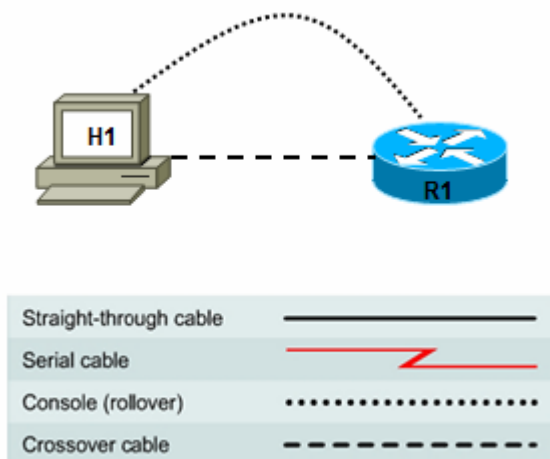


Lab 8.4.3a Managing Cisco IOS Images with TFTP



Device	Host Name	Interface	IP Address	Subnet Mask
R1	R1	Fast Ethernet 0/0	172.17.0.1	255.255.0.0

Objectives

- Analyze the Cisco IOS image and router flash memory.
- Use TFTP to copy the software image from a router to a TFTP server.
- Reload the backup software image from a TFTP server into flash on a router.

Background / Preparation

In this lab, you use the **show flash** command to view the files in the router flash memory and determine the amount of flash available. You will use Trivial File Transfer Protocol (TFTP) server software to back up the router Cisco IOS image to the TFTP server. You then copy the Cisco IOS image from the TFTP server back to the router.

Set up a network similar to the one in the topology diagram. Any router that meets the interface requirements displayed in that diagram—such as 800, 1600, 1700, 1800, 2500, or 2600 routers, or a combination of these—can be used. See the Router Interface Summary table at the end of the lab to determine which interface identifiers to use based on the equipment in the lab. This lab uses a Cisco 1841 router with Cisco IOS 12.4. Depending on the model of the router, output may vary from what is shown in this lab.

Required Resources

The following resources are required:

- One router with an Ethernet interface
- One Windows XP computer (or Discovery Server)
- Crossover Category 5 Ethernet cable (H1 to router R1)
- Console cable (from H1 to R1)

- Access to the computer host command prompt
- Access to the computer host network TCP/IP configuration

Note: Instead of using a PC and installing TFTP server software, you may use the Discovery Server, which has Linux-based TFTP server software pre-installed. Check with the instructor on the availability of a Discovery Server CD. The Discovery Server can take the place of host H1 in the topology diagram. The IP addresses used to configure host H1 and R1 in this lab are compatible with the Discovery Server.

From host H1, start a HyperTerminal session to the attached router.

Note: Make sure that the router has been erased and has no startup configurations. Instructions for erasing are provided in the Lab Manual, located on Academy Connection in the Tools section. Check with the instructor if you are unsure of how to do this.

Task 1: Build the Network and Verify Connectivity

Step 1: Configure the TFTP server host.

Connect the router and host H1 according to the topology diagram. Configure the host H1 IP address with the following settings.

IP address: 172.17.0.2
Subnet mask: 255.255.0.0
Default gateway: 172.17.0.1

Step 2: Log in to router R1 and configure the basic settings.

- a. Configure the host name for R1.

```
Router>enable
Router#configure terminal
Router(config)#hostname R1
```

- b. Configure a console, vty, and enable secret passwords. Configure synchronous logging for the console line.

```
R1(config)#line console 0
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#logging synchronous
R1(config-line)#line vty 0 4
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#exit
R1(config)#enable secret class
R1(config)#exit
```

- c. Configure a message-of-the-day (MOTD) banner and no ip domain lookup.

```
R1(config)#banner motd #Unauthorized Use Prohibited#
R1(config)#no ip domain lookup
```

- d. Configure the R1 Fast Ethernet interface.

```
R1(config)#interface FastEthernet 0/0
R1(config-if)#description R1 LAN Default Gateway
R1(config-if)#ip address 172.17.0.1 255.255.0.0
R1(config-if)#no shutdown
R1(config-if)#end
```

Step 3: Display the R1 router configuration.

Issue the **show running-config** command in privileged EXEC mode, and verify all the configuration commands that you have entered so far. Note that this command can be abbreviated as **sh run**.

```
R1#show running-config
```

Step 4: Verify basic connectivity.

Host H1 will be the TFTP server, and router R1 will be the TFTP client. To copy files to and from a TFTP server, you must have IP connectivity between the server and the client.

From host H1, ping the router Fast Ethernet interface at IP address 172.17.0.1. Are the pings successful?

If the pings are not successful, troubleshoot the host and router configurations until they are.

Step 5: Save the configuration on R1.

Save the running configuration to the startup configuration from the privileged EXEC prompt.

```
R1#copy running-config startup-config
```

Task 2: Collect Router Memory and Image Information

Step 1: Collect information to document the router.

- From the router HyperTerminal session, issue the **show version** command.

```
Router>show version
```

- What is the value of the config-register? _____
- How much flash memory does this router have? _____
- Is there at least 4 MB (4096 KB) of flash memory? _____ (This lab requires at least 4 MB.)
- What is the version number of the boot ROM? _____

(This lab requires 5.2 or later.)

Step 2: Collect information about flash memory.

- Issue the **show flash** command.

```
Router>show flash
```

- Is the Cisco IOS image already stored in flash? _____
- If yes, what is the exact name of that file? _____
- What is the size of the image in flash memory? _____
- How much flash is available or unused? _____

Note: There must be enough total flash memory to hold the new Cisco IOS image.

Task 3: Use TFTP to Save the Cisco IOS Image

Step 1: Obtain and install the TFTP server application.

There are many free TFTP servers available. A search for “free TFTP server” identifies several you can choose from to download. This lab uses the free SolarWinds TFTP Server application. SolarWinds is a multithreaded TFTP server commonly used to upload and download executable images and configurations to routers and switches. It runs on most Microsoft® operating systems, including Windows® XP, Vista, 2000, and 2003. The SolarWinds software requires the Microsoft .NET 2.0 framework to install.

Note: Check with the instructor for a copy of SolarWinds or another TFTP server that you can install.

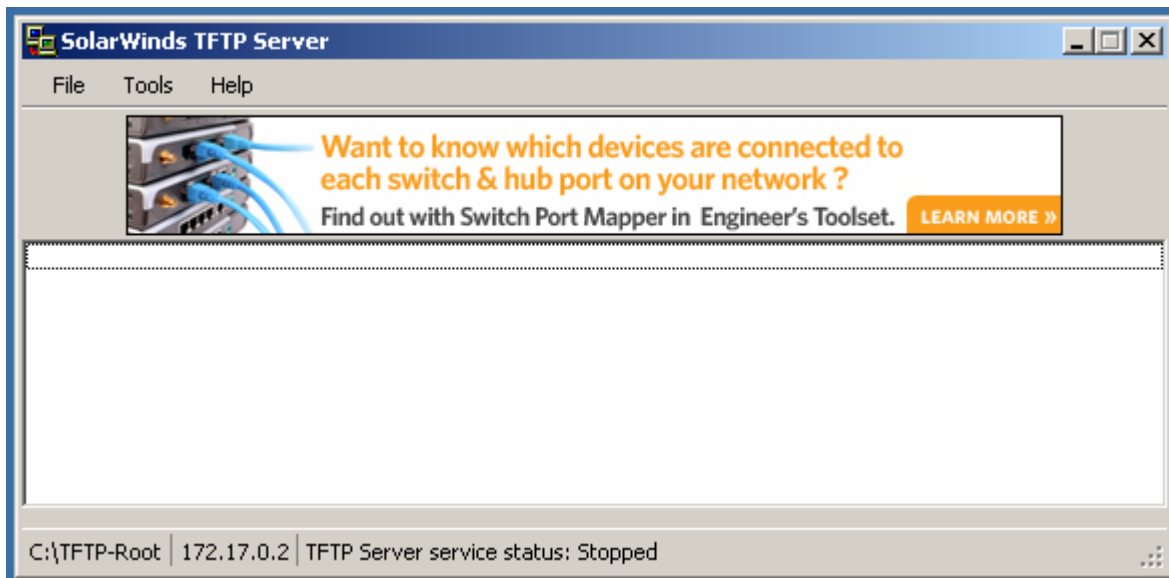
- a. Go to the SolarWinds website and download the free TFTP server software and save it to your desktop.

<http://www.solarwinds.com/downloads/>

- b. Double-click on the SolarWinds TFTP application to begin installation. Select **Next**. Agree to the license agreement, and accept default settings. After the installation has finished, click **Finish**.

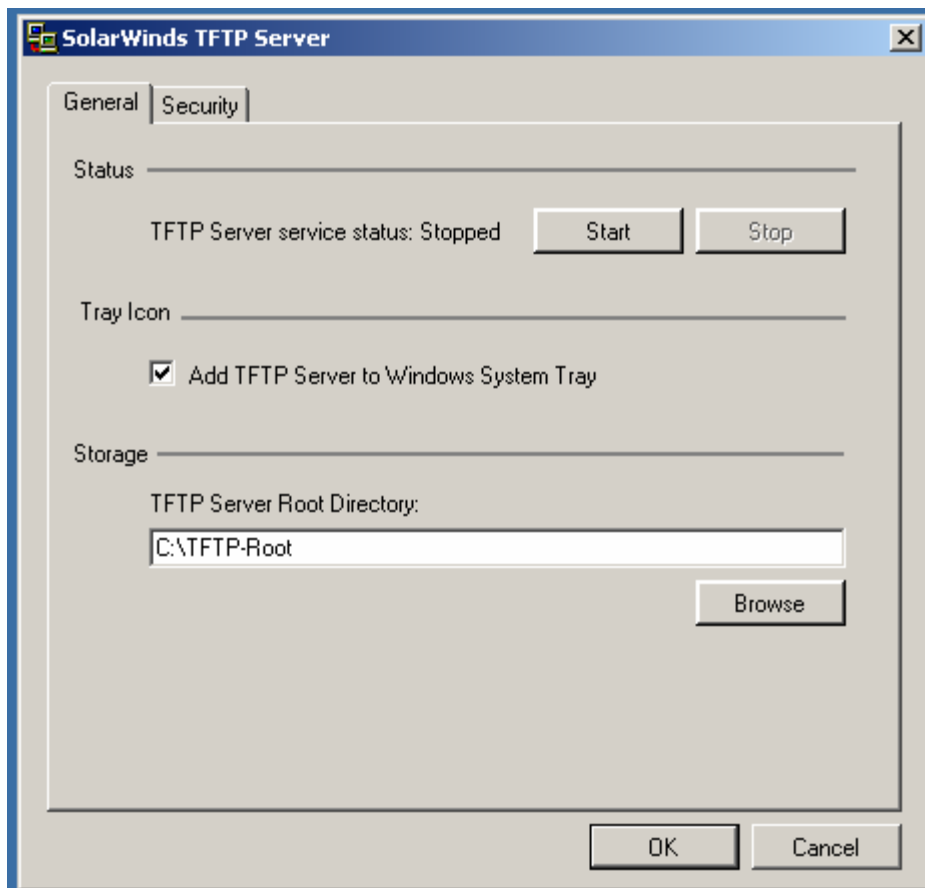
Step 2: Start the TFTP application.

Start the TFTP server by choosing **Start > Programs > SolarWinds TFTP Server > TFTP Server**.

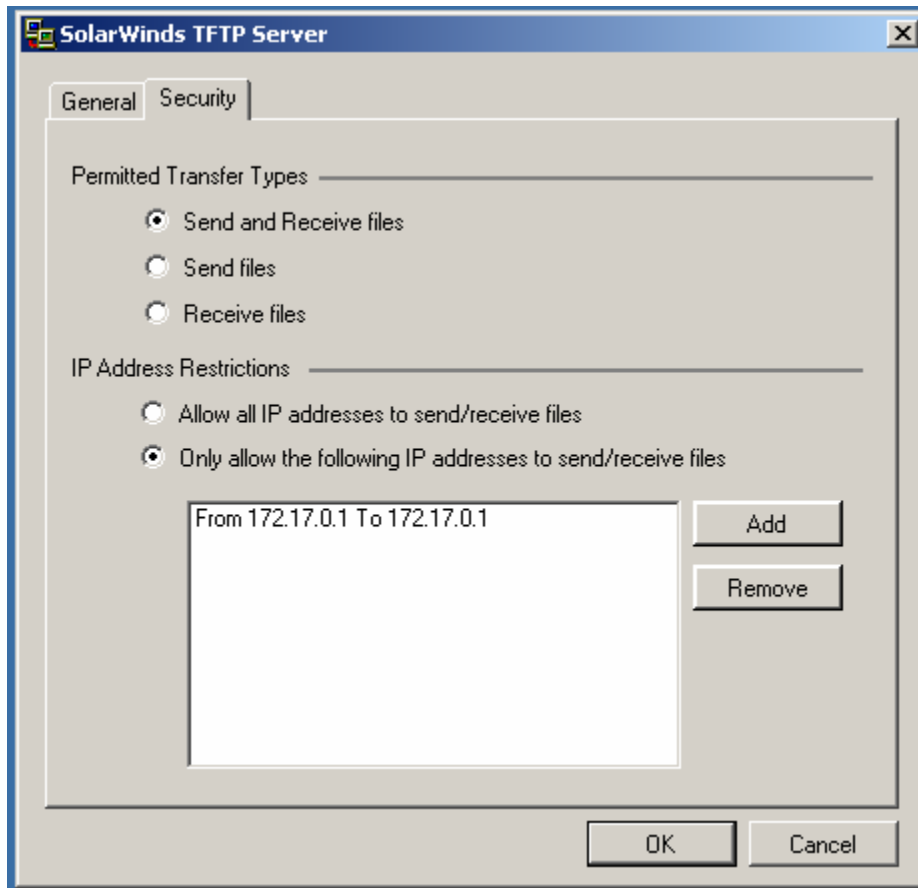


Step 3: Configure the TFTP server.

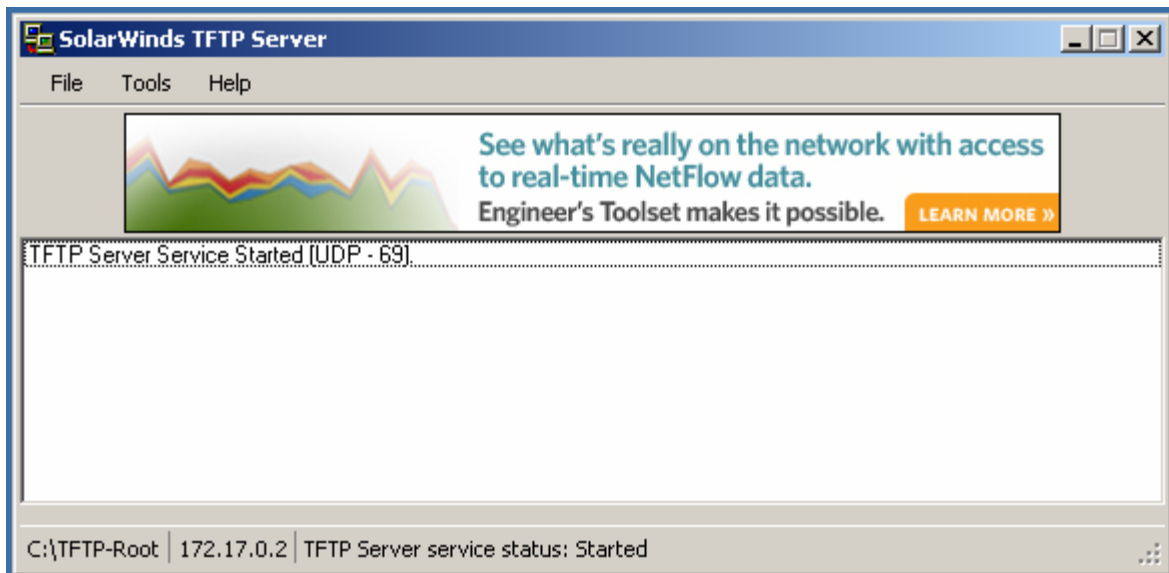
- a. To configure the TFTP server, choose **File > Configure**. The screen displayed should be similar to the following. On the **General** tab, check that the default TFTP Server Root Directory is set to C:\TFTP-Root.



- b. Click on the **Security** tab. Check that **Permitted Transfer Types** is set to **Send and Receive files**, and set **IP Address Restrictions** to allow transfers from only the router R1 Fast Ethernet 0/0 IP address (172.17.0.1 To 172.17.0.1).



- c. In the **General** tab, click the **Start** button to activate the TFTP Server.
d. When finished, click **OK**. The screen should look similar to the following.



- e. On which well-known UDP port number is the TFTP server operating? _____
- f. Leave the TFTP Server window open so that you can view the activity as the file is copied.

Step 4: Save the R1 Cisco IOS image file to the TFTP server.

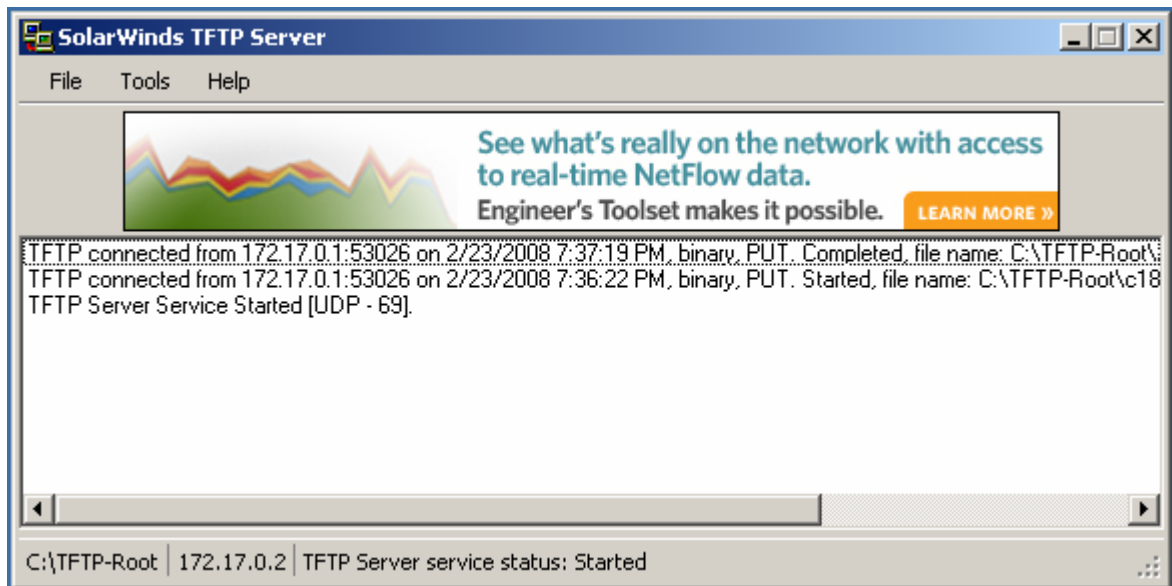
- a. Write down the Cisco IOS image filename that you will be copying.

- b. From the HyperTerminal session on router R1, begin uploading the Cisco IOS image to the TFTP server using the **copy flash tftp** command. Respond to the prompts as shown below, but replace the image filename shown with the one on your router.

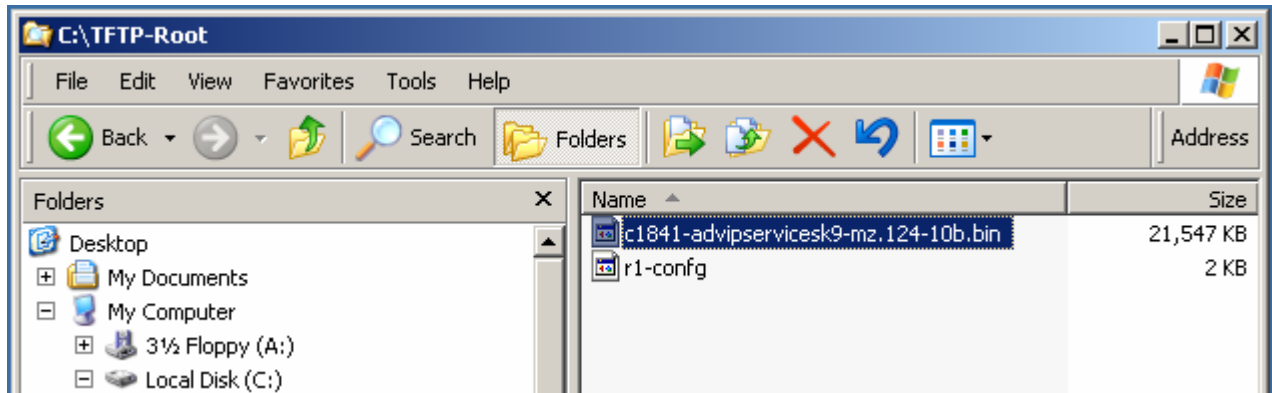
```
R1#copy flash tftp
Source filename []? c1841-advipservicesk9-mz.124-10b.bin
Address or name of remote host []? 172.17.0.2
Destination filename [c1841-advipservicesk9-mz.124-10b.bin]?
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!
22063220 bytes copied in 58.264 secs (378677 bytes/sec)
```

Step 5: Verify the TFTP server activity.

- a. Observe the TFTP Server window, which shows the connection entries for the transfer of the running-config file to the server. The output should look similar to the following.



- b. Use Windows Explorer to examine the contents of folder C:\TFTP-Root\ on the host H1 TFTP server. Verify the flash image size in the TFTP server directory. The file size in the **show flash** command should be the same size as the file stored on the TFTP server. If the file sizes are not identical, check with the instructor. The image file should be listed similar to the one shown in the screen below.



Task 4: Use TFTP to Update the Cisco IOS Image

Step 1: Copy the image from the TFTP server.

- Restore the image on the router. Start the copy from the privileged EXEC prompt. When prompted for the destination filename, use the filename from Task 3, Step 4.

```
R1#copy tftp flash
```

```
Address or name of remote host []? 172.17.0.2
```

```
Source filename []? c1841-advipservicesk9-mz.124-10b.bin
```

```
Destination filename [c1841-advipservicesk9-mz.124-10b.bin]?
```

```
%Warning:There is a file already existing with this name
```

```
Do you want to over write? [confirm]
```

```
Accessing tftp://172.17.0.2/c1841-advipservicesk9-mz.124-10b.bin...
```

```
Loading c1841-advipservicesk9-mz.124-10b.bin from 172.17.0.2 (via  
FastEthernet0/
```

```
0):
```

```
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
```

```
!!!!!!!!!!!!
```

```
[OK - 22063220 bytes]
```

```
22063220 bytes copied in 70.036 secs (315027 bytes/sec)
```

- Does the image fit in the available flash? _____
- What is the size of the file being loaded? _____
- What happened on the router console screen as the file was being downloaded?

Step 2: Verify that the image file transfer was successful.

- Restart the router using the **reload** command and observe the startup process to confirm that there were no flash errors. If there are none, the router Cisco IOS software should have started correctly.
- Verify the new image in flash using the **show flash** command. How can you tell that the previous image was overwritten? _____

```
R1#show flash
```

```
-#- --length-- -----date/time----- path
```

```
1      22063220 Feb 23 2008 01:25:20 c1841-advipservicesk9-mz.124-10b.bin
```

```
2          1038 May 18 2007 14:25:40 home.shtml
```

```
3          1821 May 18 2007 14:25:40 sdmconfig-18xx.cfg
```

```
4          113152 May 18 2007 14:25:42 home.tar
```



```
5      1164288 May 18 2007 14:25:44 common.tar
6      6036480 May 18 2007 14:25:54 sdm.tar
7       861696 May 18 2007 14:26:04 es.tar
8       527849 May 18 2007 14:25:42 128MB.sdf
9      1684577 Mar 15 2007 07:23:20 securedesktop-ios-3.1.1.27-k9.pkg
10     398305  Mar 15 2007 07:23:54 sslclient-win-1.1.0.154.pkg
```

```
31121408 bytes available (32874496 bytes used)
```

Task 5: Reflection

How can TFTP be used to manage networking device files in an enterprise network?

Router Interface Summary Table

Router Interface Summary				
Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
800 (806)	Ethernet 0 (E0)	Ethernet 1 (E1)		
1600	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)
1700	Fast Ethernet 0 (FA0)	Fast Ethernet 1 (FA1)	Serial 0 (S0)	Serial 1 (S1)
1800	Fast Ethernet 0/0 (FA0/0)	Fast Ethernet 0/1 (FA0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2500	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)
2600	Fast Ethernet 0/0 (FA0/0)	Fast Ethernet 0/1 (FA0/1)	Serial 0/0 (S0/0)	Serial 0/1 (S0/1)
Note: To find out exactly how the router is configured, look at the interfaces. The interface identifies the type of router and how many interfaces the router has. There is no way to effectively list all 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 information in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface.				