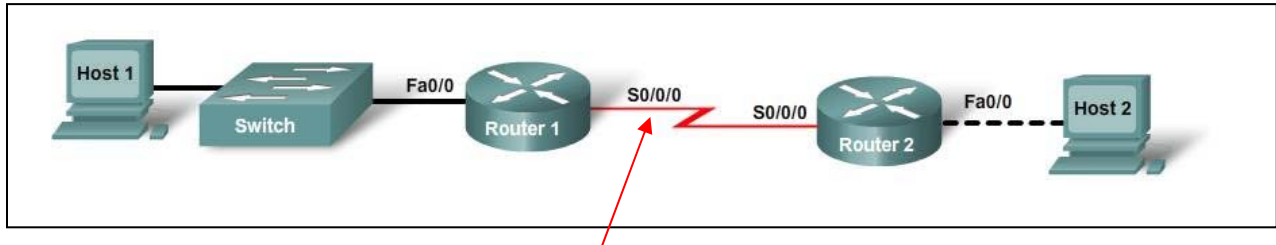


**Note:** This case study utilizes Packet Tracer. Please see the Chapter 2 Packet Tracer file located in Supplemental Materials.



(NB – serial ports are S0/1/0 in PT exercise R1 is DCE)

Device Designation	Host Name / Interface	IP Address Fa0/0	VLAN 1 IP Address	Subnet Mask	IP Address S0/1/0	Subnet Mask	Default Gateway
Router1	R1	192.168.1.1		255.255.255.0	192.168.2.1	255.255.255.0	
Router2	R2	192.168.3.1		255.255.255.0	192.168.2.2	255.255.255.0	
Switch	Switch1		192.168.1.5	255.255.255.0			192.168.1.1
Host 1	PC#1	192.168.1.10		255.255.255.0			192.168.1.1
Host 2	PC#2	192.168.3.10		255.255.255.0			192.168.3.1

### Introduction

This exercise is designed to allow you to practice setting up a small network, and configuring the associated switch and routers. It is, essentially, the same as the practical lab in Discovery 3, Chapter 2, but uses Packet Tracer to allow easy access without the requirement to be in a “real” laboratory.

The objectives are the same as the equipment lab, but this exercise does NOT step you through the commands, and requires you to recall them.

The limitations of Packet Tracer will mean that you may not get *exactly* the same configuration as in the “answer network”. This is acceptable – you can use the associated answer network to see where your own answer differs, and determine if this is a problem.

### Objectives

- Configure static routes.
- Configure a routing protocol (RIP v2).
- Configure a switch management VLAN IP address.
- Configure switchport security.

- Test and verify configurations.

### Background / Preparation

This study reviews the primary IOS commands used to manage, configure, and monitor devices in a multi-router network. In this lab, you will configure two routers using static routes and then using a routing protocol; configure a switch, including access to management functions; and configure two hosts. You will make and verify configuration changes on the switch. You will also verify network configurations and connectivity.

The following virtual resources are supplied in the initial network:

- Cisco 2960 switch or other comparable switch
- Two 1841 Cisco routers with Fast Ethernet and one serial interfaces to connect to switch and host
- Two Windows-based PCs.

### Step 1: Connect PC1 to the switch

Connect PC1 to Fast Ethernet switch port Fa0/1. Configure PC1 to use the IP address, mask, and gateway as shown in the topology diagram and table.

### Step 2: Perform an initial configuration on the switch

Configure the hostname of the switch as Switch1.

Set the privileged EXEC mode password to **cisco**.

Set the privileged EXEC mode secret password to **class**.

Configure the console and 16 virtual terminal lines to use a password and require it at login.

Save the configuration, exit from the console session and log in again.

### Step 3: Configure the switch management interface on VLAN 1

Enter the interface configuration mode for VLAN 1.

```
Switch1(config)#interface vlan 1
```

Set the IP address, and subnet mask for the management interface.

1. Why does interface VLAN1 require an IP address in this LAN?
2. Although PT does not allow the default gateway to be set, briefly explain its purpose?

#### Step 4: Verify configuration of the switch

Verify that the IP address of the management interface on the switch VLAN 1 and the IP address of PC1 are on the same local network. Use the **show running-config** command to check the IP address configuration of the switch.

- a. Save the running configuration to the startup config file.

#### Step 5: Perform basic configuration of router R1

Connect switch port Fa0/3 to interface Fa0/0 of router R1.

Enter privileged EXEC mode, and then global configuration mode.

Configure the router name as R1.

Disable DNS lookup.

```
R1(config)#no ip domain-lookup
```

1. Why would DNS lookup be disabled in a lab environment?

Configure the EXEC mode secret password as *class*.

2. Why is it not necessary to use the **enable password password** command?

Configure a message-of-the-day banner using the **banner motd** command.

3. Where does this banner display?

Configure the console and 5 virtual terminal lines to use a password and require it at login.

#### Step 6: Configure interfaces and static routing on router R1

Configure the FastEthernet 0/0 interface with the IP address 192.168.1.1/24 and set it “up”.

Configure the Serial 0/1/0 interface with the IP address 192.168.2.1/24. Set the clock rate to 64000, and set it “up”.

Return to global configuration mode.

Create a static route to enable R1 to reach the network attached to the R2 Fa0/0 interface. Use the next hop interface on R2 as the path to this network.

Why is this static route the only one required?

Return to privileged EXEC mode.

Save the running configuration to the startup config file.

### Step 7: Connect PC2 to router R2

Connect PC2 to the Fast Ethernet interface 0/0 of router R2.

1. What kind of cable is required to connect a host directly to a router Ethernet port?

Configure PC2 with correct IP address, subnet mask and default gateway as shown in table.

### Step 8: Perform basic configuration of router R2

Repeat Step 5, making the hostname R2.

Configure the Serial 0/1/0 interface with the IP address 192.168.2.2/24.

Configure the FastEthernet 0/0 interface with the IP address 192.168.3.1/24.

Create a static route to enable R2 to reach the network attached to the R1 Fa0/0 interface. Use the next hop interface on R1 as the path to this network.

Return to privileged EXEC mode.

Save the running configuration to the startup configuration file.

### Step 9: Connect the internetwork

Connect R1 and R2 using a serial cable between their configured serial interfaces.

Verify that the serial DCE cable is connected to R1 and that the serial DTE cable is connected to R2.

### Step 10: Verify and test the configurations

a. To verify that PC1 and Switch1 are correctly configured, ping the switch IP address from PC1.

b. To verify that Switch1 and R1 are correctly configured, ping the router Fa0/0 interface (default gateway) IP address from the Switch1 CLI.

c. To verify that PC2 and R2 are correctly configured, ping the router Fa0/0 interface from PC2.

1. Were the pings successful?

If the ping is not successful, verify the connections and configurations again. Check to ensure that all cables are correct and that connections are seated. Check the host, switch, and router configurations.

d. Verify that the routing tables have routes to all configured networks by using the **show ip route** command.

2. What does the "S" indicate?

Verify the static routes by pinging Host 2 from Host 1 and then Host 1 from Host 2

- e. Verify the router interface configurations using the **show ip interface brief** command.
  3. What should the output indicate for correctly configured, active interfaces?
  4. What should the output indicate for any interface that has not been configured?
- f. View devices from R1's terminal session using **the show cdp neighbors** command.
  5. If an additional switch is added between PC2 and R2, would that switch appear in this command output? Why or why not?

CDP only displays directly-connected Cisco devices.

**Step 11: Remove Static Route and configure a routing protocol on router R1**

- a. Remove the static route to 192.168.3.0 using the 'no' version of the command.
- b. Enable RIP v2 routing and advertise the participating networks.
- c. Return to privileged EXEC mode.
- d. Save the configuration.

**Step 12: Remove Static Route and configure a routing protocol on router R2**

- a. Remove the static route to 192.168.1.0.
- b. Enable RIP v2 routing and advertise the participating networks.
- c. Return to privileged EXEC mode.
- d. Save the configuration.

**Step 13: Verify and test the configurations**

\*\*\*Note - do not need to do this again since only the routing was changed\*\*\*

- a. Verify that the routing tables have routes to all configured networks by using the **show ip route** command. R2's routing table should display:

```
R2#sho ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route

Gateway of last resort is not set

R    192.168.1.0/24 [120/11] via 192.168.2.1, 00:00:11, Serial0/0/0
C    192.168.2.0/24 is directly connected, Serial0/0/0
C    192.168.3.0/24 is directly connected, FastEthernet0/0
R2#
```

1. What does the “R” indicate?
  2. On R1, which route would be displayed with an “R”?
- b. Verify the routing changes by pinging from Host 1 to Host 2 and then from Host 2 to Host 1
  - c. Verify the router interface configurations using the **show ip interface brief** command.
  - d. View devices from R1’s terminal session using the **show cdp neighbors** command.

#### Step 14: Use the switch management interface

- a. Open a command prompt on PC1, and enter the **telnet** command followed by the IP address assigned to management interface VLAN 1.
- b. Enter the vty password configured in Step 2 to gain access to the switch.
- c. At the switch prompt, issue the **show version** command.
 

```
Switch1>show version
```

  1. What is the Cisco IOS version of this switch?
- d. Determine which MAC addresses the switch has learned by using the **show mac-address-table** command at the privileged EXEC mode prompt.
 

```
Switch1#show mac-address-table
```

  2. How can you determine the MAC address belonging to PC1?
  3. Does PC1’s MAC address match one in the switch table?
- e. To allow the switch port FastEthernet 0/1 to accept only the one device, configure port security as ‘sticky’:
- f. Check the port security settings.

```
Switch1#show port-security
```

4. If a host other than PC1 attempts to connect to Fa0/1, what will happen?

It is sometimes necessary to set the speed and duplex of a port to ensure that it operates in a particular mode. You can set the speed and duplex with the **duplex** and **speed**

commands while in interface configuration mode. Force FastEthernet port 5 to operate at half duplex and 10 Mbps:

g. Issue the **show interfaces** command.

5. What is the duplex and speed setting for Fa0/5 now?

h. Enter **quit** at the switch command prompt to terminate the Telnet session.

### Step 15: Reflection

1. Describe a situation in which you would use virtual terminal access to manage a switch, as you did in Step 11.
2. Which symbol is used to show a successful ping in the Cisco IOS software?
3. Which commands used in this lab would provide the best documentation for this network?
4. This lab gave you an opportunity to review and display your knowledge of configuration commands. If you were asked to state three rules for “best practices” in device configuration, what would they be?