NetSim®
NETWORK SIMULATOR®

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NetSim® NETWORK SIMULATOR®

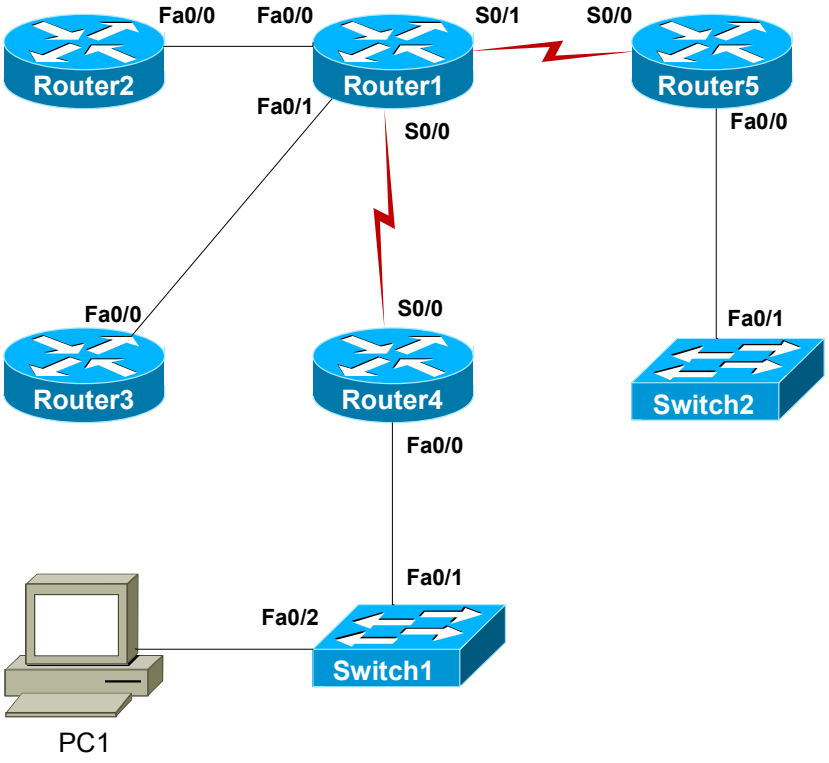
Supplemental Lab: RIP

Objective

Practice configuring Routing Information Protocol version 1 (RIPv1).

Lab Topology

The topology diagram below represents the NetMap in the Simulator.



Command Summary

Command	Description
clock rate *clock-rate*	sets the clock rate for a Data Communications Equipment (DCE) interface
configure terminal	enters global configuration mode from privileged EXEC mode
enable	enters privileged EXEC mode
end	ends and exits configuration mode
exit	exits one level in the menu structure
hostname *host-name*	sets the device name
interface *type number*	changes from global configuration mode to interface configuration mode
ip address *ip-address subnet-mask*	assigns an IP address to an interface
network *network-address*	activates the specified routing protocol on the specified network

Command	Description
no shutdown	enables an interface
ping *ip-address*	sends an Internet Control Message Protocol (ICMP) echo request to the specified address
router rip	enables RIP routing
show ip protocols	displays information about active routing protocols
show ip route	displays the IP routing table
show running-config	displays the active configuration file

The IP addresses and subnet masks used in this lab are shown in the table below:

IP Addresses

Device	Interface	IP Address	Subnet Mask
Router1	FastEthernet 0/0 Serial 0/0	10.1.1.1 172.16.10.1	255.255.255.0 255.255.255.0
Router2	FastEthernet 0/0	10.1.1.2	255.255.255.0
Router4	Serial 0/0	172.16.10.2	255.255.255.0

Lab Tasks

Task 1: Configure the Routers

This task involves configuring the three routers so that adjacent devices can communicate.

1. Configure Router1 with the appropriate host name and with the appropriate IP addresses and subnet masks on the FastEthernet 0/0 and Serial 0/0 interfaces; refer to the IP Addresses table. Enable the interfaces. Configure a clock rate of 64 kilobits per second (Kbps) on the Serial 0/0 interface. A clock rate must be configured on Router1 because it is the DCE end of the link to Router4.

2. Configure Router2 with the appropriate host name and with the appropriate IP address and subnet mask on the FastEthernet 0/0 interface; refer to the IP Addresses table. Enable the interface.

3. Configure Router4 with the appropriate host name and with the appropriate IP address and subnet mask on the Serial 0/0 interface; refer to the IP Addresses table. Enable the interface.

4. On Router1, verify that you can ping the directly connected neighbors, Router2 (10.1.1.2) and Router4 (172.16.10.2). The pings should be successful.

5. On Router2, display the routing table. What network does Router2 know how to reach? _____

6. On Router4, display the routing table. What network does Router4 know how to reach? _____

Task 2: Configure RIP

This task introduces you to router configuration mode and configuring RIP networks.

1. RIP must be configured on all devices on which you wish to advertise networks. The only networks that need to be advertised are the ones that a device's interfaces belong to. What networks should Router1 advertise? _____

2. What networks should Router2 advertise? _____

3. What networks should Router4 advertise? _____

4. What command is required to enable RIP and to enter router configuration mode? _____

5. On Router1, advertise the networks of all enabled interfaces.

6. On Router2, advertise the networks of all enabled interfaces.

7. On Router4, advertise the networks of all enabled interfaces.

Task 3: Verify RIP

This task involves verifying the RIP routes configured in the previous task.

1. On Router2, display the routing table. What does the `R` next to the 172.16.0.0 network mean? ____

2. Through which interface will Router2 send packets that are destined for the 172.16.0.0 network? _

3. On Router4, display the routing table. Through which interface will Router4 send packets destined for the 10.0.0.0 network? _____

4. On Router1, display the routing table. What does the `C` next to the 10.1.1.0 and 172.16.10.0 networks indicate? _____

5. On Router2, ping Router4's Serial 0/0 interface (172.16.10.2). The ping should be successful.

6. On Router4, ping Router2's FastEthernet 0/0 interface (10.1.1.2). The ping should be successful.

7. On Router2 and Router4, display specific IP routing protocol information that will allow you to determine which routing protocol is running on Router2 and Router4.

Lab Solutions

Task 1: Configure the Routers

1. On Router1, you should issue the following commands to configure the appropriate host name, IP addresses, and subnet masks, to enable the interfaces, and to configure a clock rate:

```
Router(config)#hostname Router1
Router1(config)#interface fastethernet 0/0
Router1(config-if)#ip address 10.1.1.1 255.255.255.0
Router1(config-if)#no shutdown
Router1(config-if)#interface serial 0/0
Router1(config-if)#ip address 172.16.10.1 255.255.255.0
Router1(config-if)#clock rate 64000
Router1(config-if)#no shutdown
```

2. On Router2, you should issue the following commands to configure the appropriate host name, IP address, and subnet mask and to enable the interface:

```
Router(config)#hostname Router2
Router2(config)#interface fastethernet 0/0
Router2(config-if)#ip address 10.1.1.2 255.255.255.0
Router2(config-if)#no shutdown
```

3. On Router4, you should issue the following commands to configure the appropriate host name, IP address, and subnet mask and to enable the interfaces:

```
Router(config)#hostname Router4
Router4(config)#interface serial 0/0
Router4(config-if)#ip address 172.16.10.2 255.255.255.0
Router4(config-if)#no shutdown
```

4. On Router1, verify that you can ping the directly connected neighbors, Router2 (10.1.1.2) and Router4 (172.16.10.2). The pings should be successful.

5. On Router2, issue the following command. The output indicates that Router2 knows how to reach the 10.0.0.0 network because it is directly connected to Router2's FastEthernet 0/0 interface. Sample output is shown below:

```
Router2#show 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
       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, * - candidate default
       U - per-user static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
C       10.1.1.0 is directly connected, FastEthernet0/0
```

6. On Router4, issue the following command. The output indicates that Router4 knows how to reach the 172.16.0.0 network because it is directly connected to Router4's Serial 0/0 interface. Sample output is shown below:

```
Router4#show ip route
<output omitted>

Gateway of last resort is not set

     172.16.0.0/24 is subnetted, 1 subnets
C       172.16.10.0 is directly connected, Serial0/0
```

Task 2: Configure RIP

1. Router1 should advertise the 10.0.0.0 and 172.16.0.0 networks because these are networks in which Router1 has interfaces.

2. Router2 should advertise the 10.0.0.0 network because this is the only network in which Router2 has an interface.

3. Router4 should advertise the 172.16.0.0 network because this is the only network in which Router4 has an interface.

4. The **router rip** command is needed to enter router configuration mode and to enable RIP.

5. On Router1, issue the following commands to add the 10.0.0.0 and 172.16.0.0 networks:

```
Router1(config)#router rip
Router1(config-router)#network 10.0.0.0
Router1(config-router)#network 172.16.0.0
```

6. On Router2, issue the following commands to add the 10.0.0.0 network:

```
Router2(config)#router rip
Router2(config-router)#network 10.0.0.0
```

7. On Router4, issue the following commands to add the 172.16.0.0 network:

```
Router4(config)#router rip
Router4(config-router)#network 172.16.0.0
```

Task 3: Verify RIP

1. In the output of the following command issued on Router2, the `R` next to the 172.16.0.0 network signifies that Router2 has a route to the 172.16.0.0 network using RIP. Sample output is below:

```
Router2#show 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
       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, * - candidate default
       U - per-user static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
C       10.1.1.0 is directly connected, FastEthernet0/0
R    172.16.0.0 [120/1] via 10.1.1.1, 00:07:27, FastEthernet0/0
```

2. Router2 will use the FastEthernet 0/0 interface to send packets that are destined for the 172.16.0.0 network.

3. In the output of the following command issued on Router4, you can determine that Router4 will use the Serial 0/0 interface to send packets that are destined for the 10.0.0.0 network. Sample output is below:

```
Router4#show ip route
<outpu omitted>

Gateway of last resort is not set

     172.16.0.0/24 is subnetted, 1 subnets
C       172.16.10.0 is directly connected, Serial0/0
R    10.0.0.0 [120/1] via 172.16.10.1, 00:04:13, Serial0/0
```

4. In the output of the following command issued on Router1, the C next to the 10.1.1.0 and the 172.16.10.0 network entries signifies that both of those networks are directly connected to Router1. Sample output is below:

```
Router1#show 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
       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, * - candidate default
       U - per-user static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
C       10.1.1.0 is directly connected, FastEthernet0/0
     172.16.0.0/24 is subnetted, 1 subnets
C       172.16.10.0 is directly connected, Serial0/0
```

5. A ping from Router2 to Router4's Serial 0/0 interface (172.16.10.2) should be successful.

6. A ping from Router4 to Router2's FastEthernet 0/0 interface (10.1.1.2) should be successful.

7. On Router2 and Router4, you should issue the following command to display specific IP routing protocol information. RIP is the routing protocol running on both Router2 and Router4. Below is sample output from Router2:

```
Router2#show ip protocols
Routing Protocol is "rip"
  Sending updates every 30 seconds, next due in 14 seconds
  Invalid after 180 seconds, hold down 180, flushed after 240
  Outgoing update filter list for all interfaces is not set
  Incoming update filter list for all interfaces is not set
  Redistributing:   rip
  Default version control: send version 1, receive any version
    Interface         Send  Recv   Key-chain
    Ethernet0           1    1 2
  Routing for Networks:
    10.0.0.0
  Routing Information Sources:
    10.1.1.1              120      00:00:04
  Distance: (default is 120)
```

Sample Configuration Script

Router1

```
Router1#show running-config
Building configuration...
Current configuration : 742 bytes
!
Version 12.3
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname Router1
!
ip subnet-zero
!
ip cef
no ip domain-lookup
!
interface Serial0/0
 ip address 172.16.10.1 255.255.255.0
 no ip directed-broadcast
 clock rate 64000
!
interface Serial0/1
 no ip address
 no ip directed-broadcast
 shutdown
!
interface FastEthernet0/0
 ip address 10.1.1.1 255.255.255.0
 no ip directed-broadcast
!
interface FastEthernet0/1
 no ip address
 no ip directed-broadcast
 shutdown
!
router rip
 network 10.0.0.0
 network 172.16.0.0
!
ip classless
no ip http server
!
line con 0
line aux 0
line vty 0 4
!
no scheduler allocate
end
```