19-1 IGP Interior Gateway Protocol Fundamentals Configuration - Answer Key

In this lab you will configure the RIPv2 and EIGRP routing protocols. IP addresses are already configured on the routers.

RIP Configuration

1) Enable RIPv2 on every router. Ensure all networks except 203.0.113.0/24 are advertised. Do not perform any summarisation.

On every router:

```
R1(config)#router rip
R1(config-router)#version 2
R1(config-router)#no auto-summary
R1(config-router)#network 10.0.0.0
```

2) Verify all networks are in the router's routing tables.

```
R1#show ip route
Codes: L - local, 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, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 12 subnets, 2 masks
C 10.0.0.0/24 is directly connected, FastEthernet0/0
L 10.0.0.1/32 is directly connected, FastEthernet0/0
C 10.0.1.0/24 is directly connected, FastEthernet0/1
L 10.0.1.1/32 is directly connected, FastEthernet0/1
C 10.0.2.0/24 is directly connected, FastEthernet1/0
L 10.0.2.1/32 is directly connected, FastEthernet1/0
C 10.0.3.0/24 is directly connected, FastEthernet1/1
L 10.0.3.1/32 is directly connected, FastEthernet1/1
R 10.1.0.0/24 [120/1] via 10.0.0.2, 00:00:00, FastEthernet0/0
R 10.1.1.0/24 [120/2] via 10.0.0.2, 00:00:00, FastEthernet0/0
             [120/2] via 10.0.3.2, 00:00:10, FastEthernet1/1
R 10.1.2.0/24 [120/2] via 10.0.3.2, 00:00:10, FastEthernet1/1
R 10.1.3.0/24 [120/1] via 10.0.3.2, 00:00:24, FastEthernet1/1
```

3) Verify that routing is working by checking that PC1 has connectivity to PC3.

```
C:\>ping 10.1.2.10

Pinging 10.1.2.10 with 32 bytes of data:

Request timed out.
Reply from 10.1.2.10: bytes=32 time=1ms TTL=125
Reply from 10.1.2.10: bytes=32 time<1ms TTL=125
Reply from 10.1.2.10: bytes=32 time<1ms TTL=125

Ping statistics for 10.1.2.10:
Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

4) Ensure that all routers have a route to the 203.0.113.0/24 network. Internal routes must not be advertised to the Service Provider at 203.0.113.2.

The 203.0.113.0/24 network must be added to the RIP process on R4, and interface FastEthernet 1/1 facing the service provider configured as a passive interface to avoid sending out internal network information.

```
R4(config)#router rip
R4(config-router)#passive-interface f1/1
R4(config-router)#network 203.0.113.0
```

5) Verify that all routers have a path to the 203.0.113.0/24 network.

```
R1#sh ip route
Codes: L - local, 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
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Gateway of last resort is not set

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L 10.0.0.1/32 is directly connected, FastEthernet0/0
C 10.0.1.0/24 is directly connected, FastEthernet0/1
L 10.0.1.1/32 is directly connected, FastEthernet0/1
C 10.0.2.0/24 is directly connected, FastEthernet1/0
L 10.0.2.1/32 is directly connected, FastEthernet1/0
```

```
C 10.0.3.0/24 is directly connected, FastEthernet1/1
L 10.0.3.1/32 is directly connected, FastEthernet1/1
R 10.1.0.0/24 [120/1] via 10.0.0.2, 00:00:24, FastEthernet0/0
R 10.1.1.0/24 [120/2] via 10.0.0.2, 00:00:24, FastEthernet0/0
             [120/2] via 10.0.3.2, 00:00:14, FastEthernet1/1
R 10.1.2.0/24 [120/2] via 10.0.3.2, 00:00:14, FastEthernet1/1
R 10.1.3.0/24 [120/1] via 10.0.3.2, 00:00:14, FastEthernet1/1
R 203.0.113.0/24 [120/2] via 10.0.3.2, 00:00:12, FastEthernet1/1
```

6) Configure a default static route on R4 to the Internet via the service provider at 203.0.113.2

```
R4(config)#ip route 0.0.0.0 0.0.0.0 203.0.113.2
```

7) Ensure that all other routers learn via RIP how to reach the Internet.

Inject the default static route into RIP on R4.

```
R4(config)#router rip
R4(config-router)#default-information originate
```

8) Verify all routers have a route to the Internet.

```
R1#sh ip route
Codes: L - local, 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, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is 10.0.3.2 to network 0.0.0.0

10.0.0.0/8 is variably subnetted, 12 subnets, 2 masks
C 10.0.0.0/24 is directly connected, FastEthernet0/0
L 10.0.0.1/32 is directly connected, FastEthernet0/0
C 10.0.1.0/24 is directly connected, FastEthernet0/1
L 10.0.1.1/32 is directly connected, FastEthernet0/1
C 10.0.2.0/24 is directly connected, FastEthernet1/0
L 10.0.2.1/32 is directly connected, FastEthernet1/0
C 10.0.3.0/24 is directly connected, FastEthernet1/1
L 10.0.3.1/32 is directly connected, FastEthernet1/1
R 10.1.0.0/24 [120/1] via 10.0.0.2, 00:00:20, FastEthernet0/0
R 10.1.1.0/24 [120/2] via 10.0.0.2, 00:00:20, FastEthernet0/0
             [120/2] via 10.0.3.2, 00:00:13, FastEthernet1/1
R 10.1.2.0/24 [120/2] via 10.0.3.2, 00:00:13, FastEthernet1/1
R 10.1.3.0/24 [120/1] via 10.0.3.2, 00:00:13, FastEthernet1/1
R 203.0.113.0/24 [120/2] via 10.0.3.2, 00:00:13, FastEthernet1/1
R* 0.0.0.0/0 [120/2] via 10.0.3.2, 00:00:13, FastEthernet1/1
```

EIGRP Configuration

9) Enable EIGRP AS 100 on every router. Ensure all networks except 203.0.113.0/24 are advertised.

On every router:

```
R1(config)#router eigrp 100
R1(config-router)#network 10.0.0.0
```

10) Verify the routers have formed adjacencies with each other.

```
R1#sh ip eigrp neighbors
EIGRP-IPv4 Neighbors for AS(100)
H   Address                Interface        Hold Uptime   SRTT   RTO  Q   Seq
                                            (sec)         (ms)        Cnt Num
0   10.0.0.2               Fa0/0             11 00:00:20   21    126  0   10
1   10.0.3.2               Fa1/1             11 00:00:10   44    264  0   6
```

11) Which routing protocol (RIP or EIGRP) do you expect routes to the 10.x.x.x networks to be learned from in the routing tables?

Both RIP and EIGRP are advertising the 10.x.x.x networks. EIGRP has a better (lower) administrative distance of 90 compared to RIP's AD of 120, so the EIGRP routes will be installed in the router's routing tables.

12) Do you expect to see any routes from the other routing protocol in the routing tables?

Only RIP (not EIGRP) is advertising the 203.0.113.0/24 network and injecting the default static route. Those routes will remain unchanged in the routing tables.

13) View the routing tables to verify your answers.

```
R1#sh ip route
Codes: L - local, 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, H - NHRP, l - LISP
       + - replicated route, % - next hop override

Gateway of last resort is 10.0.3.2 to network 0.0.0.0

      10.0.0.0/8 is variably subnetted, 12 subnets, 2 masks
C 10.0.0.0/24 is directly connected, FastEthernet0/0
L 10.0.0.1/32 is directly connected, FastEthernet0/0
C 10.0.1.0/24 is directly connected, FastEthernet0/1
L 10.0.1.1/32 is directly connected, FastEthernet0/1
C 10.0.2.0/24 is directly connected, FastEthernet1/0
L 10.0.2.1/32 is directly connected, FastEthernet1/0
C 10.0.3.0/24 is directly connected, FastEthernet1/1
L 10.0.3.1/32 is directly connected, FastEthernet1/1
D 10.1.0.0/24 [90/30720] via 10.0.0.2, 00:06:39, FastEthernet0/0
D 10.1.1.0/24 [90/33280] via 10.0.0.2, 00:06:21, FastEthernet0/0
D 10.1.2.0/24 [90/35840] via 10.0.0.2, 00:06:15, FastEthernet0/0
D 10.1.3.0/24 [90/261120] via 10.0.3.2, 00:06:09, FastEthernet1/1
R 203.0.113.0/24 [120/2] via 10.0.3.2, 00:00:22, FastEthernet1/1
R* 0.0.0.0/0 [120/2] via 10.0.3.2, 00:00:22, FastEthernet1/1
```