3.1 Connecting to a Router and Basic Configuration

Straight-through cable	————————
Serial cable	—————⁄——————
Console (Rollover)	••••••••••••••••••••
Crossover cable	– – – – – – – – –

Objective

This lab will focus on the ability to connect a PC to a router in order to establish a console session and observe the user interface. A console session allows the user to check or change the configuration of the router and is the simplest method of connecting to this device.

A new router will not find its configuration file when started and should automatically enter the setup dialog. If the router has already been configured the **setup** command may be used at the command line while in privileged mode. The setup dialog prompts for basic setup options, such as which protocols will be used and the IP address and subnet mask for each interface the router has. The setup dialog provides default values for most of the configurable options. The user can either accept these or enter their own.

The following steps are included in this exercise:
- Create a console connection from a PC to a router using the proper cable
- Configure HyperTerminal on the PC
- Observe the router user interface
- Establish some basic router configurations

Step 1 Identify and connect the console port

1. Examine the router and locate the RJ-45 connector labeled "Console".

2. What kind of cable do you need to connect the console port of the router to the PC?
_____

3. Connect the rollover cable to the routers console port. Next, connect the other end of the cable to the proper console port on the patch panel.

Step 2 Configure the HyperTerminal

1. Turn on the computer. From the Windows taskbar, locate the HyperTerminal program:
   Start>Programs>Accessories>Communications>HyperTerminal

2. Enter a name in the connection name field and select **OK**.
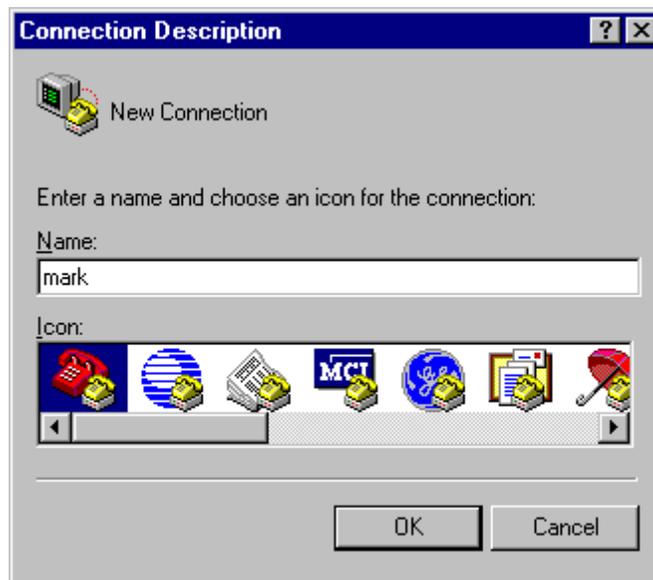
3. Specify the computer connecting interface. Use the drop down arrow in the Connect using: field to select **COM1** and select **OK**. (**Note**: It may be **COM2**, depending on which serial port was used on the PC)

4. Set the interface connection properties to the following:

- Bits per second = **9600**

- Data bits = **8**

- Parity = **None**

- Stop bits = **1**

- Flow control = **None**

Then select **Ok**. (You may also use Restore Defaults)
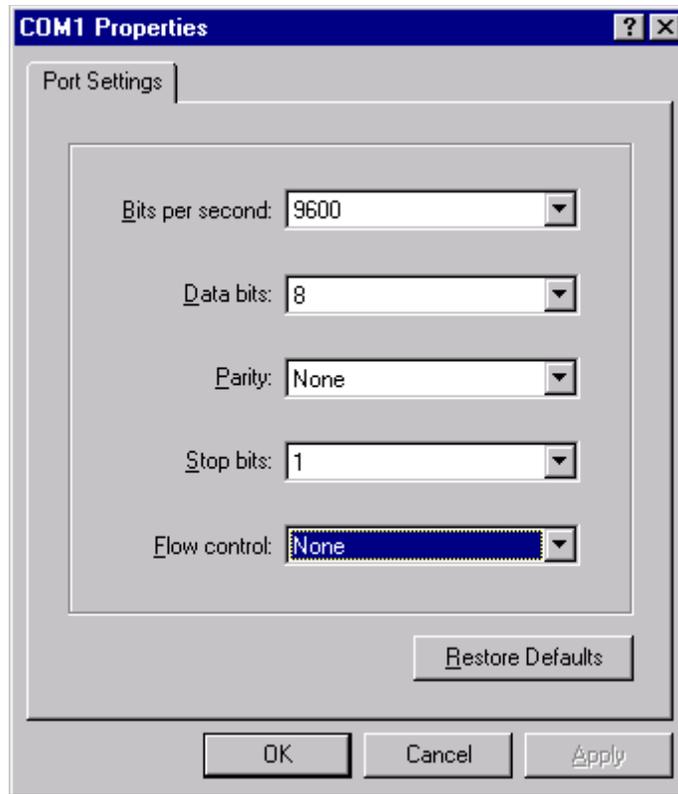
5. If the router is already turned on, there should be a response from it, when the HyperTerminal session window comes up. If there is, the connection has been successfully completed.

Step 3 Observe the router user interface and different modes

1. Observe the user interface. What is the prompt? _____

2. If the router was just started and the configuration file was missing, setup mode will be entered automatically with no passwords required. Otherwise, it is possible to simulate a new router by removing the configuration file from NVRAM, and use the reload command to restart the router and enter setup mode.

3. If a configuration file is missing, the router prompts "Would you like to enter the initial configuration dialog? [yes/no]". Enter **no** to continue. If you enter yes, you will continue to the setup dialog. The setup dialog will not be used in this course. Now, you are in user exec mode.

4. From the user exec mode, enter privileged exec mode:

        Router>**enable**
        Router#

    Verify a clean configuration file with the privileged exec command:

        Router#**show running-config**

There should be no configured passwords or IP addresses. If your router does not have a default configuration, ask the instructor to remove the configuration or look in the Appendix 'Erasing and Reloading the Router'.

5. Enter global configuration mode by typing **configure terminal** at the privilege mode prompt.

```
Router#configure terminal
```

What prompt did the router display? _____

6. Any misspelled or unrecognized command will attempt to be translated by the router as a domain name. Since there is no domain server configured, there will be a delay while the request times out. This can take between several seconds to several minutes. To terminate the wait, simultaneously hold down the **<CTRL><SHIFT>6** keys then release and press **x**:

```
Router>enabel
Translating "enabel"...domain server (255.255.255.255) %
```

Briefly hold down the keys <CTRL><SHIFT>6, release and press x

```
Name lookup aborted

Router>
```

7. To disable name translation attempts, apply the global configuration command:

```
Router(config)>no ip domain-lookup
```

To leave any of the modes, use the commands **exit** or **end.**

Step 4 Use the HELP feature

1. Enter the **help** command by typing the **?** at the user EXEC router prompt.

    Router>**?**

List eight available commands from the router response.

2. Enter enable mode by using the **enable** command at the user mode prompt. If a password is asked for, enter **class** when prompted.

    Router>**enable** [Enter]

What changed in the router prompt display, and what does it mean?

_____

_____

3. Enter the help mode by typing a question mark (**?**) at the router privileged EXEC prompt.

   Router#**?**

4. List all show commands by entering **show ?** at the router privileged EXEC prompt.

   Router#**show ?**

5. Is **running-config** one of the available commands from this mode? _____

Step 5 Configure router name and passwords

1. Enter global configuration mode by typing **configure terminal** at the privilege mode prompt.

   ```
   Router#configure terminal
   ```

   What prompt did the router display? _____

2. Assign a name to the router by typing:

   Router(config)#**hostname Router1**

   What prompt did the router display, and what does it mean? _____

   What change has occurred? _____

3. Be sure that you are in global configuration mode. Configure a console password on the router and exit from the line console.

   Router1(config)#**line console 0**
   Router1(config-line)#**password cisco**
   Router1(config-line)#**login**
   Router1(config-line)#**exit**
   Router1(config)#

4. Configure the password on the virtual terminal lines and exit line mode. This will apply a password for virtual terminal connections (telnet).

   Router1(config)#**line vty 0 4**
   Router1(config-line)#**password cisco**
   Router1(config-line)#**login**
   Router1(config-line)#**exit**
   Router1(config)#

5. Configure the **enable password** on the router and exit from global configuration mode:

   Router1(config)#**enable password cisco**
   Router1(config)#**exit**

Return to the user EXEC mode by entering the **disable** command.

6. Enter the privileged EXEC mode again. This time a prompt for a password will show. Enter the appropriate password to exit privileged mode (**cisco**).

7. Return to global configuration mode again, and configure the enable secret password.

   Router1(config)#**enable secret class**
   Router1(config)#**exit**

   Remember the enable secret password is encrypted from the configuration view. Return to user mode.

8. Enter the privileged EXEC mode again. Enter the password **cisco**. The characters will not be seen on the line. If it fails, continue until the bad secrets message is displayed.

9. Enter the privileged EXEC mode again. Enter the password **class** this time. The enable secret password takes precedence over the enable password, so once en enable secret password is entered the enable password no longer is accepted.

10. Show the routers running configuration.

    Router1#show running-config

    What important information is displayed? _____

    _____

    Is there an encrypted secret password? _____

    Are there any other passwords? _____

    Are any of the other passwords encrypted? _____

Step 6 Using the show commands

1. Enter the **show ?** command. The router responds with the **show** subcommands available in user mode.

   Enter the **show version** command. The router will return information about the IOS that is running in RAM. What is the IOS version? _____

   What is the name of the system image (IOS) file? _____

   Where was the router IOS image booted from? _____

   What type of processor (CPU) and how much RAM does the router have? _____

   _____

   How many Ethernet interfaces, and how many serial interfaces does this router have?

   _____

   _____

The router backup configuration file is stored in non-volatile random access memory (NVRAM). How much NVRAM does this router have? _____

The router operating system (IOS) is stored in Flash memory. How much Flash memory does this router have? _____

What is the configuration register set to? _____

2. Enter the **show history** command. What information is displayed with **show history**?
_____

3. Enter the privileged EXEC mode and enter the **show ?** command at the router prompt. How is this output different from the one you got in user EXEC mode previously?
_____
_____

4. Enter **show flash** at the router prompt. How much Flash memory is available and used?
_____

What is the file that is stored in Flash memory, and what is the size in bytes of the flash memory?
_____
_____

5. Enter **show startup-config** (or **show start**) at the router prompt. What important information is displayed with **show start**, and where is this information kept?
_____
_____

3.2 Configure router interfaces and saving files
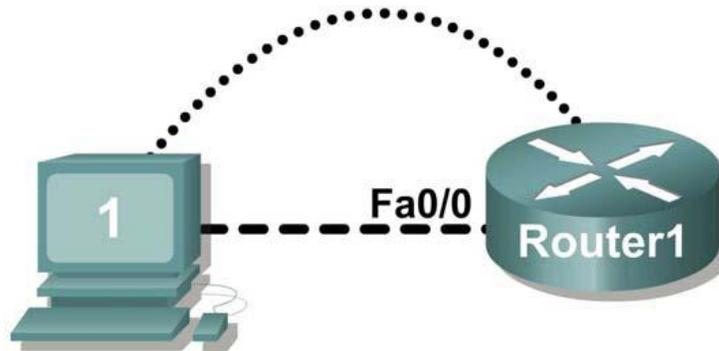
Straight-through cable ——————————

Serial cable

Console (Rollover) ································

Crossover cable — — — — — — —

Objective

This lab will focus on some basic configuration commands of router interfaces. A TFTP server will be used to backup the configuration file. Continue from the previous part of the laboration, and connect the FastEthernet 0/0 interface of the router with the Ethernet port of your PC.

The following steps are included in this exercise:
- Configure the Ethernet interface of the router
- Saving a configuration file to NVRAM
- How to backup a copy of the configuration file with a TFTP server
- Change the configuration register to perform a password recovery

Step 1 Configure the FastEthernet interface and host PC

1. Apply a description, configure an IP address, and activate the router interface with the commands below. Use the IP address **192.168.14.1**, and subnet mask **255.255.255.0**.

```
Router1(config)# interface fa0/0
Router1(config-if)# description Connection to Host1 with
crossover cable
Router1(config-if)# ip address address mask
Router1(config-if)# no shutdown
Router1(config-if)# end
Router1#
```

Look for the interface to become active:

```
*Mar 24 19:58:59.602: %LINEPROTO-5-UPDOWN: Line protocol on
Interface FastEthernet0/0, changed state to up
```

In order to better understand the interface numbering scheme, read:http://www.cisco.com/en/US/products/hw/routers/ps282/products_tech_note09186a008035b051.shtml

2. Configure the host computer for LAN connectivity. Recall that the LAN configuration window is accessed through **Start | Control Panel | Network Connections**. Right-click on the LAN icon, and select **Properties**. Highlight the Internet Protocol field, and select Properties. Fill in the following fields:

IP Address: The first host address _____

Subnet Mask: The subnet mask _____

Default Gateway: Router's IP Address _____

Click OK, and then Close. Open a terminal window, and verify network settings with the `ipconfig` command.

3. Use the **ping** command to verify network connectivity with the router. If ping replies are not successful troubleshoot the connection:

To verify the interface status, use the command **show ip interface brief**.

To verify host computer configuration, use the **ipconfig** command.

Make sure that you have used the correct type of cable between the host and Router1.

Step 2 Save the router configuration file

Cisco IOS refers to RAM configuration storage as running-configuration, and NVRAM configuration storage as startup-configuration. For configurations to survive rebooting or power restarts, the RAM configuration must be copied into non-volatile RAM (NVRAM). This does not occur automatically, NVRAM must be manually updated after any changes are made.

1. Display the contents of NVRAM. If the output of NVRAM is missing, it is because there is no saved configuration.:

```
Router1# show startup-config
startup-config is not present
Router1#
```

Display the contents of RAM:

```
Router1#show running-config
```

2. For a configuration to be used the next time the router is powered on or reloaded, it must be manually saved in NVRAM. Save the RAM configuration to NVRAM:

```
Router1# copy running-config startup-config
Destination filename [startup-config]? <ENTER>
Building configuration...
```

```
    [OK]

    Router1#
```

Review the contents of NVRAM, and verify that the configuration is the same as the configuration in RAM.

Step 3 Setup a TFTP server and host

A workstation with 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 the instructor for assistance.
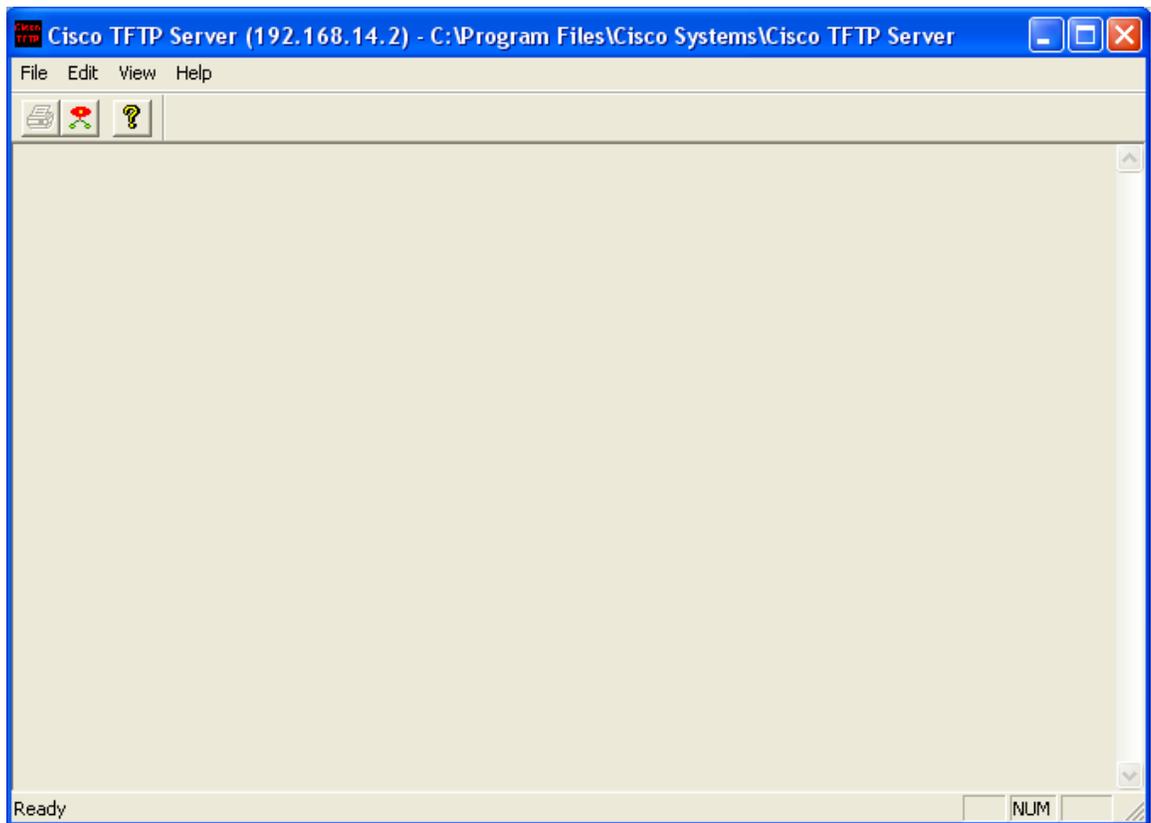
1. Make sure that the TFTP host is configured as follows:
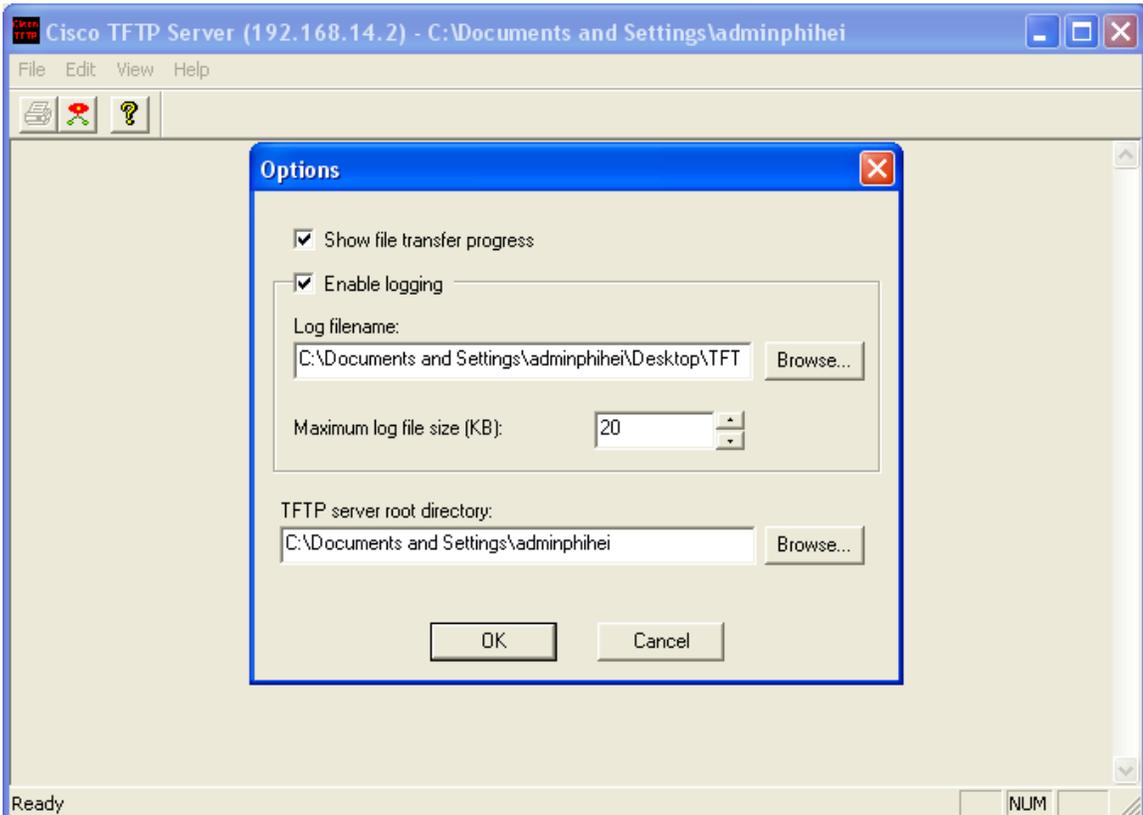
IP Address: **192.168.14.2**
IP subnet mask: **255.255.255.0**
Default gateway: **192.168.14.1**

2. Start the TFTP server. Make sure that the TFTP Server Address is correct (Same as your computer,192.168.14.2)

3. In the options menu, change the folder for log-files and the TFTP server root directory to be stored on your desktop.

4. **Ping** the TFTP server from the Router1 router. If the ping fails, review host and router configurations to resolve the problem.

Step 4 Backup a copy of the configuration file

1. Before copying the files, verify that the TFTP server is running, and record the IP address of the TFTP server: _____

   Make sure that the IP address of the TFTP server is the same as the IP address of the host.

2. To copy the startup-config to a TFTP server, type the following commands from privileged EXEC mode:

```
Router1#copy startup-config tftp
Address or name of remote host []? 192.168.14.2
Destination filename [gad-confg]? startup-config
!!
667 bytes copied in 0.036 secs (18528 bytes/sec)
```

3. Verify the transfer to the TFTP server by checking the TFTP server log file. Click **View** > **Log File**. The output should be similar to the following:

   Mon Sep 16 14:10:08 2003: Receiving 'startup-config' file from 192.168.14.1 in binary mode
   Mon Sep 16 14:11:14 2003: Successful.

4. Now that the startup-config is backed up, test this image by restoring the file to the router. Assume that the configuration on the Router1 router has become corrupt and copy the backup startup-config file from the TFTP server to the running-config of the router. To simulate this, change the hostname of the router from Router1 to "Router2".

5. Complete the following to copy the startup-config file from the TFTP server to the router.

> Router2#**copy tftp running-config**
> Address or name of remote host []? **192.168.14.2**
> Source filename []? **startup-config**
> Destination filename [running-config]? **[Enter]**
> Accessing tftp://192.168.14.2/startup-config...
> Loading startup-config from 192.168.14.2 (via FastEthernet0): !
> [OK - 667 bytes]
> 667 bytes copied in 9.584 secs (70 bytes/sec)
> Router1#

How can you see that the configuration file has been restored?

_____

_____

Save the running configuration to NVRAM.

Step 5 Password recovery

1. Now, have an instructor, lab assistant, or other student change the enable secret password. Perform **copy running-config startup-config** and reload the router.

   Attempt to logon to the router using the enable password **cisco**. The output should look like the following:

   > Router>**enable**
   > Password:
   > Password:
   > Password:
   > % Bad secrets
   > Router>

2. At the user EXEC prompt type **show version**. Record the value displayed for configuration register: _____

   To enter the ROM Monitor mode, turn the router off, wait a few seconds and turn it back on. When the router starts displaying "System Bootstrap, Version …" on the HyperTerminal screen, press the **Ctrl** key and the **Break** key together. The router will boot in ROM monitor mode. Depending on the router hardware, one of several prompts such as: "**rommon 1 >**" or simply "**>**" may show. Examine the ROM Monitor mode by typing **?** at the prompt.

3. Change the configuration register settings to boot without loading the configuration file. From ROM Monitor mode type the following commands to change the config-register.

   2500-model router:

   > > **o/r 0x2142**

   From the ROM Monitor mode, type **reset** or power cycle the router to restart it.

>**i**

2600-model router:

> rommon 2 >**confreg 0x2142**

From the ROM Monitor mode, type **reset** or power cycle the router to restart it.

> rommon 2 >**reset**

Due to the new configuration register setting, the router will not load the configuration file. The system prompts: "Would you like to enter the initial configuration dialog? [yes]:" Enter **no** and press **Enter**.

4. Now at the user mode prompt Router>, type **enable** and press **Enter** to go to the privileged mode without a password.

Use the command **copy startup-config running-config** to restore the existing configuration. Since the user is already in privileged EXEC no password is needed.

In the global configuration mode, change the secret password to **class**.

While still in the global configuration mode, type **config-register 0x2102**. 0x2102 is the original configuration register value. Press **Enter**.

Save the configuration again and reload the router. When the router reloads the enable password should be class.

5. Disconnect the equipment, erase all existing configuration and restore the cables.