Configuration Labs

Part 1: Router Configuration

Lab 5: Configuring EIGRP Routing—Solutions

Overview

The overall objective of this laboratory exercise is to configure Enhanced IGRP (EIGRP) routing between two routers so that there is a routed network connection between computers in the two LANs. You will have to configure the computer's IP address, the gateway address, and the IP addresses for the appropriate router interfaces. You will have to configure and enable the serial connection between the routers to establish a connection.

Topology

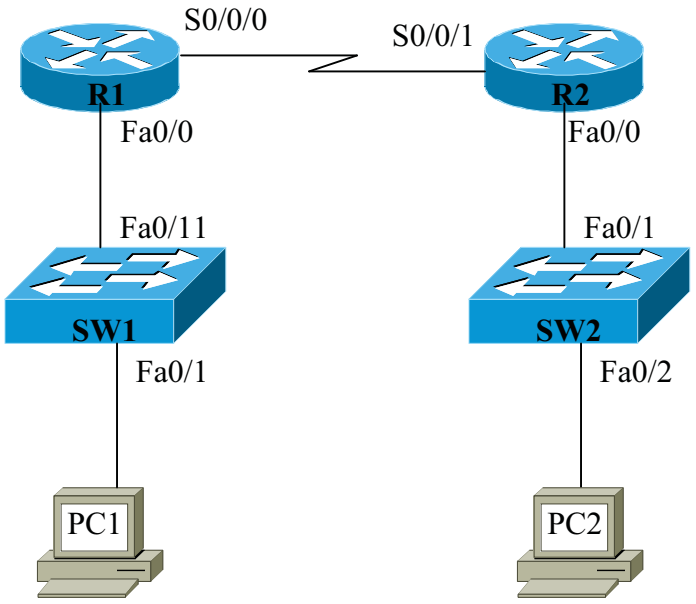

Figure 1 Network Topology for This Lab

Reference

The following simulator exercises provided with the CCNA 640-802 Network Simulator should be reviewed prior to starting this virtual laboratory exercise:

- EIGRP Configuration I, II
- EIGRP Serial Configuration I–VI
- EIGRP Neighbors I–V

Key Concepts

The following concepts, terms, commands, and steps should have been mastered in this laboratory exercise:

- How to configure the IP address, subnet mask, and default gateway for the computers in your LAN.
- How is the gateway address for your LAN router configured?
- The steps for configuring the host name for your router.
- The steps for configuring the router interface's IP addresses and subnet masks.
- The commands for configuring EIGRP routing from LAN-A to LAN-B.
- List two commands that can be used to verify that the routes are configured on the router.
- Use the computers in your LAN to ping the computers in the adjacent LAN.
- Use the proper command to trace the route from a PC in LAN-A to the host in the connected LAN-B.
- Use the proper command to trace the route from your router in LAN-A to the host computer in LAN-B.
- The steps to establish a Telnet connection to your router.
- Use the router command that displays the network routes stored in your router's routing table.
- Use the command to save your router configuration to NVRAM.
- What command is used to verify the routing protocol being used? What are two commands that can be used to display the routing protocol?
- What command displays only the EIGRP routes?
- What are wildcard bits or inverse mask bits?

Reference Tables

Table 1 provides the IP addresses and subnet masks of all interfaces used to complete this lab.

Table 1 Computer IP Addresses, Subnet Masks, and Gateway Addresses for Lab 5

Computer/Interface - R1	IP Address	Subnet Mask	Gateway Address
PC1	192.168.21.18	255.255.255.240	192.168.21.17
R1-Fa0/0	192.168.21.17	255.255.255.240	—
R1-S0/0/0	10.30.1.1	255.255.255.252	—
Computer/Interface – R2	**IP Address**	**Subnet Mask**	**Gateway Address**
PC2	192.168.85.21	255.255.255.240	192.168.85.18
R2-Fa0/0	192.168.85.18	255.255.255.240	—
R2-S0/0/1	10.30.1.2	255.255.255.252	—

Detailed Lab Steps

Task 1

In this lab, you are configuring EIGRP routing to the adjacent LAN for the network shown in Figure 1. You will be required to verify that computers in your LAN can ping the neighbor LAN. Note that a serial interface is being used to interconnect the LANs. You are configuring routing for both 172.20.15.0 and 192.168.25.0 networks. A subnet mask of 255.255.255.240 is being used. Use 56000 for the clock rate on the serial link (DCE interface).

Step 1. Configure the gateway address for FastEthernet 0/0 and the serial s0/0/0 interfaces on Router R1. You also need to configure the IP and gateway address for computer PC1. Use the IP address and subnet mask specified in Table 1. You will need to enable each interface and set the clock rate on the serial interface to 56000. List the router prompts and commands used to configure the interfaces.

```
R1(config)# interface fastEthernet 0/0
R1(config-if)# ip address 192.168.21.17 255.255.255.240
R1(config-if)# no shut
R1(config-if)#

R1(config)# interface serial 0/0/0
R1(config-if)# ip address 10.30.1.1 255.255.255.252
R1(config-if)# clock rate 56000
R1(config-if)# no shut
```

PC1

```
C:\> ip address 192.168.21.18 255.255.255.240
C:\> gateway 192.168.21.17
```

Step 2. Configure the gateway address for FastEthernet 0/0 and the serial s0/0/1 interfaces on Router R2. You also need to configure the IP and gateway address for computer PC2. Use the IP address and subnet mask specified in Table 1. List the router prompts and commands used to configure the interfaces.

```
R2(config)# interface fastEthernet 0/0
R2(config-if)# ip address 192.168.85.18 255.255.255.240
R2(config-if)# no shut
R2(config-if)#

R2(config)# interface serial 0/0/0
R2(config-if)# ip address 10.30.1.2 255.255.255.252
R2(config-if)# no shut
```

PC2

```
C:\> ip address 192.168.85.21 255.255.255.240
C:\> gateway 192.168.85.18
```

Step 3. Configure the host name for your routers (R1 should be renamed LAN-A, and R2 should be renamed LAN-B). List the router prompts and commands used to configure the router's host name.

```
R1# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.

R1(config)# hostname LAN-A
LAN-A(config)#

R2# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.

R2(config)# hostname LAN-B
LAN-B(config)#
```

Step 4. Use the proper command to verify that the router interfaces are properly configured. List the router prompts and commands used to verify the interfaces.

```
LAN-A# show ip interface brief
Interface        IP-Address     OK? METHOD  Status                Protocol
FastEthernet0/0  192.168.21.17  YES manual  up                    up
FastEthernet0/1  unassigned     YES NVRAM   administratively down down
Serial0/0/0      10.30.1.1      YES NVRAM   up                     up
Serial0/0/1      unassigned     YES NVRAM   administratively down  down
LAN-A#

LAN-B# sh ip int br
Interface         IP-Address     OK? Method Status                Protocol
FastEthernet0/0   192.168.85.18  YES manual up                    up
FastEthernet0/1   unassigned     YES unset  administratively down down
Serial0/0/0       unassigned     YES unset  administratively down down
Serial0/0/1       10.30.1.2      YES manual up                    up
LAN-B#
```

Step 5. Configure an EIGRP route from the LAN-A router to the LAN-B router. Use an autonomous system number of 100. List the router prompts and commands used to configure EIGRP routing.

```
LAN-A# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
LAN-A(config)# router eigrp 100
LAN-A(config-router)# network 192.168.21.0 0.0.0.255
LAN-A(config-router)# network 10.30.0.0 0.0.255.255
LAN-A(config-router)#

LAN-B(config)# router eigrp 100
LAN-B(config-router)# network 192.168.85.0 0.0.0.255
LAN-B(config-router)# network 10.30.0.0 0.0.255.255
LAN-B(config-router)#
```

Step 6. List the router prompts and commands used to verify that EIGRP routing has been configured on the LAN-A router. Are there routes configured to all the networks?

Yes, routing has been configured to the 10.30.0.0, 192.168.21.0, and 192.168.85.0 networks.

```
LAN-A#
%SYS-5-CONFIG_I: Configured from console by console
sh ip route
Codes: C - connected, S - static, I - IGRP, 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, E - EGP
       i - IS-IS, 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

     10.0.0.0/8 is variably subnetted, 2 subnets, 2 masks
D       10.0.0.0/8 is a summary, 00:00:16, Null0
C       10.30.1.0/30 is directly connected, Serial0/0/0
     192.168.21.0/24 is variably subnetted, 2 subnets, 2 masks
D       192.168.21.0/24 is a summary, 00:00:16, Null0
C       192.168.21.16/28 is directly connected, FastEthernet0/0
D    192.168.85.0/24 [90/20514560] via 10.30.1.2, 00:00:16, Serial0/0/0
LAN-A#
```

Step 7. Use the computers in each LAN to ping the computers in the adjacent LAN.

From PC1

```
PC> ping 192.168.85.21

Pinging 192.168.85.21 with 32 bytes of data:

Reply from 192.168.85.21: bytes=32 time=93ms TTL=126
Reply from 192.168.85.21: bytes=32 time=94ms TTL=126
```

```
Reply from 192.168.85.21: bytes=32 time=94ms TTL=126
Reply from 192.168.85.21: bytes=32 time=93ms TTL=126

Ping statistics for 192.168.85.21:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 93ms, Maximum = 94ms, Average = 93ms
```

From PC2

```
PC> ping 192.168.21.18

Pinging 192.168.21.18 with 32 bytes of data:

Reply from 192.168.21.18: bytes=32 time=93ms TTL=126
Reply from 192.168.21.18: bytes=32 time=94ms TTL=126
Reply from 192.168.21.18: bytes=32 time=93ms TTL=126
Reply from 192.168.21.18: bytes=32 time=94ms TTL=126

Ping statistics for 192.168.21.18:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 93ms, Maximum = 94ms, Average = 93ms
```

Step 8. Use the proper command to trace the route from a PC in LAN-A to a host in LAN-B. Your trace should pass through two routers. List the command used and record the trace information. How many hops did you record?

```
PC> tracert 192.168.85.21

Tracing route to 192.168.85.21 over a maximum of 30 hops:

  1    32 ms     31 ms     17 ms     192.168.21.17
  2    47 ms     62 ms     62 ms     10.30.1.2
  3    94 ms     94 ms     93 ms     192.168.85.21

Trace complete.
```

The trace passes through two router hops.

Step 9. Use the command to list the EIGRP neighbors off the LAN-A router.

```
LAN-A# show ip eigrp neighbors
IP-EIGRP neighbors for process 100
H   Address         Interface      Hold  Uptime    SRTT  RTO   Q   Seq
                    (sec)          (ms)  Cnt       Num
0   10.30.1.2       Se2/0          13    00:15:24  40    1000  0    3
```

Step 10. Use the command to make a Telnet connection from the LAN-A router to the LAN-B router. Set the VTY password to ciscopress and enable remote login. List the commands used to establish the Telnet connection. What IP address did you use?

```
LAN-B(config)# line vty 0 4
LAN-B(config-line)# password ciscopress
LAN-B(config-line)# login
LAN-B(config-line)#

LAN-A# telnet 192.168.85.18        This is LAN-B FA0/0 IP address.
Trying 192.168.85.18 ...Open
User Access Verification
Password:
LAN-B>
```

Step 11. Use the command to save your router configuration to the startup configuration. What command did you use? Use the proper command to verify that the configuration has been saved to NVRAM. List the router prompts and the commands used.

```
LAN-A# copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]

LAN-B# copy running-config startup-config
Destination filename [startup-config]?
Building configuration...
[OK]
```

Task 2

The following is a partial list of the items displayed when you issue the **show running-configuration [sh run]** command. Your task is to define each item and its purpose. You may need to go to the Cisco website (http://www.cisco.com) and look up what each of these commands means.

1. **shutdown**

   This indicates that an interface is shut down.

2. **log-adjacency changes**

   To configure the router to send a syslog message when an OSPF neighbor goes up or down, use the **log-adjacency-changes** command in router configuration mode.

3. **control-plane**

   The Control Plane Policing (CoPP) feature allows users to configure a quality of service (QoS) filter that manages the traffic flow of control plane packets to protect the control plane of Cisco IOS routers and switches against reconnaissance and denial of service (DoS) attacks. To enter control-plane configuration mode and apply a CoPP, port-filter, or queue-threshold policy to police traffic destined for the control plane, use the **control-plane** command in global configuration mode.

4. **scheduler allocate 20000 1000**

   To guarantee CPU time for processes, use the **scheduler allocate** global configuration command on the Cisco 7200 series and Cisco 7500 series. The **no** form of this command restores the default.

5. **scheduler allocate interrupt-time process-time**

   interrupt-time: Integer (in microseconds) that limits the number of microseconds to spend on fast switching within any one network interrupt context. The range is 400 to 60,000 microseconds. The default is 4000 microseconds.

   process-time: Integer (in microseconds) that guarantees the minimum number of microseconds to spend at the process level when network interrupts are disabled. The range is 100 to 4000. The default is 200 microseconds.

6. **login local**

   To establish a username-based authentication system, use the **username** command in global configuration mode. To enable password checking at login, use the **login local** command in line configuration mode.

7. **line con 0**

   This is the path for enabling the login and setting the password for the console port connection.

8. **line aux 0**

   This is the path for enabling the login and setting the password for the auxiliary port connection.

9. **line vty 0 4**

   This is the path for enabling the login and setting the password for the virtual port connection.

Answer the following router questions:

1. What is the purpose of the wildcard bits?

   These are used to select the bits that must match. A 0 indicates a must match and a 255 is a don't care.

2. How many IP addresses are available using a 255.255.255.240 subnet mask?

   Sixteen IP addresses are defined, but one is reserved for the network and one is reserved for the broadcast address, thereby providing 14 usable IP addresses.

3. How many IP addresses are available using a 255.255.255.252 subnet mask?

   Four IP addresses are defined, but one is reserved for the network and one is reserved for the broadcast address, thereby providing two usable IP addresses.

4. What command is used to determine your EIGRP neighbors?

   LAN-A# **show ip eigrp neighbors**