NetSim®
NETWORK SIMULATOR®

Lab ID: 9.9K614A049.SUP1.1

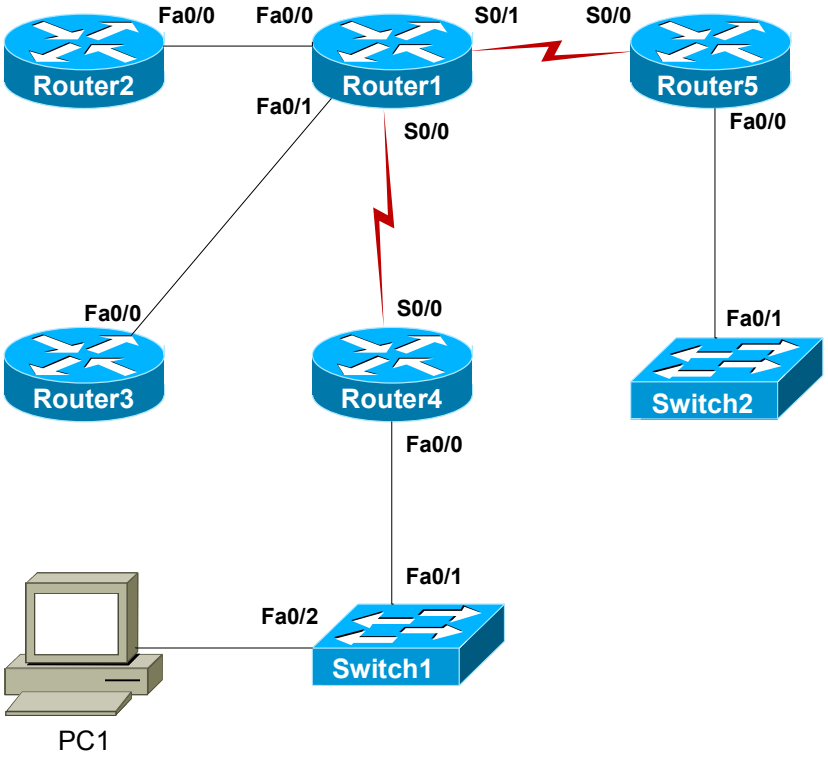
Supplemental Lab: IGRP

Objective

Configure Router1, Router2, and Router4 with the appropriate settings, and enable them to use the Interior Gateway Routing Protocol (IGRP). IGRP is a classful distance-vector routing protocol. Because IGRP is proprietary to Cisco, it cannot be used on non-Cisco routers.

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
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 igrp *autonomous-system-number*	enables the IGRP routing process
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 Router1, Router2, and Router4

1. Configure Router1 with the appropriate host name, IP addresses, and subnet masks; refer to the IP Addresses table. Enable the interfaces. Configure a clock rate of 64 kilobits per second (Kbps) on the Serial 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, IP address, and subnet mask; refer to the IP Addresses table. Enable the interface.

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

4. Verify that each router can ping its directly connected neighbor.

   From Router1: 10.1.1.2 and 172.16.10.2
   From Router2: 10.1.1.1

   From Router4: 172.16.10.1

Task 2: Configure IGRP on Router1, Router2, and Router4

1. What is the main difference between configuring IGRP and RIP on a router? _____
   _____

2. What must be true about the autonomous system (AS) number configured on routers in a network in order for the routers to establish an IGRP neighbor relationship? _____
   _____

3. On Router1, configure IGRP as the routing protocol; use AS number **100**, and advertise all enabled interfaces.

4. On Router2, configure IGRP as the routing protocol; use AS number **100**, and advertise all enabled interfaces.

5. On Router4, configure IGRP as the routing protocol; use AS number **100**, and advertise all enabled interfaces.

Task 3: Verify the IGRP Configuration

1. IGRP should now be the routing protocol running on all three routers. Allow a short period of time for the network to converge, and then ping between the interfaces of the routers that are not directly connected. From Router2, you should be able to successfully ping Router4's Serial 0/0 interface (172.16.10.2). From Router4, you should be able to successfully ping Router2's FastEthernet 0/0 interface (10.1.1.2).

2. On Router4, display the routing table. What is indicated by the `I` next to the network that is not directly connected? _____
   _____

Lab Solutions

Task 1: Configure Router1, Router2, and Router4

1. Issue the following commands to configure Router1 with the appropriate host name, IP addresses, and subnet masks, to enable the interfaces, and to configure a clock rate on Router1's Serial 0/0 interface:

```
Router>enable
Router#configure terminal
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. Issue the following commands to configure Router2 with the appropriate host name, IP address, and subnet mask and to enable the interface:

```
Router>enable
Router#configure terminal
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. Issue the following commands to configure Router4 with the appropriate host name, IP address, and subnet mask and to enable the interface:

```
Router>enable
Router#configure terminal
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. Verify that each router can ping its directly connected neighbor. If the pings do not succeed, verify that you issued the commands in the previous steps correctly.

```
Router1(config-if)#end
Router1#ping 10.1.1.2
Router1#ping 172.16.10.2

Router2(config-if)#end
Router2#ping 10.1.1.1

Router4(config-if)#end
Router4#ping 172.16.10.1
```

Task 2: Configure IGRP on Router1, Router2, and Router4

1. The main difference between configuring IGRP and RIP on a router is that IGRP requires an AS number.

2. The IGRP process on both routers must be configured with the same AS number in order for routers to establish an IGRP neighbor relationship and thus exchange routing table updates.

3. Issue the following commands on Router1 to configure IGRP as the routing protocol on Router1; use AS number **100**, and advertise all enabled interfaces:

```
Router1#configure terminal
Router1(config)#router igrp 100
Router1(config-router)#network 10.0.0.0
Router1(config-router)#network 172.16.0.0
```

4. On Router2, issue the following commands to configure IGRP as the routing protocol, to use AS number **100**, and to advertise all enabled interfaces. In order for routers to establish an IGRP neighbor relationship and thus exchange routing table updates, the IGRP process on both routers must be configured with the same AS number.

```
Router2#configure terminal
Router2(config)#router igrp 100
Router2(config-router)#network 10.0.0.0
```

5. On Router4, issue the following commands to configure IGRP as the routing protocol, to use AS number **100**, and to advertise all enabled interfaces:

```
Router4#configure terminal
Router4(config)#router igrp 100
Router4(config-router)#network 172.16.0.0
```

Task 3: Verify the IGRP Configuration

1. IGRP should now be the routing protocol running on all three routers. Allow a short period of time for the network to converge, and then ping between the interfaces of the routers that are not directly connected. From Router2, you should be able to successfully ping Router4's Serial 0/0 interface (172.16.10.2). From Router4, you should be able to successfully ping Router2's FastEthernet 0/0 (10.1.1.2) interface.

```
Router2(config-router)#end
Router2#ping 172.16.10.2

Router4(config-router)#end
Router4#ping 10.1.1.2
```

2. On Router4, issue the **show ip route** command to display the routing table, The I next to the network that is not directly connected indicates that the router learned the route by using the IGRP routing protocol.

```
Router4#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

     172.16.0.0/24 is subnetted, 1 subnets
C       172.16.10.0 is directly connected, Serial0/0
I    10.0.0.0 [100/8477] via 172.16.10.1, 00:07:36, Serial0/0
```

Sample Configuration Script

Router1	Router1 (continued)
Router1#show running-config Building configuration... Current configuration : 747 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 igrp 100 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