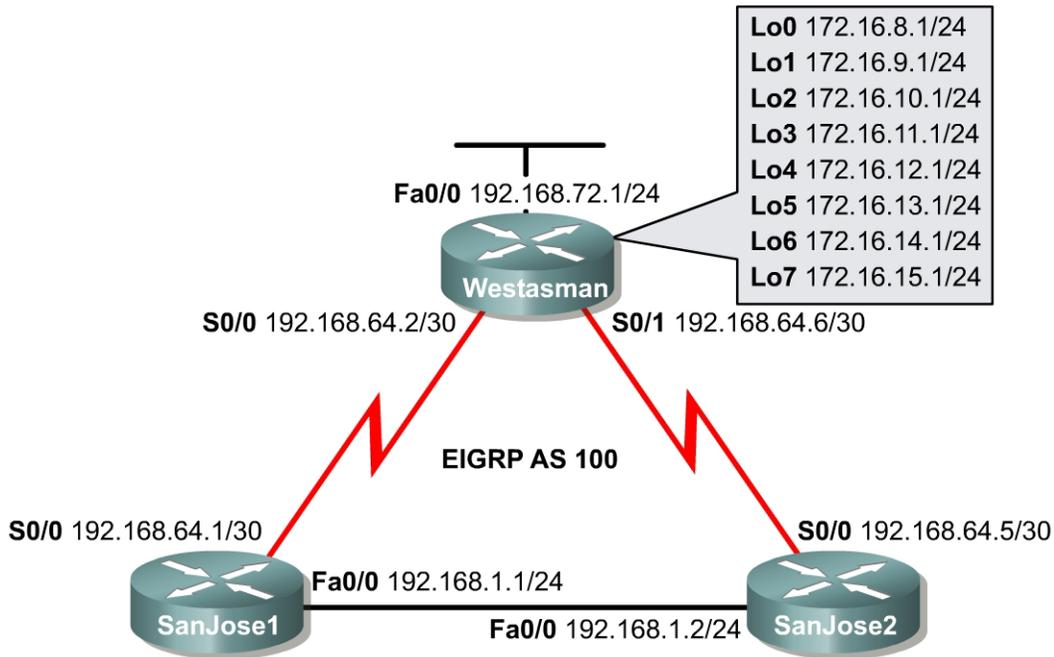


Lab 5.7.3 Configuring EIGRP Summarization



Objective

In this lab EIGRP will be configured and the operation will be tested over discontinuous subnets by disabling automatic route summarization. Discontinuous subnets are subnets that are out of order. Finally, EIGRP will be manually configured to use specific summary routes.

Scenario

The International Travel Agency uses VLSM to conserve IP addresses. All LANs are addressed using contiguous subnets, but the company would like to examine the effects of discontinuous subnets using EIGRP for future reference. The existence of multiple networks is simulated by loopback interfaces on the Westasman router. The WAN links are addressed using 192.168.64.0 with a 30-bit mask.

Because this scheme creates discontinuous subnets, the default summarization behavior of EIGRP should result in incomplete routing tables. The problem should be resolved by disabling the default summarization in EIGRP while maintaining a route summary at the Westasman router with manual route summarization.

Step 1

Build and configure the network according to the diagram. Add the loopback interfaces if the configuration files from the previous lab are used. This configuration requires the use of subnet 0. Therefore, check if this is enabled or enter the `ip subnet-zero` command, depending on which IOS version is used. Configure the Westasman router with eight loopback interfaces using the IP addresses from the diagram. These interfaces simulate the existence of multiple networks behind the Westasman router. Configure EIGRP as indicated for AS 100.

Use `ping` to verify that all serial interfaces can `ping` each other.

Note: Until the additional configurations are complete, not all networks will appear in the routing table for each router.

Step 2

Use `show ip route` to check the routing table for SanJose1 and SanJose2.

1. Are any routes missing? If so, which ones?

SanJose1 and SanJose2 will install a summary route to 192.168.64.0/24 by way of Null0. EIGRP routers create these summary routes automatically. Because the local router has generated the summary, there is no next hop for the route. Therefore, the router maps this summary route to its null interface.

2. Look again at the routing tables for SanJose1 and SanJose2. What subnet masks appear on each router for the route 192.168.64.0? What are the corresponding next hop interfaces?

Examine the routing table on Westasman.

3. Are any routes missing? If so, which ones?

In order for all subnets to appear in the routing table, the default behavior of EIGRP that automatically summarizes routes must be disabled.

Step 3

Disable the automatic summarization feature on EIGRP.

One each router, issue the following commands:

```
Westasman(config)#router eigrp 100
Westasman(config-router)#no auto-summary
```

After issuing these commands on all three routers, return to the SanJose1 router and type the `show ip route` command.

4. Has anything changed in the SanJose1 routing table?

Finally, to provide the most prescriptive routing updates, use the wildcard mask option for advertising networks in EIGRP. For a given classful network, all subnets need to be advertised with their exact subnet masks. This is completed through the wildcard mask. If just one subnet is advertised without

the mask option then all other subnets will be advertised. To illustrate this, on Westasman enter the following commands:

```
Westasman(config)#router eigrp 100
Westasman(config-router)#no network 172.16.0.0
Westasman(config-router)#network 172.16.8.0 0.0.0.255
```

Now, enter **show ip route** on SanJose1:

```
SanJose1#show ip route

<output omitted>

Gateway of last resort is not set

D    192.168.72.0/24 [90/2297856] via 192.168.64.2, 00:02:27, Serial0/0
    172.16.0.0/24 is subnetted, 1 subnets
D    172.16.8.0 [90/2297856] via 192.168.64.2, 00:02:27, Serial0/0
    192.168.64.0/30 is subnetted, 2 subnets
C    192.168.64.0 is directly connected, Serial0/0
D    192.168.64.4 [90/2172416] via 192.168.1.2, 00:03:31,
FastEthernet0/0
C    192.168.1.0/24 is directly connected, FastEthernet0/0
```

Next, enter the command **network 172.16.9.0** in EIGRP 100 configuration mode on Westasman. Then enter **show ip route** again on SanJose1:

```
SanJose1#show ip route

<output omitted>

Gateway of last resort is not set

D    192.168.72.0/24 [90/2297856] via 192.168.64.2, 00:05:55, Serial0/0
    172.16.0.0/24 is subnetted, 8 subnets
D    172.16.12.0 [90/2297856] via 192.168.64.2, 00:00:06, Serial0/0
D    172.16.13.0 [90/2297856] via 192.168.64.2, 00:00:06, Serial0/0
D    172.16.14.0 [90/2297856] via 192.168.64.2, 00:00:06, Serial0/0
D    172.16.15.0 [90/2297856] via 192.168.64.2, 00:00:06, Serial0/0
D    172.16.8.0 [90/2297856] via 192.168.64.2, 00:05:55, Serial0/0
D    172.16.9.0 [90/2297856] via 192.168.64.2, 00:00:07, Serial0/0
D    172.16.10.0 [90/2297856] via 192.168.64.2, 00:00:07, Serial0/0
D    172.16.11.0 [90/2297856] via 192.168.64.2, 00:00:07, Serial0/0
    192.168.64.0/30 is subnetted, 2 subnets
C    192.168.64.0 is directly connected, Serial0/0
D    192.168.64.4 [90/2172416] via 192.168.1.2, 00:07:00,
FastEthernet0/0
C    192.168.1.0/24 is directly connected, FastEthernet0/0
```

The wildcard mask option in EIGRP allows prescriptive subnet advertisements, as long as each advertised subnet has the mask applied in the configuration.

Before proceeding to Step 4, remove the **network 172.16.8.0 0.0.0.255** and **network 172.16.9.0** commands on Westasman and apply the **network 172.16.0.0** command.

Step 4

Now that auto summarization is disabled, the International Travel Agency's routers should build complete routing tables. Unfortunately, this means that the Westasman router is advertising eight routes that should be summarized for efficiency. Use the manual summarization feature of EIGRP to summarize these addresses.

The Westasman router should be advertising eight subnets:

- 172.16.8.0
- 172.16.9.0
- 172.16.10.0
- 172.16.11.0
- 172.16.12.0
- 172.16.13.0
- 172.16.14.0
- 172.16.15.0

The first 21 bits of these addresses are the same. Therefore, a summary route for all subnets can be created using a /21 prefix which is 255.255.248.0 in dotted-decimal notation.

Because the Westasman router must advertise the summary route to the SanJose1 and SanJose2 routers, enter the following commands on the Westasman router:

```
Westasman(config)#interface s0/0
Westasman(config-if)#ip summary-address eigrp 100 172.16.8.0
255.255.248.0
Westasman(config-if)#interface s0/1
Westasman(config-if)#ip summary-address eigrp 100 172.16.8.0
255.255.248.0
```

These commands configure EIGRP to advertise summary routes for AS 100 through the serial 0/0 and 0/1 interfaces. Verify this configuration by issuing the `show ip protocols` command.

5. Which metric is the Westasman router using for its address summarization?

After verifying manual address summarization on the Westasman router, check the routing tables on SanJose1 and SanJose2.

6. What has happened in the SanJose1 and SanJose2 routing tables since they were looked at in Step 3?

From the SanJose1 or SanJose2 router, verify that 172.168.72.1 can be pinged.

It should be possible to ping 172.16.15.1 from the SanJose1 router.

7. Is there a route to 172.16.15.0 in the SanJose1 routing table? Explain.
