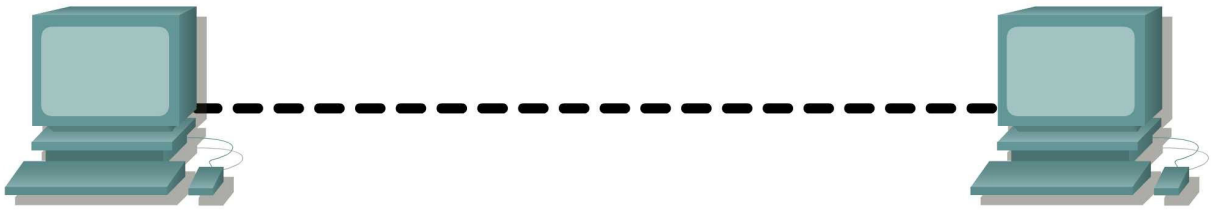
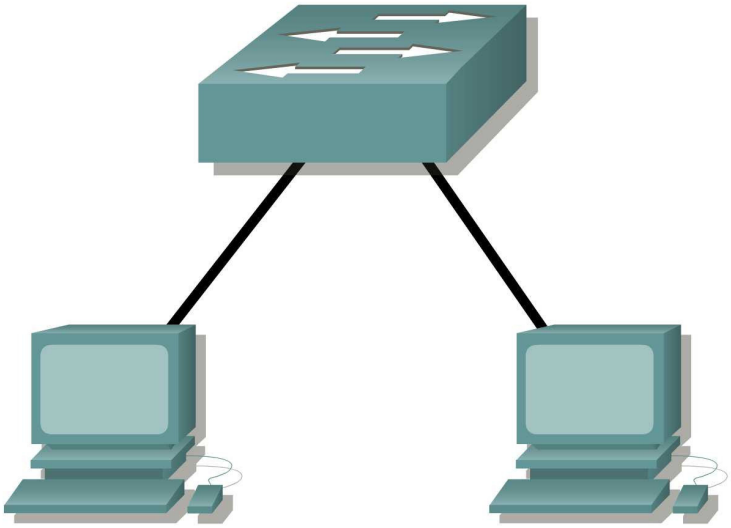
Lab 2.6.1: Topology Orientation and Building a Small Network

Topology Diagram

Peer to Peer Network





Switched Network

Learning Objectives

Upon completion of this lab, you will be able to:

- Correctly identify cables for use in the network.
- Physically cable a peer-to-peer and switched network.
- Verify basic connectivity on each network.

Background

Many network problems can be fixed at the Physical layer of a network. For this reason, it is important to have a clear understanding of which cables to use for your network connections.

At the Physical layer (Layer 1) of the OSI model, end devices must be connected by media (cables). The type of media required depends on the type of device being connected. In the basic portion of this lab, straight–through or patch—cables will be used to connect workstations and switches.

In addition, two or more devices communicate through an address. The Network layer (Layer 3) requires a unique address (also know as a logical address or IP Addresses), which allows the data to reach the appropriate destination device.

Addressing for this lab will be applied to the workstations and will be used to enable communication between the devices.

Scenario

This lab starts with the simplest form of networking (peer-to-peer) and ends with the lab connecting through a switch.

Task 1: Create a Peer-to-Peer Network.

Step 1: Select a lab partner.

Step 2: Obtain equipment and resources for the lab.

Equipment needed:

2 workstations

2 straight through (patch) cables

1 crossover cable

1 switch (or hub)

Task 2: Identify the Cables used in a Network.

Before the devices can be cabled, you will need to identify the types of media you will be using. The cables used in this lab are crossover and straight-through.

Use a **crossover cable** to connect two workstations to each other through their NIC's Ethernet port. This is an Ethernet cable. When you look at the plug you will notice that the orange and green wires are in opposite positions on each end of the cable.

Use a **straight-through cable** to connect the router's Ethernet port to a switch port or a workstation to a switch port. This is also an Ethernet cable. When you look at the plug you will notice that both ends of the cable are exactly the same in each pin position.

Task 3: Cable the Peer-to-peer Network.

Step 1: Connect two workstations.

Using the correct Ethernet cable, connect two workstations together. Connect one end of the cable to the NIC port on PC1 and the other end of the cable to PC2.

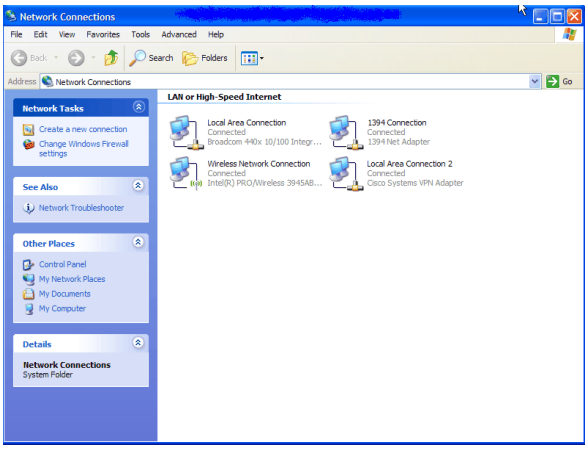
Which cable did you use? _____

Step 2: Apply a Layer 3 address to the workstations.

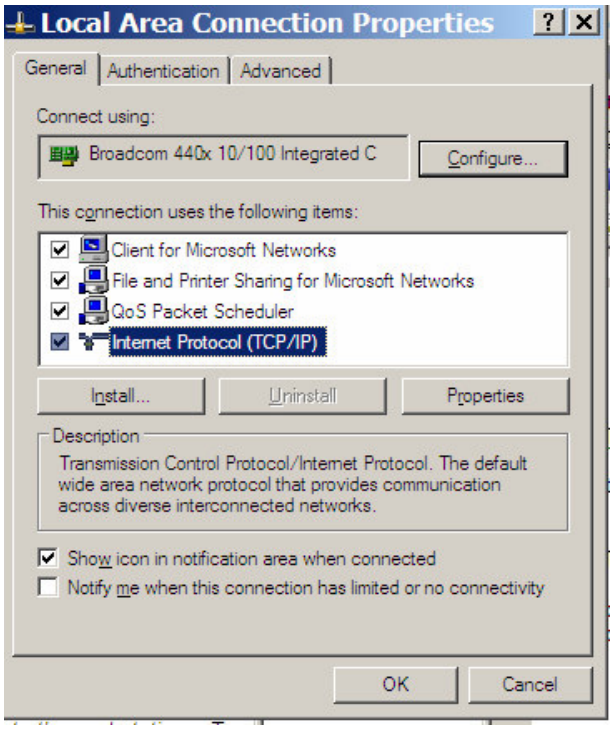
To complete this task, you will need to follow the step-by-step instructions below.

Note: These steps must be completed on *each* workstation. The instructions are for Windows XP—steps may differ slightly if you are using a different operating system.

1. On your computer, click **Start**, right-click **My Network Places**, and then click **Properties.** The Network Connections window should appear, with icons showing the different network connections.

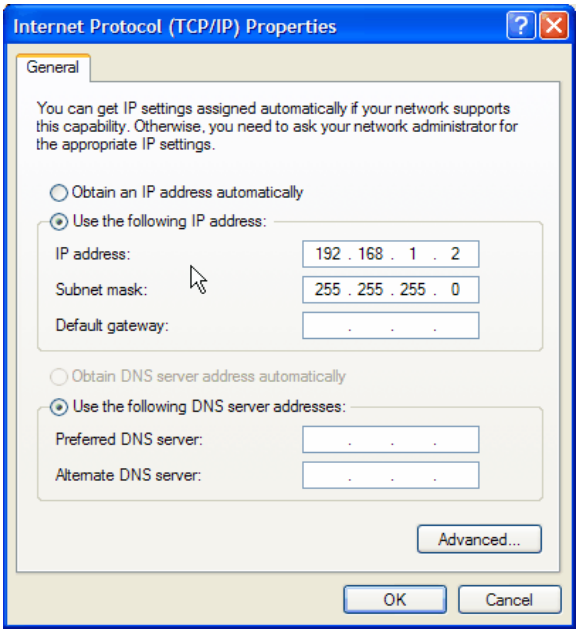


2. Right-click the **Local Area Connection** and click **Properties**.
3. Select the **Internet Protocol (TCP/IP)** item and then click the **Properties** button.



4. On the General tab of the Internet Protocol (TCP/IP) Properties window, select the **Use the following IP address** option.

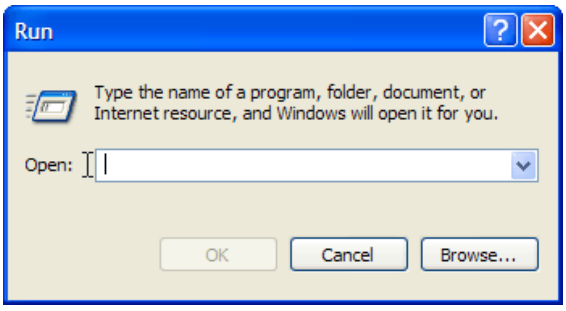
5. In the **IP address** box, enter the IP address 192.168.1.2 for PC1. (Enter the IP address 192.168.1.3 for PC2.)
6. Press the tab key and the Subnet mask is automatically entered. The subnet address should be 255.255.255.0. If this address is not automatically entered, enter this address manually.
7. Click **OK**.



8. Close the Local Area Connection Properties window.

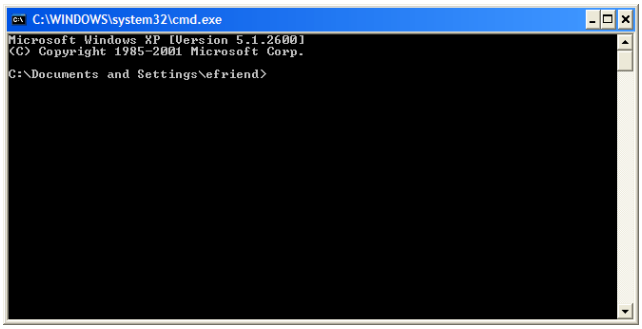
Step 3: Verify connectivity.

1. On your computer, click **Start**, and then click **Run**.



2. Type **cmd** in the Open box and then click **OK**.

   The DOS command (cmd.exe) window will appear. You can enter DOS commands using this window. For the purposes of this lab, basic network commands will be entered to allow you to test you computer connections.



The **ping** command is a computer network tool used to test whether a host (workstation, router, server, etc.) is reachable across an IP network.

3. Use the **ping** command to verify that PC1 can reach PC2 and PC2 can reach PC1. From the PC1 DOS command prompt, type **ping 192.168.1.3**. From the PC2 DOS command prompt, type **ping 192.168.1.2**.

   What is the output of the **ping** command?

   _____

   _____

   _____

   _____

   If the **ping** command displays an error message or doesn't receive a reply from the other workstation, troubleshoot as necessary. Possible areas to troubleshoot include:

   - Verifying the correct IP addresses on both workstations
   - Ensuring that the correct type of cable is used between the workstations

   What is the output of the **ping** command if you unplug the network cable and ping the other workstation?

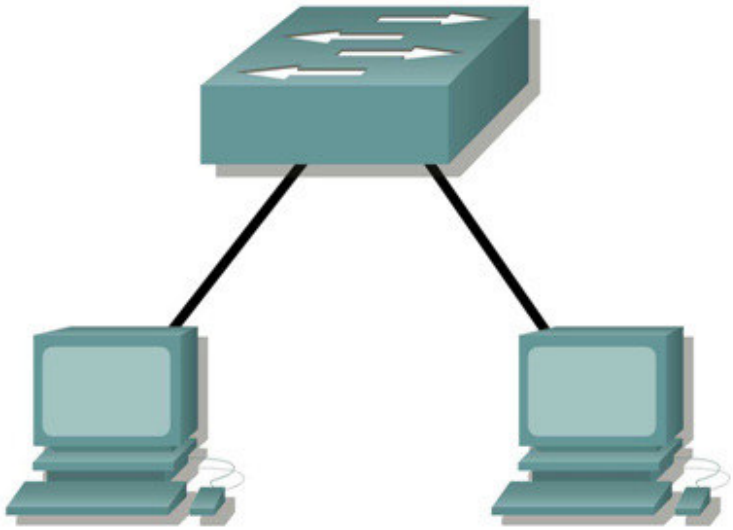
   _____

   _____

   _____

   _____

Task 4: Connect Your Workstations to the Classroom Lab Switch.



Step 1: Connect workstation to switch.

Using the correct cable, connect one end of the cable to the NIC port on the workstation and the other end to a port on the switch.

Step 2: Repeat this process for each workstation on your network.

Which cable did you use? _____

Step 3: Verify connectivity.

Verify network connectivity by using the **`ping`** command to reach the other workstations attached to the switch.

What is the output of the **`ping`** command?

_____

_____

_____

_____

What is the output of the **`ping`** command if you ping an address that is not connected to this network?

_____

_____

_____

_____

Step 4: Share a document between PCs.

1. On your desktop, create a new folder and name it **test**.
2. Right-click the folder and click File sharing. **Note:** A hand will be placed under the icon.

3. Place a file in the folder.
4. On the desktop, double-click **My Network Places** and then **Computers Near Me**.
5. Double-click the workstation icon. The **test** folder should appear. You will be able to access this folder across the network. Once you are able to see it and work with the file, you have access through all 7 layers of the OSI model.

Task 5: Reflection

What could prevent a ping from being sent between the workstations when they are directly connected?

_____

_____

_____

_____

What could prevent the ping from being sent to the workstations when they are connected through the switch?

_____

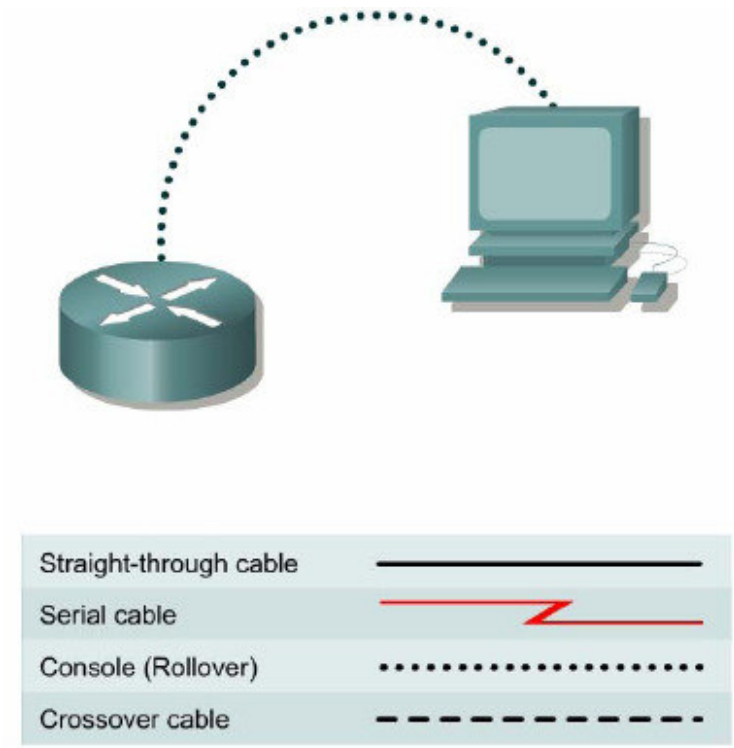
_____

_____

_____

Lab 10.6.2: Establishing a Console Session with HyperTerminal

Topology Diagram



Learning Objectives

Upon completion of this lab, you will be able to:

- Connect a router and computer using a console cable.
- Configure HyperTerminal to establish a console session with a Cisco IOS router.
- Configure HyperTerminal to establish a console session with a Cisco IOS switch.

Background

HyperTerminal is a simple Windows-based terminal emulation program for serial communication that can be used to connect to the console port on Cisco IOS devices. A serial interface on a computer is connected to the Cisco device via a rollover cable. Using HyperTerminal is the most basic way to access a router for checking or changing its configuration. Another popular serial communication utility is TeraTerm Web. Instructions for TeraTerm Web use are contained in Appendix A.

Scenario

Set up a network similar to the one in the Topology Diagram. Any router that meets the interface requirements may be used. Possible routers include 800, 1600, 1700, 2500, 2600 routers, or a combination. The following resources will be required:

- Computer with a serial interface and HyperTerminal loaded
- Cisco router
- Console (rollover) cable for connecting the workstation to the router

Task 1: Connect a Router and Computer with a Console Cable.

Step 1: Set up basic physical connection.

Connect the console (rollover) cable to the console port on the router. Connect the other cable end to the host computer with a DB-9 or DB-25 adapter to the COM 1 port.

Step 2: Power on devices.

If not already powered on, enable power to the computer and router.

Task 2: Configure HyperTerminal to Establish a Console Session with a Cisco IOS Router.

Step 1: Start HyperTerminal application.

From the Windows taskbar, start the HyperTerminal program by clicking **Start > Programs > Accessories > Communications > HyperTerminal**.

Step 2: Configure HyperTerminal.

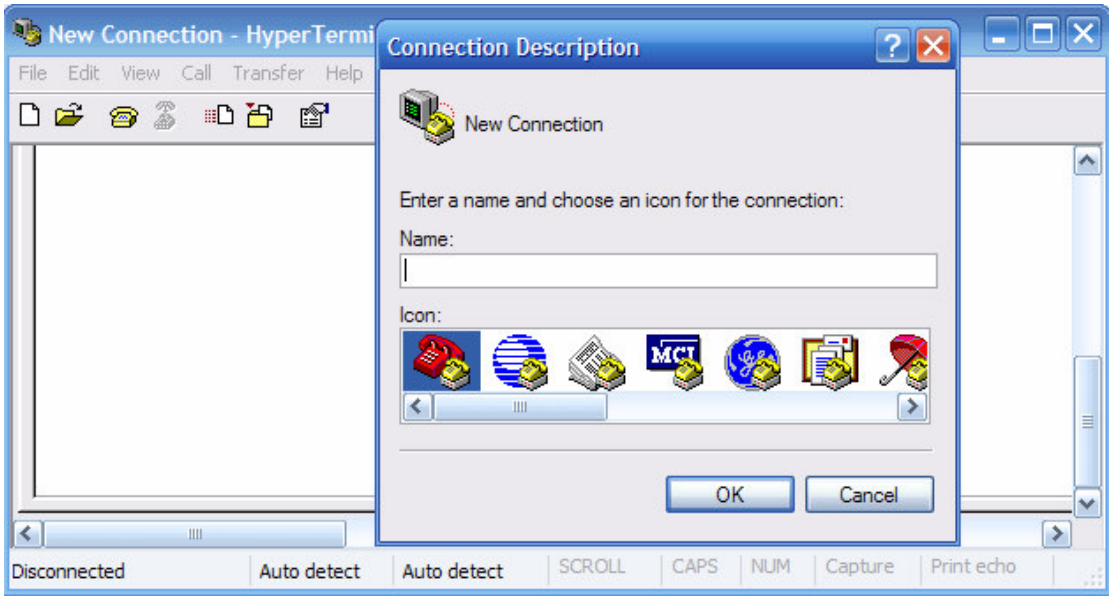


Figure 1. HyperTerminal Name Configuration Window

Refer to Figure 1 for a description of the opening HyperTerminal configuration window. At the Connection Description window, enter a session name in the Name field. Select an appropriate icon, or leave the default. Click **OK**.

Figure 2. HyperTerminal Connection Type

Refer to Figure 2. Enter the appropriate connection type, COM 1, in the Connect using field. Click **OK**.

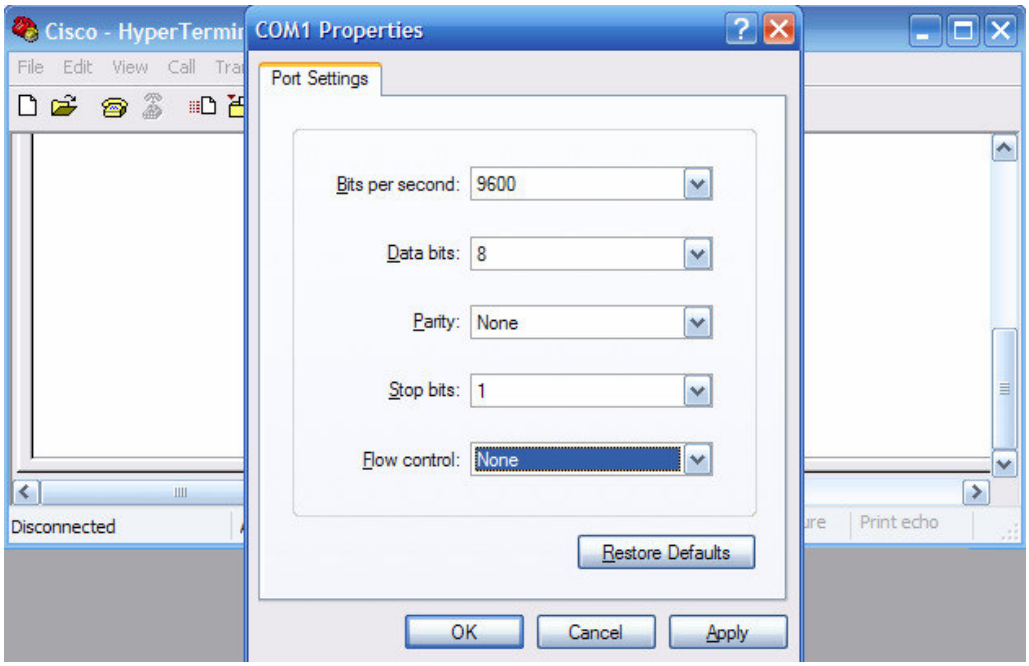


Figure 3. HyperTerminal COM1 Port Settings

Refer to Figure 3. Change port settings to the following values:

Setting	Value
Bits per second	**9600**
Data bits	**8**
Parity	**None**
Stop bits	**1**
Flow control	**None**

Click **OK**.

When the HyperTerminal session window comes up, press the **Enter** key. There should be a response from the router. This indicates that connection has been successfully completed. If there is no connection, troubleshoot as necessary. For example, verify that the router has power. Check the connection to the correct COM 1 port on the PC and the console port on the router. If there is still no connection, ask the instructor for assistance.

Step 3: Close HyperTerminal.

When finished, close the HyperTerminal session. Click **File > Exit**. When asked whether to save the session, click **Yes**. Enter a name for the session.

Step 4: Reconnect the HyperTerminal session.

Reopen the HyperTerminal session as described in Task 2, Step 1. This time, when the Connection Description window opens (see Figure 1), click **Cancel**.

Click **File > Open**. Select the saved session and then click **Open**. Use this technique to reconnect the HyperTerminal session to a Cisco device without reconfiguring a new session.

When finished, exit TeraTerm.

Task 3: Configure HyperTerminal to Establish a Console Session with a Cisco IOS Switch.

Serial connections between Cisco IOS routers and switches are very similar. In this task, you will make a serial connection between the host computer and a Cisco IOS switch.

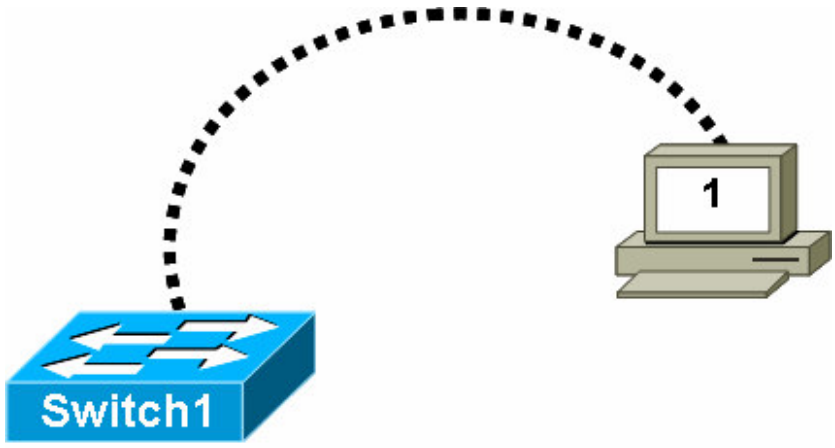


Figure 4. Serial Connection Between a Host Computer and Cisco Switch

Step 1: Set up basic physical connection.

Refer to Figure 4. Connect the console (rollover) cable to the console port on the router. Connect the other cable end to the host computer with a DB-9 or DB-25 adapter to the COM 1 port.

Step 2: Power on devices.

If not already powered on, enable power to the computer and switch.

Step 3: Start HyperTerminal application.

From the Windows taskbar, start the HyperTerminal program by clicking **Start > Programs > Accessories > Communications > Hyper Terminal**.

Step 4: Configure HyperTerminal.

Use the procedure described in Task 2, Step 2, to configure HyperTerminal.

Refer to Figure 1 of the opening HyperTerminal configuration window. At the Connection Description window, enter a session name in the Name field. Select an appropriate icon, or leave the default. Click **OK**.

Refer to Figure 2. Enter the appropriate connection type, COM 1, in the Connect using field. Click **OK**.

Refer to Figure 3. Change port settings to the following values:

Setting	Value
Bits per second	9600
Data bits	8
Parity	None
Stop bits	1
Flow control	None

Click **OK**.

When the HyperTerminal session window comes up, press the **Enter** key. There should be a response from the switch. This indicates that connection has been successfully completed. If there is no connection, troubleshoot as necessary. For example, verify that the switch has power. Check the connection to the correct COM 1 port on the PC and the console port on the switch. If there is still no connection, ask the instructor for assistance.

Step 5: Close HyperTerminal.

When finished, close the HyperTerminal session. Click **File > Exit**. When asked whether to save the session, click **No**.

Task 3: Reflection

This lab provided information for establishing a console connection to a Cisco IOS router and switch.

Task 4: Challenge

Draw the pin connections for the rollover cable and straight-through cable. Compare the differences, and be able to identify the different cable types.

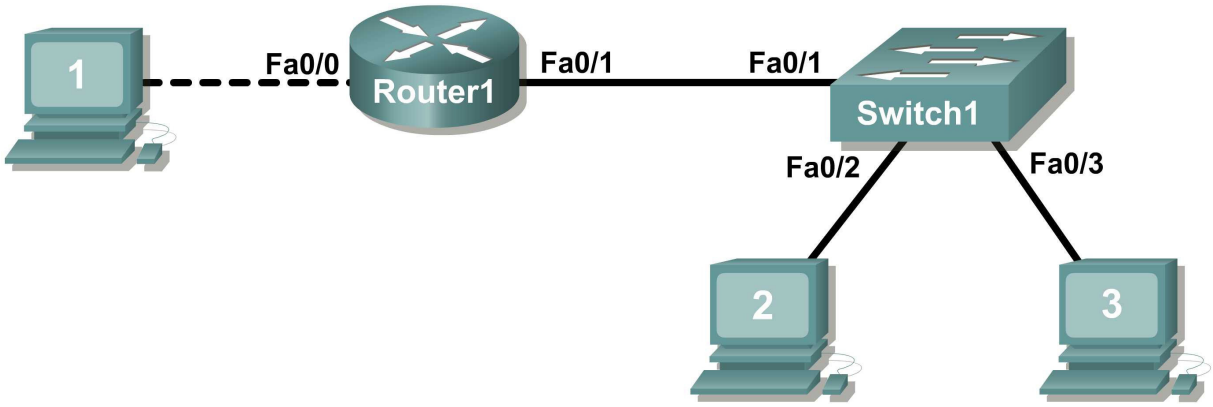
Task 5: Clean Up

Unless directed otherwise by the instructor, turn off power to the host computer and router. Remove the rollover cable.

Remove anything that was brought into the lab, and leave the room ready for the next class.

Lab 11.5.1: Basic Cisco Device Configuration

Topology Diagram



Learning Objectives

- Configure Cisco router global configuration settings.
- Configure Cisco router password access.
- Configure Cisco router interfaces.
- Save the router configuration file.
- Configure a Cisco switch.

Background

Hardware	Qty	Description
Cisco Router	1	Part of CCNA Lab bundle.
Cisco Switch	1	Part of CCNA Lab bundle.
*Computer (host)	1	Lab computer.
Console (rollover) cable	1	Connects computer host 1 to Router console port.
UTP Cat 5 crossover cable	1	Connects computer host 1 to Router LAN interface Fa0/0
Straight Through Cable	3	Connects computer hosts to Switch and switch to router

Table 1. Equipment and hardware required for this lab.

Gather the necessary equipment and cables. To configure the lab, make sure the equipment listed in Table 1 is available.

Common configuration tasks include setting the hostname, access passwords, and MOTD banner.

Interface configuration is extremely important. In addition to assigning a Layer 3 IP address, enter a description that describes the destination connection speeds troubleshooting time.

Configuration changes are effective immediately.

Configuration changes must be saved in NVRAM to be persistent across reboot.

Configuration changes may also be saved off-line in a text file for auditing or device replacement.

Cisco IOS switch configuration is similar to Cisco IOS router configuration.

Scenario

In this lab students will configure common settings on a Cisco Router and Cisco Switch.

Given an IP address of 198.133.219.0/24, with 4 bits borrowed for subnets, fill in the following information in the table below.
(Hint: fill in the subnet number, then the host address. Address information will be easy to compute with the subnet number filled in first)

Maximum number of usable subnets (including the 0th subnet): _____

Number of usable hosts per subnet: _____

	IP Address:		Subnet mask:	
#	Subnet	First host address	Last host address	Broadcast
0				

Before proceeding, verify your addresses with the instructor. The instructor will assign subnetworks.

Task 1: Configure Cisco Router Global Configuration Settings.

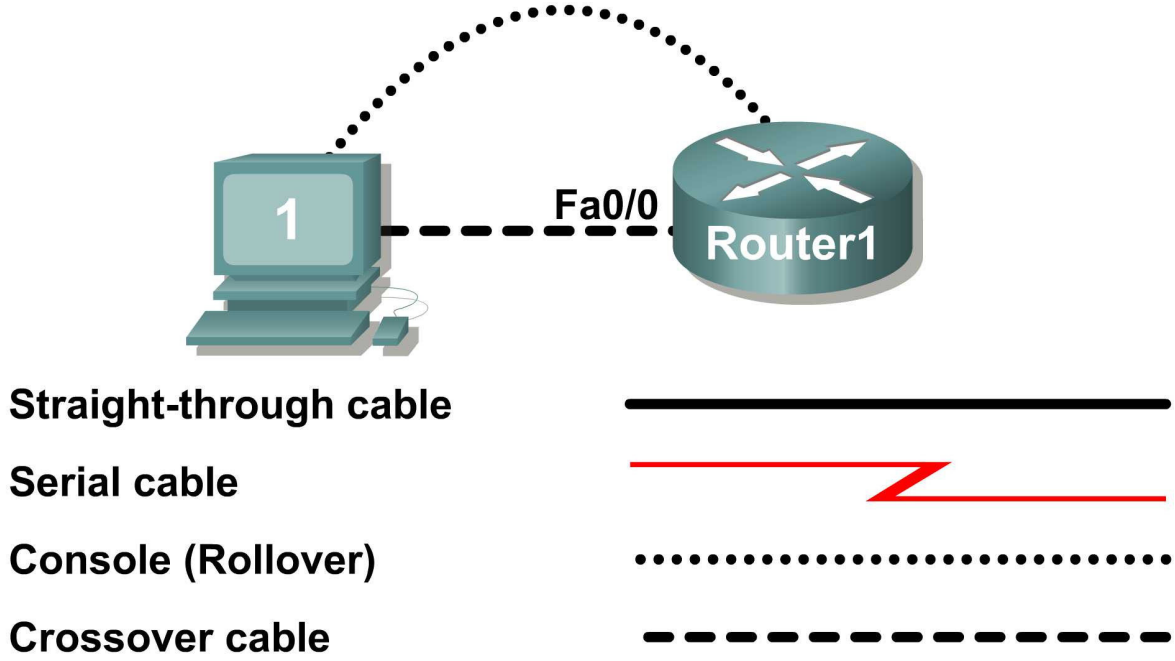


Figure 1. Lab cabling.

Step 1: Physically connect devices.

Refer to Figure 1. Connect the console or rollover cable to the console port on the router. Connect the other end of the cable to the host computer using a DB-9 or DB-25 adapter to the COM 1 port. Connect the crossover cable between the host computer's network interface card (NIC) and Router interface Fa0/0. Connect a straight-through cable between the Router interface Fa0/1 and any of the switch's interfaces (1-24).

Ensure that power has been applied to the host computer, switch and router.

Step 2: Connect host computer to router through HyperTerminal.

From the Widows taskbar, start the HyperTerminal program by clicking on Start | Programs | Accessories | Communications | HyperTerminal.

Configure HyperTerminal with the proper settings:

Connection Description
Name: **Lab 11_2_11**
Icon: **Personal choice**

Connect to
Connect Using: **COM1** (or appropriate COM port)

COM1 Properties

```
Bits per second: 9600
      Data bits: 8
         Parity: None
      Stop bits: 1
   Flow Control: None
```

When the HyperTerminal session window comes up, press the **Enter** key until there is a response from the router.

If the router terminal is in the configuration mode, exit by typing **NO**.

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

Press RETURN to get started!
Router>
```

When in privileged exec command mode, any misspelled or unrecognized commands 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>
```

From the user exec mode, enter privileged exec mode:

```
Router> enable
Router#
```

Verify a clean configuration file with the privileged exec command **show running-config**. If a configuration file was previously saved, it will have to be removed. Appendix 1 shows a typical default router's configuration. Depending on router's model and IOS version, your configuration may look slightly different. However, 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.

Step 3: Configure global configuration hostname setting.

What two commands may be used to leave the privileged exec mode? _____

What shortcut command can be used to enter the privileged exec mode? _____

Examine the different configuration modes that can be entered with the command **configure?** Write down the list of configuration modes and description:

_____

_____

_____

_____

_____

_____

From the `privileged exec` mode, enter global configuration mode:

```
Router# configuration terminal
Router(config)#
```

What three commands may be used to leave the global configuration mode and return to the privileged exec mode?

_____

_____

What shortcut command can be used to enter the global configuration mode? _____

Set the device hostname to `Router1`:

```
router(config)# hostname Router1
            Router1(config)#
```

How can the hostname be removed?

_____

_____

Step 5: Configure the MOTD banner.

In production networks, banner content may have a significant legal impact on the organization. For example, a friendly “Welcome” message may be interpreted by a court that an attacker has been granted permission to hack into the router. A banner should include information about authorization, penalties for unauthorized access, connection logging, and applicable local laws. The corporate security policy should provide policy on all banner messages.

Create a suitable MOTD banner. Only system administrators of the ABC Company are authorized access, unauthorized access will be prosecuted, and all connection information will be logged.

_____

_____

_____

_____

_____

_____

Examine the different banner modes that can be entered. Write down the list of banner modes and description.

Router1(config)# banner ?

_____

_____

_____

_____

_____

_____

Choose a terminating character that will not be used in the message text._____

Configure the MOTD banner. The MOTD banner is displayed on all connections before the login prompt. Use the terminating character on a blank line to end the MOTD entry:

```
Router1(config)# banner motd %
Enter TEXT message.  End with the character '%'
***You are connected to an ABC network device. Access is granted to only
current ABC company system administrators with prior written approval. ***

*** Unauthorized access is prohibited, and will be prosecuted. ***

*** All connections are continuously logged. ***

%
Router1(config)#
```

What is the global configuration command to remove the MOTD banner?

_____

Task 2: Configure Cisco router password access.

Access passwords are set for the privileged exec mode and user entry point such as console, aux, and virtual lines. The privileged exec mode password is the most critical password, since it controls access to the configuration mode.

Step 1: Configure the privileged exec password.

Cisco IOS supports two commands that set access to the privileged exec mode. One command, **enable password**, contains weak cryptography and should never be used if the **enable secret** command is available. The **enable secret** command uses a very secure MD5 cryptographic hash algorithm. Cisco says "As far as anyone at Cisco knows, it is impossible to recover an enable secret based on the contents of a configuration file (other than by obvious dictionary attacks)." Password security relies on the password algorithm, and the password. . In production environments, strong passwords should be used at all times. A strong password consists of at least nine characters of upper and lower case letters, numbers, and symbols. In a lab environment, we will use weak passwords.

Set the privileged exec password to **cisco**.

```
Router1(config)# enable secret cisco
Router1(config)#
```

Step 2: Configure the console password.

Set the console access password to **class**. The console password controls console access to the router.

```
Router1(config)# line console 0
Router1(config-line)# password class
Router1(config-line)# login
```

What is the command to remove the console password? _____

Step 3: Configure the virtual line password.

Set the virtual line access password to **class**. The virtual line password controls Telnet access to the router. In early Cisco IOS versions, only five virtual lines could be set, 0 through 4. In newer Cisco IOS versions, the number has been expanded. Unless a telnet password is set, access on that virtual line is blocked.

```
Router1(config-line)# line vty 0 4
Router1(config-line)# password class
Router1(config-line)# login
```

There are three commands that may be used to exit the line configuration mode:

Command	Effect
	Return to the global configuration mode.
	Exit configuration and return to the privileged exec mode.

Issue the command **exit**. What is the router prompt? What is the mode?

```
Router1(config-line)# exit
```

_____

_____

Issue the command **end**. What is the router prompt? What is the mode?

_____

_____

Task 3: Configure Cisco Router Interfaces.

All cabled interfaces should contain documentation about the connection. On newer Cisco IOS versions, the maximum description is 240 characters.

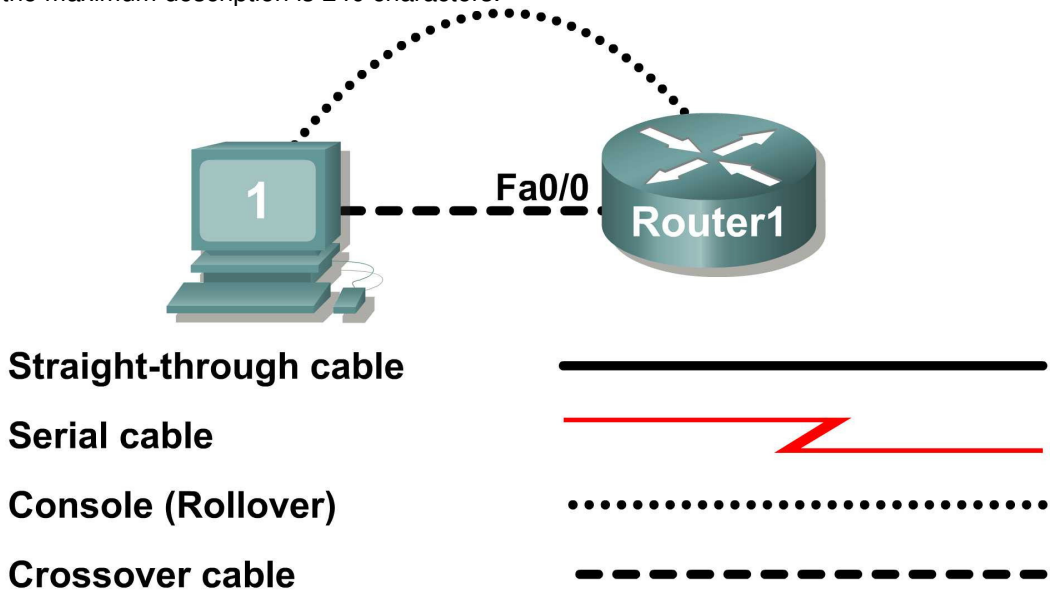


Figure 2. Physical lab topology.

Figure 2 shows a network topology where a host computer is connected to Router1, interface Fa0/0.

Write down your subnet number and mask: _____

The first IP address will be used to configure the host computer LAN. Write down the first IP Address:

_____

The last IP address will be used to configure the router fa0/0 interface. Write down the last IP Address:

_____

Step 1: Configure the router fa0/0 interface.

Write a short description for the connections on Router1:
Fa0/0 ->

_____

Apply the description on the router interface with the interface configuration command, **description**:

```
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
```

Step 2: Configure the router Fa0/1 interface.

Write a short description for the connections on Router1:
Fa0/1 ->

_____

Apply the description on the router interface with the interface configuration command, **description**:

```
Router1(config)# interface fa0/1
Router1(config-if)# description Connection to switch with straight-through
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
FastEthernet0/1, changed state to up
```

Step 3: Configure the host computer.

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.

Step 4: Verify network connectivity.

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

What Cisco IOS command can be used to verify the interface status? _____

What Windows command can be used to verify host computer configuration? _____

What is the correct LAN cable between host1 and Router1? _____

Task 4: 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.

Step 1: Compare router RAM and NVRAM configurations.

Use the Cisco IOS **show** command to view RAM and NVRAM configurations. The configuration is displayed one screen at a time. A line containing " `-- more --` " indicates that there is additional information to display. The following list describes acceptable key responses:

Key	Description
<SPACE>	Display the next page.
<RETURN>	Display the next line.
Q	Quit
<CTRL> c	Quit

Write down one possible shortcut command that will display the contents of NVRAM.

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
```

Use the output to answer the following questions:

How large is the configuration file? _____

What is the enable secret password? _____

Does your MOTD banner contain the information you entered earlier? _____

Do your interface descriptions contain the information you entered earlier? _____

Write down one possible shortcut command that will display the contents of RAM. _____

Step 2: Save RAM configuration to NVRAM.

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#
```

Write down one possible shortcut command that will copy the RAM configuration to NVRAM.

_____

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

Task 5: Configure a Cisco Switch.

Cisco IOS switch configuration is (thankfully) similar to configuring a Cisco IOS router. The benefit of learning IOS commands is that they are similar to many different devices and IOS versions.

Step 1: Connect the host to the switch.

Move the console, or rollover, cable to the console port on the switch. Ensure power has been applied to the switch. In Hyperterminal, press Enter until the switch responds.

Step 2. Configure global configuration hostname setting.

Appendix 2 shows a typical default switch configuration. Depending on router model and IOS version, your configuration may look slightly different. However, there should be no configured passwords. If your router does not have a default configuration, ask the instructor to remove the configuration.

From the user exec mode, enter global configuration mode:

```
Switch> en
Switch# config t
Switch(config)#
```

Set the device hostname to Switch1.

```
Switch(config)# hostname Switch1
Switch1(config)#
```

Step 3: Configure the MOTD banner.

Create a suitable MOTD banner. Only system administrators of the ABC company are authorized access, unauthorized access will be prosecuted, and all connection information will be logged.

Configure the MOTD banner. The MOTD banner is displayed on all connections before the login prompt. Use the terminating character on a blank line to end the MOTD entry. For assistance, review the similar step for configuring a router MOTD banner.

```
Switch1(config)# banner motd %
```

Step 4: Configure the privileged exec password.

Set the privileged exec password to **cisco**.

```
Switch1(config)# enable secret cisco
Switch1(config)#
```

Step 5: Configure the console password.

Set the console access password to **class**.


```
Switch1(config)# line console 0
Switch1(config-line)# password class
Switch1(config-line)# login
```

Step 6: Configure the virtual line password.

Set the virtual line access password to **class**. There are 16 virtual lines that can be configured on a Cisco IOS switch, 0 through 15.

```
Switch1(config-line)# line vty 0 15
Switch1(config-line)# password class
Switch1(config-line)# login
```

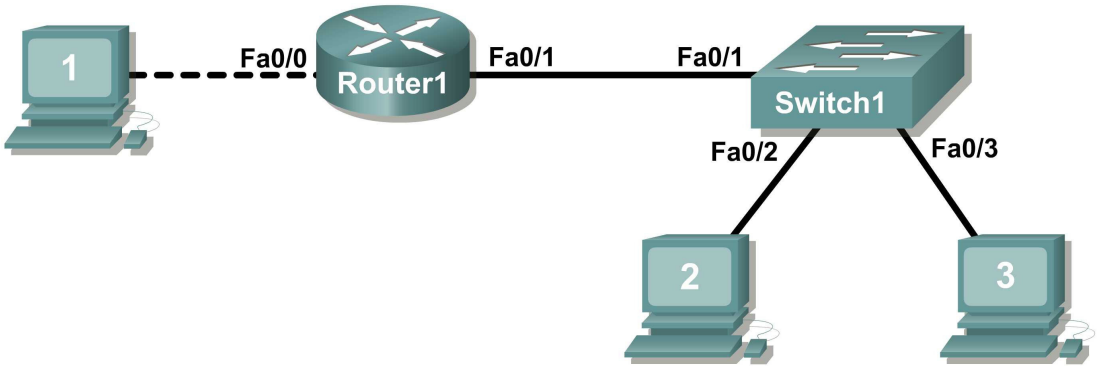


Figure 3. Network topology.

Step 7: Configure the interface description.

Figure 3 shows a network topology where Router1 is connected to Switch1, interface Fa0/1. Switch1 interface Fa0/2 is connected to host computer 2, and interface Fa0/3 is connected to host computer 3.

Write a short description for the connections on Switch1:

Router1 Interface	Description
Fa0/1	
Fa0/2	
Fa0/3	

Apply the descriptions on the switch interface with the interface configuration command, **description**:

```
Switch1(config)# interface fa0/1
Switch1(config-if)# description Connection to Router1
Switch1(config)# interface fa0/2
Switch1(config-if)# description Connection to host computer 2
Switch1(config)# interface fa0/3
Switch1(config-if)# description Connection to host computer 3
Switch1(config-if)# end
Switch1#
```

Step 7: Save RAM configuration to NVRAM.

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

```
Switch1# copy run start
Destination filename [startup-config]? <ENTER>
Building configuration...
[OK]
Switch1#
```

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

Task 6: Reflection

The more you practice the commands, the faster you will become in configuring a Cisco IOS router and switch. It is perfectly acceptable to use notes at first to help configure a device, but a professional network engineer does not need a 'cheat sheet' to perform common configuration tasks. The following table lists commands covered in this lab:

Purpose	Command
Enter the global configuration mode.	**configure terminal** Example: Router> **enable** Router# configure terminal Router(config)#
Specify the name for the router.	**hostname** *name* Example: Router(config)# **hostname Router1** Router(config)#
Specify an encrypted password to prevent unauthorized access to the privileged exec mode.	**enable secret** *password* Example: Router(config)# **enable secret cisco** Router(config)#

Specify a password to prevent unauthorized access to the console.	**password** *password* **login** Example: Router(config)# **line con 0** Router(config-line)# **password class** Router(config-line)# **login** Router(config)#
Specify a password to prevent unauthorized telnet access. Router vty lines: 0 4 Switch vty lines: 0 15	**password** *password* **login** Example: Router(config)# **line vty 0 4** Router(config-line)# **password class** Router(config-line)# **login** Router(config-line)#
Configure the MOTD banner.	**Banner motd %** Example: Router(config)# **banner motd %** Router(config)#
Configure an interface. Router- interface is OFF by default Switch- interface is ON by default	Example: Router(config)# **interface fa0/0** Router(config-if)# **description** *description* Router(config-if)# **ip address** *address mask* Router(config-if)# **no shutdown** Router(config-if)#
Save the configuration to NVRAM.	**copy running-config startup-config** Example: Router# **copy running-config startup-config** Router#

Task 7: Challenge

It is often necessary, and always handy, to save the configuration file to an off-line text file. One way to save the configuration file is to use HyperTerminal Transfer menu option Capture.

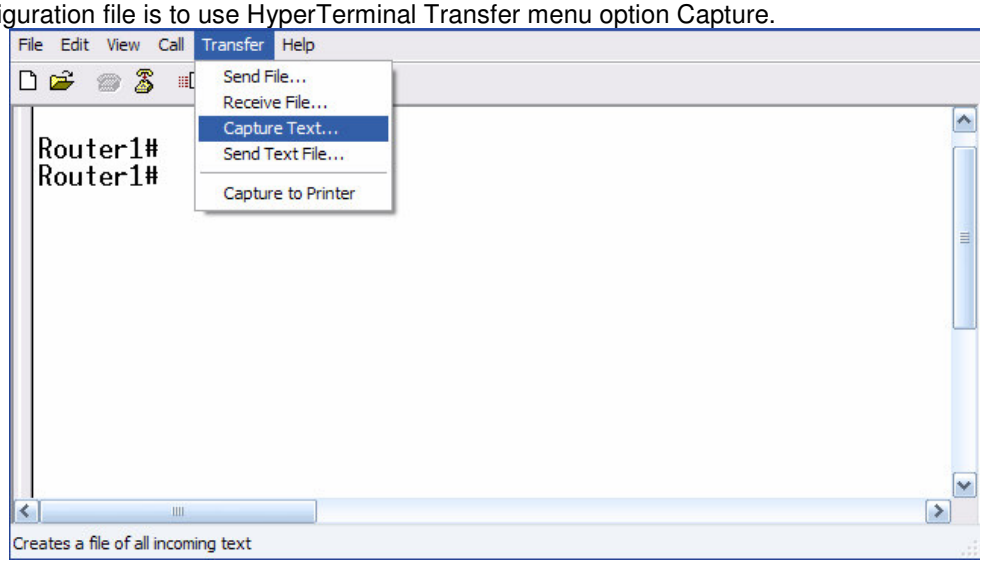


Figure 2. Hyperterminal Capture menu.

Refer to Figure 2. All communication between the host computer and router are saved to a file. The file can be edited, and saved. The file can also be edited, copied, and pasted into a router:

To start a capture, select Hyperterminal menu option Transfer | Capture Text. Enter a path and file name, and select Start.

Issue the privileged exec command **`show running-config`**, and press the <SPACE> key until all of the configuration has been displayed.

Stop the capture. Select menu option Transfer | Capture Text | Stop.

Open the text file and review the contents. Remove any lines that are not configuration commands, such as the `more` prompt. Manually correct any lines that were scrambled or occupy the same line. After checking the configuration file, highlight the lines and select Notepad menu Edit | Copy. This places the configuration in host computer memory.

To load the configuration file, it is ALWAYS best practice to begin with a clean RAM configuration. Otherwise, stale configuration commands may survive a paste action and have unintended consequences (also known as the Law of Unintended Consequences):

Erase the NVRAM configuration file:

```
Router1# erase start
Erasing the nvram filesystem will remove all configuration files! Continue?
[confirm] <ENTER>
[OK]
Erase of nvram: complete
```

Reload the router:

```
Router1# reload
Proceed with reload? [confirm] <ENTER>
```

When the router reboots, enter the global configuration mode:

```
Router> en
Router# config t
Router(config)#
```

Using the mouse, right-click inside the Hyperterminal window and select Paste To Host. The configuration will be loaded, very quickly, to the router. Watch closely for error messages, each message must be investigated and corrected.

Verify the configuration, and save to NVRAM.

Task 6: Cleanup

Before turning off power to the router and switch, remove the NVRAM configuration file from each device with the privileged exec command **`erase startup-config`**.

Delete any configuration files saved on the host computers.

Unless directed otherwise by the instructor, restore host computer network connectivity, then turn off power to the host computers. Remove anything that was brought into the lab, and leave the room ready for the next class.

Appendix 1- default Cisco IOS router configuration

```
Current configuration : 824 bytes
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname Router
!
boot-start-marker
boot-end-marker
!
no aaa new-model
ip cef
!
interface FastEthernet0/0
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface FastEthernet0/1
 no ip address
 shutdown
 duplex auto
 speed auto
!
interface Serial0/1/0
 no ip address
 shutdown
 no fair-queue
!
interface Serial0/1/1
 no ip address
 shutdown
 clock rate 2000000
!
interface Vlan1
 no ip address
!
ip http server
no ip http secure-server
!
control-plane
!
line con 0
line aux 0
line vty 0 4
 login
!
scheduler allocate 20000 1000
end
```


Appendix 2- default Cisco IOS switch configuration

```
Current configuration : 1519 bytes
!
version 12.1
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Switch
!
!
ip subnet-zero
!
!
spanning-tree mode pvst
no spanning-tree optimize bpdu transmission
spanning-tree extend system-id
!
!
interface FastEthernet0/1
 no ip address
!
interface FastEthernet0/2
 no ip address
!
interface FastEthernet0/3
 no ip address
!
interface FastEthernet0/4
 no ip address
!
interface FastEthernet0/5
 no ip address
!
interface FastEthernet0/6
 no ip address
!
interface FastEthernet0/7
 no ip address
!
interface FastEthernet0/8
 no ip address
!
interface FastEthernet0/9
 no ip address
!
interface FastEthernet0/10
 no ip address
!
interface FastEthernet0/11
 no ip address
!
interface FastEthernet0/12
```



```
 no ip address
!
interface FastEthernet0/13
 no ip address
!
interface FastEthernet0/14
 no ip address
!
interface FastEthernet0/15
 no ip address
!
interface FastEthernet0/16
 no ip address
!
interface FastEthernet0/17
no ip address
!
interface FastEthernet0/18
 no ip address
!
interface FastEthernet0/19
 no ip address
!
interface FastEthernet0/20
 no ip address
!
interface FastEthernet0/21
 no ip address
!
interface FastEthernet0/22
 no ip address
!
interface FastEthernet0/23
 no ip address
!
interface FastEthernet0/24
 no ip address
!
interface GigabitEthernet0/1
 no ip address
!
interface GigabitEthernet0/2
 no ip address
!
interface Vlan1
 no ip address
 no ip route-cache
 shutdown
!
ip http server
!
!
line con 0
line vty 5 15
!
```



```
end
```

