Configuration Labs

Part 1: Router Configuration

Lab 2: Configuring Static Routes—Solutions

Overview

The overall objective of this lab is to configure static routes on two routers so that there is a network connection between the 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. This will require that the serial connection between routers be configured and enabled. In addition, you will also configure static routing between the two networks.

Topology

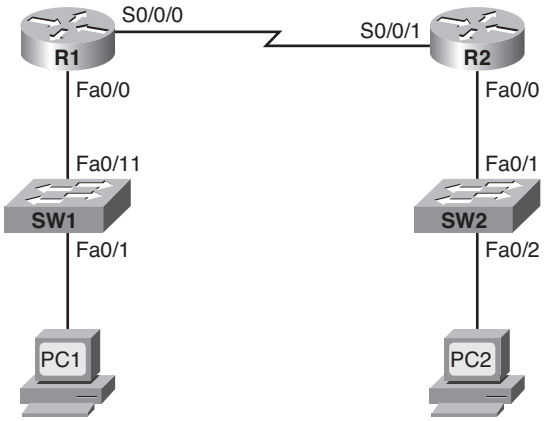

Figure 1 Network Topology for This Lab

Reference

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

- Examining the IP Routing Table
- Using debug
- Connected Routes
- Testing Using Pings with Host Names
- Static Routes I–IV
- Default Routes

Key Concepts

The following concepts, terms, commands, and steps should have been mastered in this laboratory exercise. Verify your understanding of the material before taking the lab quiz.

- How to set the clock rate for the router.
- Which router controls the clock rate, DCE, and DTE?
- 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 a static route from your LAN router to the adjacent LAN router.
- 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 in the router to trace the route from your router to a host in the other LAN.
- 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?

Reference Tables

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

Table 1 Computer IP Addresses, Subnet Masks, and Gateway Addresses for Lab 2

Computer/Interface - R1	IP Address	Subnet Mask	Gateway Address
PC1	192.168.20.1	255.255.255.0	192.168.20.250
R1-Fa0/0	192.168.20.250	255.255.255.0	—
R1-S0/0/0	10.10.100.1	255.255.255.0	—
Computer/Interface – R2	**IP Address**	**Subnet Mask**	**Gateway Address**
PC2	172.16.75.65	255.255.255.0	172.16.75.250
R2-Fa0/0	172.16.75.250	255.255.255.0	—
R2-S0/0/1	10.10.100.2	255.255.255.0	—

Detailed Lab Steps

Task 1

Configure a `static` route to the adjacent LAN, LAN-A to LAN-B. Use the IP addresses provided in Table 1. You will be asked to verify that the 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 192.168.20.0 and 172.16.75.0 networks. A subnet mask of 255.255.255.0 is being used. Use 1536000 for the clock rate on the serial link (DCE interface).

Step 1. Configure the gateway address for your LAN routers (R1 and R2) according to the addresses provided in Table 1. You will also need to enable the interfaces. List the commands used to configure the IP addresses and the subnet mask for your gateway, and list the command used to enable the interface.

```
R1# configure terminal
R1(config)# interface fa 0/0
R1(config-if)# ip address 192.168.20.250 255.255.255.0
R1(config-if)# no shutdown

R2# configure terminal
R2(config)# interface fa 0/0
R2(config-if)# ip address 172.16.75.250 255.255.255.0
R2(config-if)# no shutdown
```

Step 2. 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
R1(config)# hostname LAN-A
LAN-A(config)#

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

Step 3. Configure the router interface's serial IP addresses and subnet masks according to the addresses specified in Table 1. Use the proper command to verify that the interfaces are properly configured. Set the clock rate on the serial interface interconnecting the two routers to 1536000. List the prompts and the commands used to accomplish this task.

```
LAN-A# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
LAN-A(config)# interface serial 0/0/0
LAN-A(config-if)# ip address 10.10.100.1 255.255.255.0
LAN-A(config-if)# clock rate 1536000
LAN-A(config-if)# no shut
LAN-A(config-if)#

LAN-A# show ip interface brief
Interface        IP-Address      OK?   METHOD  Status                  Protocol
FastEthernet0/0  192.168.20.250  YES   manual  up                      up
FastEthernet0/1  unassigned      YES   NVRAM   administratively down   down
Serial0/0/0      10.10.100.1     YES   manual  up                      down
Serial0/0/1      unassigned      YES   NVRAM   administratively down   down

LAN-B#
LAN-B# configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
LAN-B(config)# interface serial 0/0/1
LAN-B(config-if)# ip address 10.10.100.2 255.255.255.0
LAN-B(config-if)# no shut
LAN-B(config-if)#


LAN-B# sh ip interface brief
Interface        IP-Address      OK?   METHOD  Status                  Protocol
FastEthernet0/0  172.16.75.250   YES   manual  up                      up
FastEthernet0/1  unassigned      YES   NVRAM   administratively down   down
Serial0/0/0      unassigned      YES   NVRAM   administratively down   down
Serial0/0/1      10.10.100.2     YES   manual  up                      up
```

Step 4. Configure static routes from the LAN-A router to the LAN-B router and from LAN-B router back to the LAN-A router. Use two commands to verify that the routes are configured. List the commands used.

```
LAN-A# configure terminal
LAN-A(config)# ip route 172.16.75.0 255.255.0.0 10.10.100.2
LAN-A(config)#

LAN-B# configure terminal
LAN-B(config)# ip route 192.168.20.0 255.255.255.0 10.10.100.1
LAN-B(config)#

LAN-B# sh run     [only a portion of the running-configuration file is
displayed]
!
ip route 192.168.20.0 255.255.255.0 10.10.100.1
!

LAN-B# show ip route static
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

S    192.168.20.0/24 [1/0] via 10.10.100.1
```

Step 5. What does the statement "Gateway of last resort is not set" mean?

The gateway of last resort is used to tell the router where to send packets that do not have a defined destination route.

Step 6. Use the computers in each LAN to ping the computers in the adjacent LAN.

```
C:\> ping 172.16.75.65  [this is from the computer in LAN-A]

Pinging 172.16.75.65 with 32 bytes of data:

Reply from 172.16.75.65: bytes=32 time=3ms TTL=126
Reply from 172.16.75.65: bytes=32 time=6ms TTL=126
Reply from 172.16.75.65: bytes=32 time=3ms TTL=126
Reply from 172.16.75.65: bytes=32 time=4ms TTL=126

Ping statistics for 172.16.75.65

    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum =  1ms, Average =  1ms
```

```
C:\>


C:\> ping 192.168.20.1     [this is from the computer in LAN-B]

Pinging 192.168.20.1 with 32 bytes of data:

Reply from 192.168.20.1: bytes=32 time=6ms TTL=126
Reply from 192.168.20.1: bytes=32 time=3ms TTL=126
Reply from 192.168.20.1: bytes=32 time=6ms TTL=126
Reply from 192.168.20.1: bytes=32 time=6ms TTL=126

Ping statistics for 192.168.20.1

    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum =  1ms, Average =  1ms

C:\>
```

Step 7. 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 may hops did you record?

```
C:\> tracert 172.16.75.65
Tracing route to 172.16.75.65 over a maximum of 30 hops:

 1    8ms    9ms    9ms    192.168.20.250
 2    15ms   15ms   15ms   10.10.100.2
 3    24ms   23ms   22ms   172.16.75.65

Trace complete.
```

Step 8. Use the command to open Telnet connectivity to the LAN-A router. Set the VTY password to ciscopress and enable remote login. List the commands used to establish the Telnet connection.

```
LAN-A# configure terminal
LAN-A(config)# line vty 0 4
LAN-A(config-line)# password ciscopress
LAN-A(config-line)# login
```

Step 9. Use the router command that lists the network routes stored in the LAN-A router's routing table. List the routes. Are all the routes defined for your network?

```
LAN-A# sh 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

S    172.16.0.0/16 [1/0] via 10.10.100.2
     10.0.0.0/24 is subnetted, 1 subnets
C    10.10.100.0 is directly connected, Serial0/0/0
C    192.168.20.0/24 is directly connected, FastEthernet0/0
```

Yes, a static route is defined to the 172.16.0.0 network.

Step 10. 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. What command did you use?

```
LAN-A#
LAN-A# copy running-config startup-config
Destination filename [startup-config]?
LAN-A#
```

Step 11. What command is used to verify the routing protocol being used? List two router commands.

```
LAN-A# sh ip route   [the S indicate a Static route, C means the network is
connected to the router interface]

S    172.16.0.0/16 [1/0] via 10.10.100.2
     10.0.0.0/24 is subnetted, 1 subnets
C    10.10.100.0 is directly connected, Serial0/0/0
C    192.168.20.0/24 is directly connected, FastEthernet0/0


LAN-A# sh run   [only a portion of the running-configuration is listed]
!
ip route 172.16.0.0 255.255.0.0 10.10.100.2
!
```

Task 2

Observe the status and protocol states for the serial interfaces. If the routers are properly configured, explain what could cause the following conditions.

1. Serial 0/0/0 is up, line protocol is up

   This is the proper setting for a fully configured serial interface.

2. Serial 0/0/0 is down, line protocol is down (DTE mode)

   Typically indicates that the router is not sensing a CD signal (that is, CD is not active).

   Telephone company problem—Line is down or line is not connected to the CSU/DSU

   Faulty or incorrect cabling

   Hardware failure (CSU/DSU)

3. Serial 0/0/0 is up, line protocol is down (DTE mode)

   Local or remote router is misconfigured.

   Keepalives are not being sent by remote router.

   Leased-line or other carrier service problem—Noisy line or misconfigured or failed switch.

   Timing problem on the cable (SCTE not set on CSU/DSU).

   Failed local or remote CSU/DSU.

   Router hardware failure (local or remote).

4. Serial 0/0/0 is up, line protocol is down (DCE mode)

   Missing **clockrate** interface configuration command.

   DTE device does not support or is not set up for SCTE mode.

   Failed remote CSU or DSU.

   Failed or incorrect cable.

   Router hardware failure.

5. Serial 0/0/0 is administratively down, line protocol is down

   Router configuration includes the **shutdown** interface configuration command.

Task 3: Configuration List

In this task you are to issue the **show running-configuration** command from the LANA# prompt.

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 might need to go to the Cisco website (http://www.cisco.com) and look up what each of these commands means.

1. **no service password-encryption**

   Shows the passwords in clear text in the running and startup configuration.

2. **boot-start-marker**

   This marker is written to configuration files automatically to flag the beginning of the boot commands (boot statements).

3. **boot-end-marker**

   This marker is written to configuration files automatically to flag the end of the boot commands (boot statements).

4. **enable secret 5 1KXED$S08d)zG3x3aiaeFjy7nCP**

   This is showing that the enable secret has been configured but it is being displayed in an unreadable format.

5. **no aaa new-model**

   This command is used to globally disable a Cisco router for AAA—authentication, authorization, and accounting.

6. **resource policy**

To enter ERM configuration mode and configure an ERM policy, use the resource policy command in global configuration mode. The Embedded Resource Manager (ERM) feature allows you to monitor internal system resource utilization for specific resources such as the buffer, memory, and CPU.