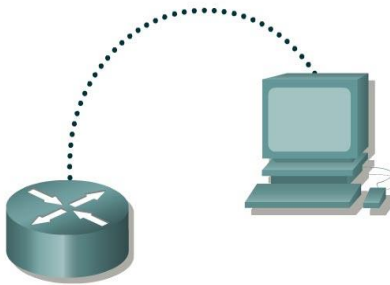


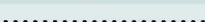



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EXPERIMENT 2 – Router Configuration

PART I: Establishing a Console Session with HyperTerminal



Straight-through cable	
Serial cable	
Console (Rollover)	
Crossover cable	

OBJECTIVES

- Connect a router and workstation using a console cable.
- Configure HyperTerminal to establish a console session with the router.

MATERIALS/EQUIPMENT NEEDED

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

INTRODUCTION

Router is typically like a computer which operates with two main components:

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1. Hardware (Router physical components)
2. Software (Internetwork Operating System and Configuration File)
 - Cisco IOS (Internetwork Operating System): is the operating system that manages the hardware platform it is working on.
 - Configuration File: is a program file that contains commands that reflect how the router will react.

Router external connections as shown in figure 1 can be divided as:-

1. Management Ports

Console port : Most common of the management ports which used to connect a terminal, Or most likely a PC running terminal emulator software,

- No need for network access to that router.
- The console port must be used during initial configuration of the router.

Auxiliary (AUX) port (Not all routers have auxiliary ports). At times, can be used similarly to a console port .It Can also be used to attach a modem.

2. Router Interfaces

Interface on Cisco routers refers to a physical connector on the router whose main purpose is to receive and forward packets. Routers have multiple interfaces used to connect to multiple networks which may mean: various types of networks, different types of media and connectors and different types of interfaces. For example, Fast Ethernet interfaces for connections to different LANs and also have different types of WAN interfaces used to connect a variety of serial links, including T1, DSL, and ISDN.

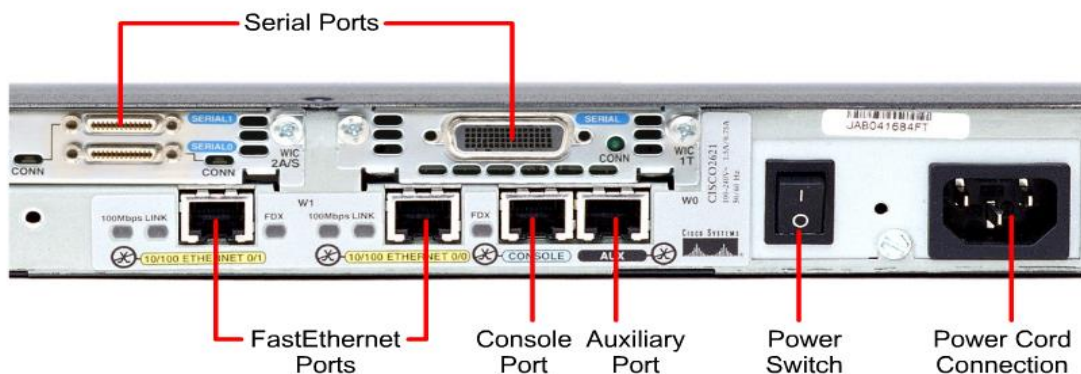


Figure 1: Router external connections

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HyperTerminal is a simple Windows-based terminal emulation program that can be used to connect to the console port on the router. A PC with HyperTerminal provides a keyboard and monitor for the router. Connecting to the console port with a rollover cable and using HyperTerminal is the most basic way to access a router for checking or changing its configuration.

Set up a network similar to the one in the diagram. Any router that meets the interface requirements may be used. Possible routers include 800, 1600, 1700, 2500, 2600 routers, or a combination.

PROCEDURE

Step 1: Basic Router Configuration

Connect a rollover cable to the console port on the router and the other end to the PC with a DB-9 or DB-25 adapter to a COM port. This should be completed prior to powering on any devices.

Step 2: Start HyperTerminal program

- a. Turn on the computer and router.
- b. From the Windows taskbar, locate the HyperTerminal program:

Start > Programs > Accessories > Communications > Hyper Terminal

Step 3: Name the HyperTerminal Session

- a. At the “Connection Description” popup, enter a name in the connection Name: field and select **OK**.



Step 4: Specify the computers connecting interface

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- a. At the “Connect To” popup, use the drop down arrow in the Connect using: field to select COM1 and select OK.



Step 5: Specify the interface connection properties

- a. At the “COM1 Properties” popup, use the drop down arrows to select:

Bits per second: 9600

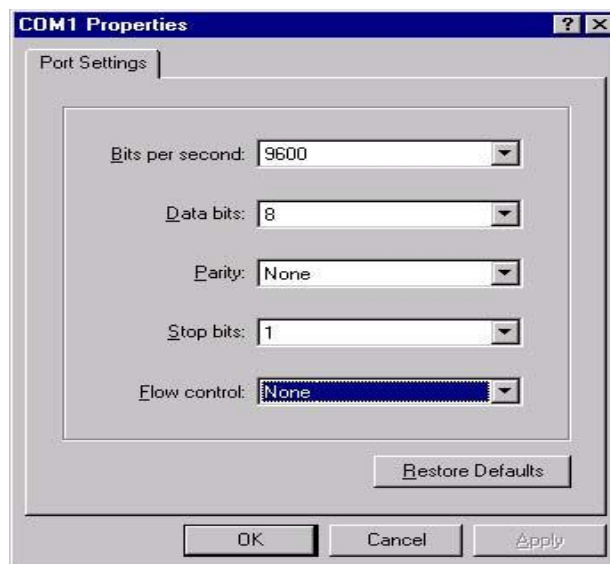
Data bits: 8

Parity: None

Stop bits: 1

Flow control: None

Then select OK.



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- b. When the HyperTerminal session window comes up, turn on the router. If the router is already on, press the Enter key. There should be a response from the router.

If there is, then the connection has been successfully completed.

- c. Record in the engineering journal the correct procedure for establishing a console session with the router.

PART II: Command Modes and Router Identification

Objective

- Identify basic router modes of user EXEC and privileged EXEC.
- Use commands to enter specific modes.
- Become familiar with the router prompt for each mode.
- Assign a name to the router.

INTRODUCTION

The Cisco IOS is designed as a modal operating system. The term modal describes a system where there are different modes of operation, each having its own domain of operation. The CLI uses a hierarchical structure for the modes.

Each mode is used to accomplish particular tasks and has a specific set of commands that are available when in that mode. For example, to configure a router interface, the user must enter interface configuration mode. All configurations that are entered in interface configuration mode apply only to that interface. Each mode is distinguished with a distinctive prompt, and only commands that are appropriate for that mode are allowed.

In order from top to bottom, the major modes (as shown in fig. 2) are:

User Executive Mode

The user executive mode, or user EXEC for short, has limited capabilities but is useful for some basic operations. The user EXEC mode is at the top of the modal hierarchical structure. This mode is the first entrance into the CLI of an IOS router.

The user EXEC mode allows only a limited number of basic monitoring commands. This is often referred to as view-only mode. The user EXEC level does not allow the execution of any commands that might change the configuration of the device.

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Privileged EXEC Mode

The execution of configuration and management commands requires that the network administrator use the privileged EXEC mode or a specific mode further down the hierarchy. The privileged EXEC mode can be identified by the prompt ending with the # symbol.

Router#

By default, privileged EXEC does not require authentication. It is a good practice to ensure that authentication is configured. Global configuration mode and all other more specific configuration modes can only be reached from the privileged EXEC mode.

Global Configuration Mode

The primary configuration mode is called global configuration or global config. From global config, CLI configuration changes are made that affect the operation of the device as a whole.

We also use the global config mode as a precursor to accessing specific configuration modes.

The following CLI command is used to take the device from privileged EXEC mode to the global configuration mode and to allow entry of configuration commands from a terminal:

Router#configure terminal

Once the command is executed, the prompt changes to show that the router is in global configuration mode.

Router(config)#

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Specific Configuration Modes

From the global config mode, there are many different configuration modes that may be entered. Each of these modes allows the configuration of a particular part or function of the IOS device. The list below shows a few of them:

- *Interface* mode - to configure one of the network interfaces (Fa0/0, S0/0/0, ...)
- *Line* mode - to configure one of the lines (physical or virtual) (console, AUX, ...)
- *Router* mode - to configure the parameters for one of the routing protocols

To exit a specific configuration mode and return to global configuration mode, enter exit at a prompt. To leave configuration mode completely and return to privileged EXEC mode, enter end or use the key sequence Ctrl-Z.

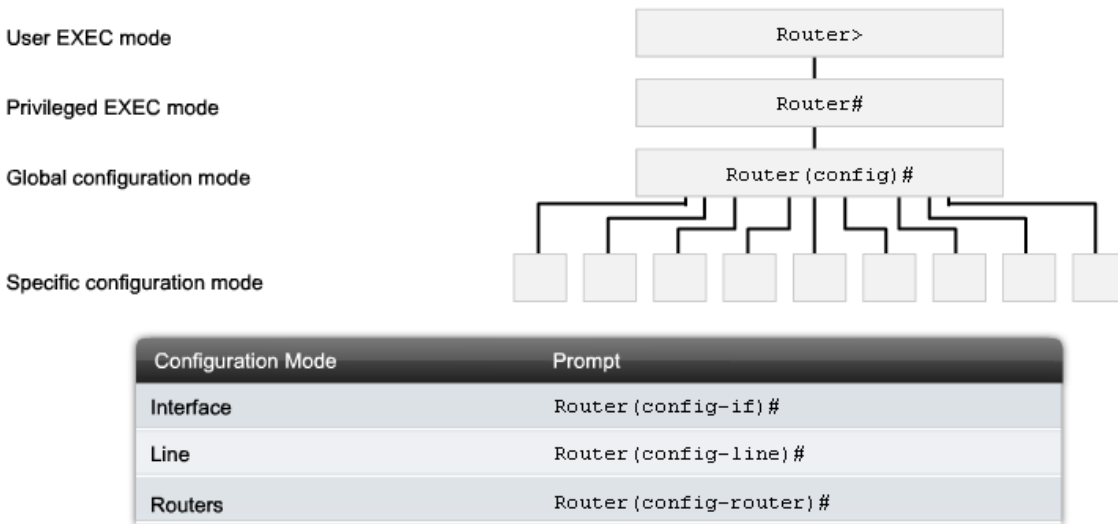


Figure 2: IOS Configuration Modes

Experiment steps

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. The following steps are intended to be executed on each router unless specifically instructed otherwise.

PROCEDURE

Start a HyperTerminal session as performed in part I.

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Step 1: Login to the router in user EXEC mode

- Connect to the router and login.
- What prompt did the router display? _____
- What does this prompt mean? _____

Step 2: Login to the router in privileged EXEC mode

- Enter **enable** at the user mode prompt.
Router>**enable**
- If prompted for a password, enter the password class.
- What prompt did the router display? _____
- What does this prompt mean? _____

Step 3: Enter global configuration mode

- Enter **configure terminal** at the privilege mode prompt.
Router#**configure terminal**
- What prompt did the router display? _____
- What does this prompt mean? _____

Step 4: Enter router configuration mode

- Enter **router rip** at the global configuration mode.
Router(config)#**router rip**
- What prompt did the router display? _____
- What does this prompt mean? _____

Step 5: Exit from router mode and go into interface configuration mode

- Enter **exit** at the prompt to return to global configuration mode.
Router(config-router)#**exit**
- Enter **interface serial 0** at the global configuration mode prompt.
Note: See chart for the interface identifier.
Router(config)#**interface serial 0**
- What prompt did the router display? _____
- What does this prompt mean? _____
- Enter **exit** at the prompt to return to global configuration mode.
Router(config-if)#**exit**

Step 6: Assign a name to the router

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a. Router(config)#**hostname Nozom**

b. What prompt did the router display? _____

c. What does this prompt mean? _____

d. What change has occurred in the prompt? _____

Step 7: Exit the router

a. Enter **exit** at the prompt to close out of the router.

GAD(config)#**exit**

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

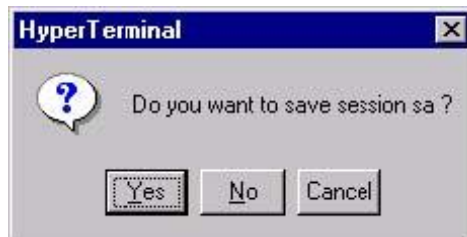
Step 8: Closing the session

a. To end the console session from a HyperTerminal session, select: File > Exit

b. When the HyperTerminal disconnect warning popup appears, select Yes.



c. The computer will then ask if the session is to be saved. Select No.



PART III: Connect Multiple Networks

Objective

- How to connect different networks
- Configure an Ethernet interface on the router with an IP address and a subnet mask.

INTRODUCTION

The purpose of a router is to interconnect different networks. Router Ethernet interfaces are used as the gateways for the end devices on the LANs directly connected to the router. Each Ethernet interface must have an IP address and subnet mask to route IP packets.

To configure an Ethernet interface follow these steps:

1. Enter global configuration mode.
2. Enter interface configuration mode.
3. Specify the interface address and subnet mask.
4. Enable the interface.

By default, interfaces are disabled. To enable an interface, enter the **no shutdown** command from the interface configuration mode. If an interface needs to be disabled for maintenance or troubleshooting, use the **shutdown** command.

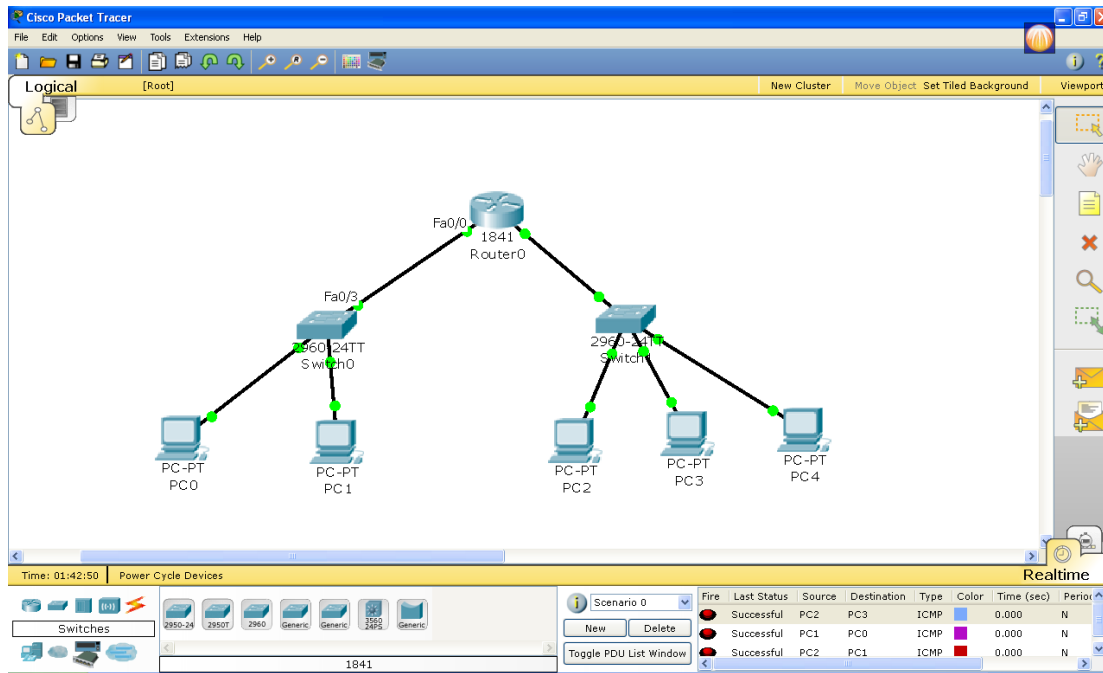
PROCEDURE

Step 1: Build the network shown in figure

This network consist of the following devices

- A router 1841
- Two switches 2960
- Five PCs

EXPERIMENT 2 – Router Configuration



Step 2: Configure PCs

Configure the network PCs as following:

PC Name	Network Address	IP Address	Subnet mask	Default Gateway
PC0	192.168.1.0	192.168.1.1	255.255.255.0	192.168.1.254
PC1	192.168.1.0	192.168.1.2	255.255.255.0	192.168.1.254
PC2	10.0.0.0	10.0.0.1	255.0.0.0	10.0.0.254
PC3	10.0.0.0	10.0.0.2	255.0.0.0	10.0.0.254
PC4	10.0.0.0	10.0.0.3	255.0.0.0	10.0.0.254

Configuring an Ethernet Interface

Step 3: Configure the Fast Ethernet 0/0 interface

Note: The designation for the first Ethernet interface on the router will vary. It may be ethernet 0, fast Ethernet 0 or fast Ethernet 0/0 depending on the type of router.

```
Router(config)#interface fastEthernet 0/0
```

```
Router(config-if)#ip address 192.168.1.254 255.255.255.0
```

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```
Router(config-if)#no shutdown
```

```
Router(config-if)#exit
```

```
Router(config)#exit
```

Note: Once interface configuration mode is entered and note the IP address of the interface. Enter the subnet mask. The command **no shutdown** turns on the interface. Shutdown is when the interface is off.

Step 4: Display FastEthernet 0/0 configuration information

```
Router #show interface fastethernet 0/0
```

Note: This will show the details of the Ethernet interface.

a. List at least three details discovered by issuing this command.

b. FastEthernet0/0 is _____. Line protocol is _____.

c. Internet address is _____.

The interface status will be one of the following

- FastEthernet0/0 is up, line protocol is up

The interface H/W and its protocol are working

- FastEthernet0/0 is administratively down, line protocol is down

The interface is shut down

- FastEthernet0/0 is down , line protocol is down

Interface or cable H/W failure.

- FastEthernet0/0 is up , line protocol is down

.Interface H/W is working but its protocol does not.

Step 5: Configure the Fast Ethernet 0/1 interface

```
Router(config)#interface fastEthernet 0/1
```

```
Router (config-if)#ip address 10.0.0.254 255.0.0.0
```

```
Router (config-if)#no shutdown
```

```
Router (config-if)#exit
```

EXPERIMENT 2 – Router Configuration

Router (config)#**exit**

Step 6: Display FastEthernet 0/1 configuration information

Router #**show interface fastethernet 0/1**

Note: This will show the details of the Ethernet interface.

- a. List at least three details discovered by issuing this command.
- b. FastEthernet0 is _____. Line protocol is _____.
- c. Internet address is _____.

Step 7: Test the connection between two PCs in different networks

To test Connectivity between PC1 and PC3 follows the following instructions:

- Click **PC1**
- Click the **Desktop** tab
- Click the **Command Prompt** tab
- Type **ping 10.0.0.2** then press *enter*

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

POST-LAB

Exercise 1: Change network which has address (192.168.1.0) to be (172.16.0.0 & subnet mask 255.255.0.0). Then do required changes to make it communicate with the other network again.