes (results may vary)

g. What happened on the router console screen as the file was being downloaded?

Lines of “!”s will popup as the file is being downloaded.

h. Was the verification successful? Yes

i. Was the whole operation successful? Yes

Step 11 Test the restored IOS image

a. Verify that the router Image is correct. Cycle the router power and observe the startup process to confirm that there were no flash errors. If there are none, then the router IOS should have started correctly.

b. Further verify IOS image in flash by issuing the `show version` command which will show output similar to:

```
System image file is "flash:c1700-y-mz.122-11.T.bin"
```

Upon completion of the previous steps, logoff by typing **exit**. Turn the router off.

Erasing and reloading the router

Enter into the privileged EXEC mode by typing **enable**.

```
Router>enable
```

If prompted for a password, enter **class**. If “class” does not work, ask the instructor for assistance.

At the privileged EXEC mode, enter the command **erase startup-config**.

```
Router#erase startup-config
```

The responding line prompt will be:

```
Erasing the nvram filesystem will remove all files! Continue?
[confirm]
```

Press **Enter** to confirm.

The response should be:

```
Erase of nvram: complete
```

Now at the privileged EXEC mode, enter the command **reload**.

```
Router#reload
```

The responding line prompt will be:

```
System configuration has been modified. Save? [yes/no]:
```

Type **n** and then press **Enter**.

The responding line prompt will be:

```
Proceed with reload? [confirm]
```

Press **Enter** to confirm.

In the first line of the response will be:

```
Reload requested by console.
```

After the router has reloaded the line prompt will be:

```
Would you like to enter the initial configuration dialog? [yes/no]:
```

Type **n** and then press **Enter**.

The responding line prompt will be:

```
Press RETURN to get started!
```

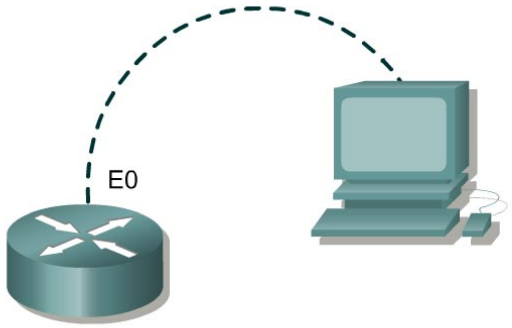
Press **Enter**.

The router is ready for the assigned lab to be performed.

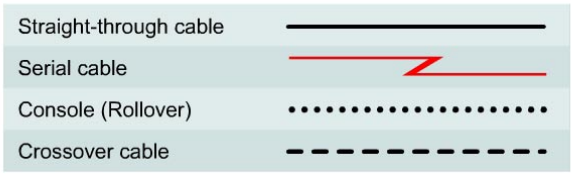
Router Interface Summary					
Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2	Interface #5
800 (806)	Ethernet 0 (E0)	Ethernet 1 (E1)			
1600	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)	
1700	FastEthernet 0 (FA0)	FastEthernet 1 (FA1)	Serial 0 (S0)	Serial 1 (S1)	
2500	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)	
2600	FastEthernet 0/0 (FA0/0)	FastEthernet 0/1 (FA0/1)	Serial 0/0 (S0/0)	Serial 0/1 (S0/1)	
In order to find out exactly how the router is configured, look at the interfaces. This will identify the type of router as well as how many interfaces the router has. There is no way to effectively list all of the combinations of configurations for each router class. What is provided are the identifiers for the possible combinations of interfaces in the device. This interface chart does not include any other type of interface even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in IOS command to represent the interface.					

```
router#show version
Cisco Internetwork Operating System Software
IOS (tm) 2500 Software (C2500-I-L), Version 12.1(18), RELEASE SOFTWARE (fc1)
Copyright (c) 1986-2002 by cisco Systems, Inc.
Compiled Mon 02-Dec-02 23:45 by kellythw
Image text-base: 0x03041E94, data-base: 0x00001000

ROM: System Bootstrap, Version 11.0(10c), SOFTWARE
BOOTLDR: 3000 Bootstrap Software (IGS-BOOT-R), Version 11.0(10c), RELEASE
SOFTWARE (fc1)

router uptime is 29 minutes
System returned to ROM by reload
System image file is "flash:c2500-i-l.121-18.bin"

cisco 2500 (68030) processor (revision N) with 14336K/2048K bytes of memory.
Processor board ID 08026577, with hardware revision 00000001
Bridging software.
X.25 software, Version 3.0.0.
Basic Rate ISDN software, Version 1.1.
1 Ethernet/IEEE 802.3 interface(s)
2 Serial network interface(s)
1 ISDN Basic Rate interface(s)
32K bytes of non-volatile configuration memory.
16384K bytes of processor board System flash (Read ONLY)

Configuration register is 0x2102


router#show flash

System flash directory:
File  Length    Name/status
  1   8023460   c2500-i-l.121-18.bin
[8023524 bytes used, 8753692 available, 16777216 total]
16384K bytes of processor board System flash (Read ONLY)
```


Lab 5.2.5 Managing IOS Images with TFTP – Instructor Version 2600



Router designation	Router name	Fast Ethernet 0 address	Subnet mask all addresses
Router 1	GAD	192.168.14.1	255.255.255.0



Objective

- Backup a copy of a router IOS from flash to a TFTP server.
- Reload the backup IOS software image from a TFTP server into flash on a router.

Background/Preparation

For recovery purposes it is important to keep backup copies of router IOS images. These can be stored in a central location such as a TFTP server and retrieved if necessary.

Setup a network as displayed in the figure. Any router that meets the interface requirements may be used. Possible routers include 800, 1600, 1700, 2500, 2600 routers, or a combination. Refer to the chart at the end of the lab to correctly identify the interface identifiers to be used based on the equipment in the lab. The configuration output used in this lab is produced from 1721 series routers. Any other router used may produce slightly different output.

Start a HyperTerminal session as performed in the Establishing a HyperTerminal session lab.

Step 1 Configure the GAD router

a. Using the table at the beginning of the lab, configure the router hostname and Ethernet interface. If there are any difficulties configuring hostname, refer to the Configuring Router Passwords lab. If there are any difficulties configuring the interface, refer to the Configuring Host Tables lab.

b. Verify the router configuration by performing a **`show running-config`**. Correct any configuration errors and verify.

Step 2 Configure the workstation

A workstation with the TFTP server software must be available for this lab. There are a number of good freeware and shareware TFTP servers available by searching the Internet for "TFTP server". This Lab uses the Cisco TFTP server. Verify that the software is available. If not, ask your instructor for assistance.

Configure the TFTP Host as follows:

IP Address	192.168.14.2
IP subnet mask	255.255.255.0
Default gateway	192.168.14.1

Confirm that the host has accepted the new IP settings with the **winipcfg** command (Windows 9x) or the **ipconfig** command (Windows NT/2000/XP).

Step 3 Collect information to document the router

The answers may vary.

a. Issue the **show version** command.

b. What is the current value of the config-register? 0x 2102

c. How much flash memory does this router have? 64MB

d. Is there at least 4mb (4096K) of flash? Yes (This lab requires at least 4Mb flash.)

e. What is the version number of boot ROM? 12.1(3r)T2

f. Is the boot ROM version 5.2 or later? Yes (This lab requires 5.2 or later.)

Step 4 Collect more information to document the router

The answers may vary.

a. Issue the **show flash** command.

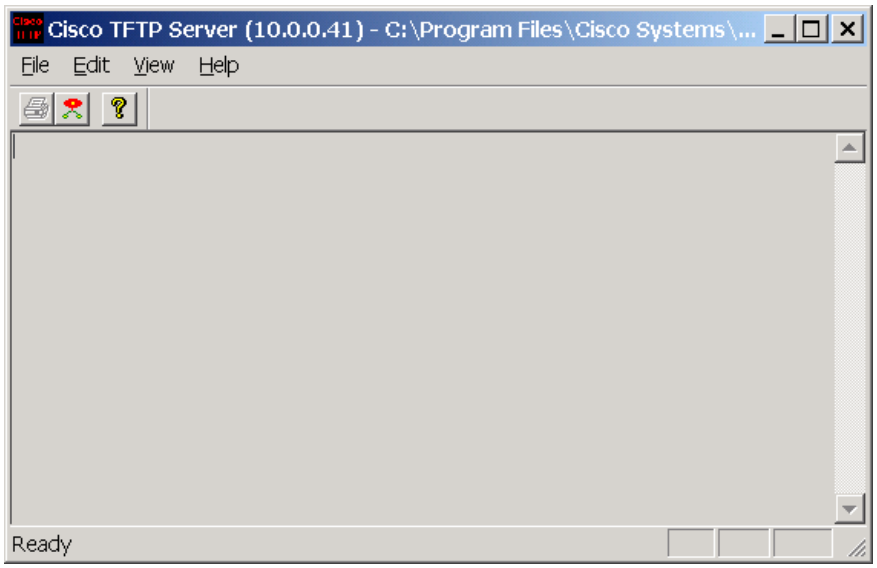
b. Is there a file already stored in flash? Yes

c. If so, what is the exact name of that file? c2600-is-mz.122-12.bin

d. How much of flash is available or unused? 11101176_available

Step 5 Start and configure the Cisco TFTP Server

Start the TFTP server.



Step 6 Verify connectivity

Ping the TFTP server from the Gadsden router.

If the ping fails, review host and router configurations to resolve the problem.

Step 7 Copy IOS to TFTP server

a. Before copying the files, verify that the TFTP server is running.

b. What is the IP address of the TFTP server? 192.168.14.2

c. From the console session, enter **show flash**.

d. What is the name and length of the Cisco IOS image stored in flash?

c2500-i-l.121-18.bin and 8023460

e. What attributes can be identified from codes in the Cisco IOS filename?

Hardware platform, feature set, file format, and version number

Step 8 Copy the IOS image to the TFTP server

a. From the console session in the privileged EXEC mode, enter the **copy flash tftp** command. At the prompt enter the IP address of the TFTP server. Filenames will vary based on IOS and platform. The filename for your system was reported in Step 4:

```
GAD#copy flash tftp
Source filename []? flash:c1700-y-mz.122-11.T.bin
Address or name of remote host []? 192.168.14.2
Destination filename [c1700-y-mz.122-11.T.bin]? y
```

After entering this command and answering the process requests, the student should see the following output on the console. The process may take a few minutes depending on the size of the image. Do not interrupt this process.

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
4284648 bytes copied in 34.012 secs (125975 bytes/sec)
```

Step 9 Verify the transfer to the TFTP server

a. Check the TFTP server log file by clicking **View** > **Log File**. The output should resemble the following output:

```
Mon Sep 16 14:10:08 2003: Receiving 'c1700-y-mz.122-11.T.bin' in binary
mode
Mon Sep 16 14:11:14 2003: Successful.
```

b. Verify the flash image size in the TFTP server directory. To locate it, click on **View** > **Options**. This will show the TFTP server root directory. It should be similar to the following, unless the default directories were changed:

```
C:\Program Files\Cisco Systems\Cisco TFTP Server
If not using the Cisco TFTP server consult supplied documentation for
default TFTP server root directory
```


c. Locate this directory using Windows Explorer or My Computer. Look at the detail listing of the file. The file length in the **show flash** command should be the same file size as the file stored on the TFTP server. If the file sizes are not identical, check with the instructor.

Step 10 Copy the IOS image from the TFTP server

a. Now that the IOS is backed up, the image must be tested and the IOS restored to the router. Ping the TFTP server IP address. When prompted for "Destination filename" use the file name from Step 7.

b. Record the IP address of the TFTP server. 192.168.14.2

c. Copy from the privileged EXEC prompt.

```
GAD#copy tftp flash
Address or name of remote host []?192.168.14.2
Source filename []?c1700-y-mz.122-11.T.bin
Destination filename [c1700-y-mz.122-11.T.bin]? [Enter]
%Warning:There is a file already existing with this name
Do you want to over write? [confirm]
Accessing tftp://192.168.14.2/c1700-y-mz.122-11.T.bin...
Erase flash: before copying? [confirm][Enter]
Erasing the flash filesystem will remove all files! Continue?
[confirm][Enter]
Erasing device...
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
...erased
Erase of flash: complete
Loading c1700-y-mz.122-11.T.bin from 192.168.14.2 (via
FastEthernet0):!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 4284648 bytes]

Verifying checksum...  OK (0x9C8A)
4284648 bytes copied in 26.584 secs (555739 bytes/sec)
```

d. The router may prompt to erase flash. Will the image fit in available flash? Yes

e. If the flash is erased, what happened on the router console screen as it was doing so?

Lines of “e”s will popup as the flash module is being erased.

f. What is the size of the file being loaded? 4284648 bytes (Results will vary.)

g. What happened on the router console screen as the file was being downloaded?

Lines of “!”s will popup as the file is being downloaded.

h. Was the verification successful? Yes

i. Was the whole operation successful? Yes

Step 11 Test the restored IOS image

a. Verify that the router Image is correct. Cycle the router power and observe the startup process to confirm that there were no flash errors. If there are none, then the router IOS should have started correctly.

b. Further verify IOS image in flash by issuing the **show version** command which will show output similar to:

```
System image file is "flash:c1700-y-mz.122-11.T.bin"
```

Upon completion of the previous steps, logoff by typing **exit**. Turn the router off.

Erasing and reloading the router

Enter into the privileged EXEC mode by typing **enable**.

```
Router>enable
```

If prompted for a password, enter **class**. If “class” does not work, ask the instructor for assistance.

At the privileged EXEC mode, enter the command **erase startup-config**.

```
Router#erase startup-config
```

The responding line prompt will be:

```
Erasing the nvram filesystem will remove all files! Continue?
[confirm]
```

Press **Enter** to confirm.

The response should be:

```
Erase of nvram: complete
```

Now at the privileged EXEC mode, enter the command **reload**.

```
Router#reload
```

The responding line prompt will be:

```
System configuration has been modified. Save? [yes/no]:
```

Type **n** and then press **Enter**.

The responding line prompt will be:

```
Proceed with reload? [confirm]
```

Press **Enter** to confirm.

In the first line of the response will be:

```
Reload requested by console.
```

After the router has reloaded the line prompt will be:

```
Would you like to enter the initial configuration dialog? [yes/no]:
```

Type **n** and then press **Enter**.

The responding line prompt will be:

```
Press RETURN to get started!
```

Press **Enter**.

The router is ready for the assigned lab to be performed.

Router Interface Summary					
Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2	Interface #5
800 (806)	Ethernet 0 (E0)	Ethernet 1 (E1)			
1600	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)	
1700	FastEthernet 0 (FA0)	FastEthernet 1 (FA1)	Serial 0 (S0)	Serial 1 (S1)	
2500	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)	
2600	FastEthernet 0/0 (FA0/0)	FastEthernet 0/1 (FA0/1)	Serial 0/0 (S0/0)	Serial 0/1 (S0/1)	
In order to find out exactly how the router is configured, look at the interfaces. This will identify the type of router as well as how many interfaces the router has. There is no way to effectively list all of the combinations of configurations for each router class. What is provided are the identifiers for the possible combinations of interfaces in the device. This interface chart does not include any other type of interface even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in IOS command to represent the interface.					


```
router#show version
01:05:33: %SYS-5-CONFIG_I: Configured from console by consolesho ver
Cisco Internetwork Operating System Software
IOS (tm) C2600 Software (C2600-IS-M), Version 12.2(12), RELEASE SOFTWARE (fc1)
Copyright (c) 1986-2002 by cisco Systems, Inc.
Compiled Wed 21-Aug-02 03:01 by pwade
Image text-base: 0x8000808C, data-base: 0x810CE168

ROM: System Bootstrap, Version 12.1(3r)T2, RELEASE SOFTWARE (fc1)

router uptime is 1 hour, 5 minutes
System returned to ROM by reload
System image file is "flash:c2600-is-mz.122-12.bin"

cisco 2621 (MPC860) processor (revision 0x600) with 60416K/5120K bytes of
memory.
Processor board ID JAD054304U6 (196842265)
M860 processor: part number 0, mask 49
Bridging software.
X.25 software, Version 3.0.0.
2 FastEthernet/IEEE 802.3 interface(s)
2 Low-speed serial(sync/async) network interface(s)
32K bytes of non-volatile configuration memory.
16384K bytes of processor board System flash (Read/Write)

Configuration register is 0x2102

router#


router#show flash

System flash directory:
File  Length    Name/status
  1   5413832   c2600-is-mz.122-12.bin
[5413896 bytes used, 11101176 available, 16515072 total]
16384K bytes of processor board System flash (Read/Write)
```

