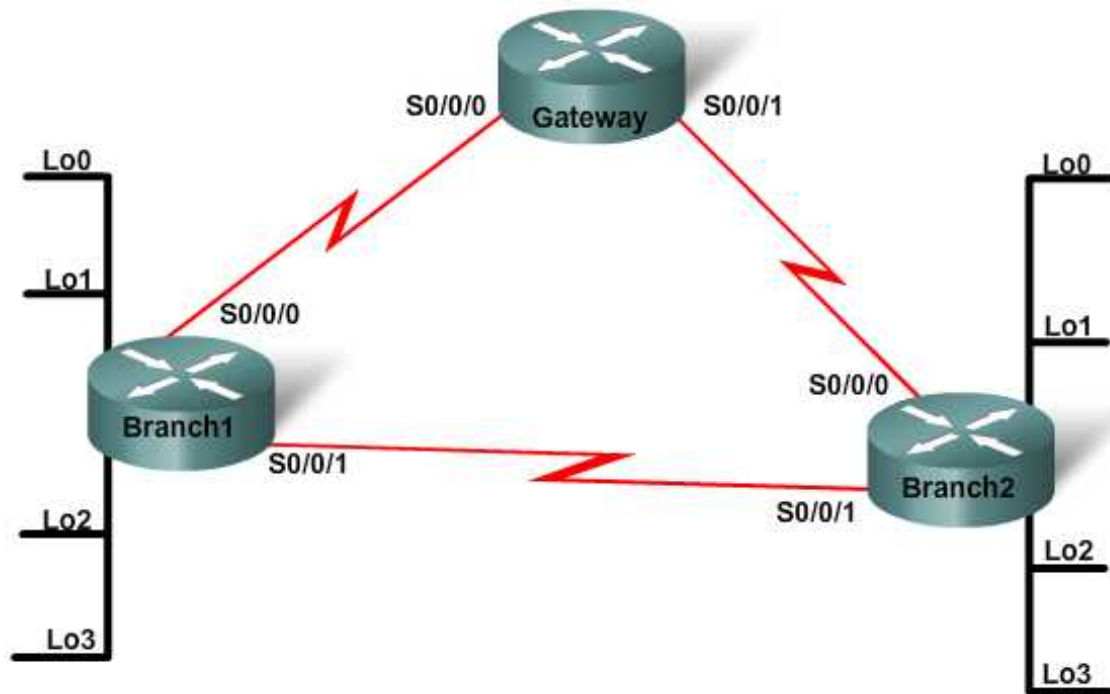Cisco | Networking Academy®
Mind Wide Open™

Lab 5.4.2 EIGRP Configuring Automatic and Manual Route Summarization and Discontiguous Subnets

Device	Host Name	Loopback Interfaces / Subnet Masks	Interface S0/0/0 / Subnet Mask	Serial Interface Type	Interface S0/0/1 / Subnet Mask	Serial Interface Type	Enable Secret Password	vty, Console Password
Router1	Gateway	N/A	10.0.0.1/30	DCE	10.0.0.5/30	DCE	class	cisco
Router2	Branch1	Lo0 172.17.2.1/24 Lo1 172.17.3.1/24 Lo2 172.16.2.1/24 Lo3 172.16.3.1/24	10.0.0.2/30	DTE	10.0.0.9/30	DCE	class	cisco
Router3	Branch2	Lo0 172.17.0.1/24 Lo1 172.17.1.1/24 Lo2 172.16.0.1/24 Lo3 172.16.1.1/24	10.0.0.6/30	DTE	10.0.0.10/30	DTE	class	cisco

Objectives

- Configure a three-router topology with discontiguous subnets using EIGRP with automatic summarization.

- Disable auto-summarization and configure a manual summarization.

- Observe and interpret the results in the routing table.

Background / Preparation

Set up a network similar to the one in the topology diagram. This lab presents a three-router corporate network using variably subnetted private IP addressing. On Branch1and Branch2, loopbacks simulate LANs attached to those routers. The design creates discontiguous subnets on the routers which will be "hidden" when EIGRP is configured with automatic summarization as the default. You will disable automatic summarization and configure manual summarization to verify that the routers share subnet information.

The following resources are required:

- Three Cisco 1841 routers or comparable routers

- At least one PC with a terminal emulation program

- At least one RJ-45-to-DB-9 connector console cable

- Serial cables to connect R1 to both R2 and R3, and to connect R2 to R3

NOTE: Make sure that the routers and the switches have been erased and have no startup configurations. Instructions for erasing both switch and router are provided in the Lab Manual, located on Academy Connection in the Tools section.

NOTE: SDM Enabled Routers – If the startup-config is erased in an SDM enabled router, SDM will no longer come up by default when the router is restarted. It will be necessary to build a basic router configuration using IOS commands. The steps provided in this lab use IOS commands and do not require the use of SDM. If you wish to use SDM, refer to the instructions in the Lab Manual, located on the Academy Connection in the Tools section or contact your instructor if necessary.

Step 1: Connect the equipment

a. Connect Router1 to Router2 and Router3 using serial cables.

b. Connect Router2 to Router3 using serial cables.

c. Connect a PC with a console cable to perform configurations on the routers.

Step 2: Perform basic configurations on the routers

a. Establish a console session with Router1 and configure hostname, passwords, and interfaces as described in the table. Save the configuration.

b. Establish a console session with Router2 and perform a similar configuration, using the addresses and other information from the table. Save the configuration.

c. Establish a console session with Router3. Configure hostname, passwords, and interfaces according to the table. Save the configuration.

Step 3: Configure EIGRP routing with default commands

a. On Gateway, configure EIGRP as the routing protocol with an autonomous system number of 100, and advertise the appropriate networks.

```
Gateway(config)#router eigrp 100
Gateway(config-router)#network 10.0.0.0
Gateway(config-router)#network 10.0.0.4
```

Predict: How will EIGRP report these subnets in the routing table?

_____

_____

b. On Branch1, configure EIGRP as the routing protocol with an autonomous system number of 100, and advertise the appropriate networks:

```
Branch1(config-router)#network 10.0.0.0 0.0.0.3
Branch1(config-router)#network 10.0.0.8 0.0.0.3
Branch1(config-router)#network 172.17.2.0 0.0.0.255
Branch1(config-router)#network 172.17.3.0 0.0.0.255
Branch1(config-router)#network 172.16.2.0 0.0.0.255
Branch1(config-router)#network 172.16.3.0 0.0.0.255
```

c. Perform a similar configuration on Branch2, using EIGRP 100 and advertising the appropriate networks.

Step 4: Verify the routing configuration

View the routing table on Gateway.

```
    Gateway of last resort is not set
D    172.17.0.0/16 [90/2297856] via 10.0.0.6, 00:00:49, Serial0/0/1
                    [90/2297856] via 10.0.0.2, 00:00:49, Serial0/0/0
D    172.16.0.0/16 [90/2297856] via 10.0.0.6, 00:00:36, Serial0/0/1
                    [90/2297856] via 10.0.0.2, 00:00:36, Serial0/0/0
    10.0.0.0/30 is subnetted, 3 subnets
D      10.0.0.8 [90/2681856] via 10.0.0.6, 00:01:34, Serial0/0/1
                [90/2681856] via 10.0.0.2, 00:01:34, Serial0/0/0
C      10.0.0.0 is directly connected, Serial0/0/0
C      10.0.0.4 is directly connected, Serial0/0/1
```

Which subnets are not reported in this output?

_____

Why are there two paths reported for the 10.0.0.8/30 route?

_____

_____

Step 5: Remove Automatic summarization

On each of the three routers, remove automatic summarization to force EIGRP to report all subnets. A sample command is given for Gateway.

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

Step 6: Verify the routing configuration

View the routing table again on Gateway.

```
    Gateway of last resort is not set

    172.17.0.0/24 is subnetted, 4 subnets
D      172.17.1.0 [90/2297856] via 10.0.0.6, 00:00:22, Serial0/0/1
D      172.17.0.0 [90/2297856] via 10.0.0.6, 00:00:22, Serial0/0/1
D      172.17.3.0 [90/2297856] via 10.0.0.2, 00:00:22, Serial0/0/0
```

```
D        172.17.2.0 [90/2297856] via 10.0.0.2, 00:00:22, Serial0/0/0
         172.16.0.0/24 is subnetted, 4 subnets
D        172.16.0.0 [90/2297856] via 10.0.0.6, 00:00:22, Serial0/0/1
D        172.16.1.0 [90/2297856] via 10.0.0.6, 00:00:22, Serial0/0/1
D        172.16.2.0 [90/2297856] via 10.0.0.2, 00:00:22, Serial0/0/0
D        172.16.3.0 [90/2297856] via 10.0.0.2, 00:00:22, Serial0/0/0
         10.0.0.0/30 is subnetted, 3 subnets
D        10.0.0.8 [90/2681856] via 10.0.0.6, 00:02:08, Serial0/0/1
                  [90/2681856] via 10.0.0.2, 00:02:08, Serial0/0/0
C        10.0.0.0 is directly connected, Serial0/0/0
C        10.0.0.4 is directly connected, Serial0/0/1
```

Are all subnets represented in the table? _____

What kind of interface is "Null0"? _____

Step 7: Configure manual summarization

On Branch2, configure manual summarization to force EIGRP to summarize only the 172.17.0.0 and
172.17.1.0 subnets.

```
Branch2(config)#interface s0/0/0
Branch2(config-if)#ip summary-address eigrp 100 172.17.0.0
255.255.252.0
Branch2(config)#interface s0/0/1
Branch2(config-if)#ip summary-address eigrp 100 172.17.0.0
255.255.252.0
```

View the routing tables of Branch1 and Gateway again. Describe the effect that these summary
commands have on the routing tables.

_____

_____

Step 7: Reflection

a. Although removing automatic summarization solved the issue of missing subnets, what possible
    problem could it cause?

    _____

    _____

b. How could removing automatic summarization help in troubleshooting an EIGRP network?

    _____

    _____

c. How did the use of loopback interfaces make this lab easier to complete?

    _____