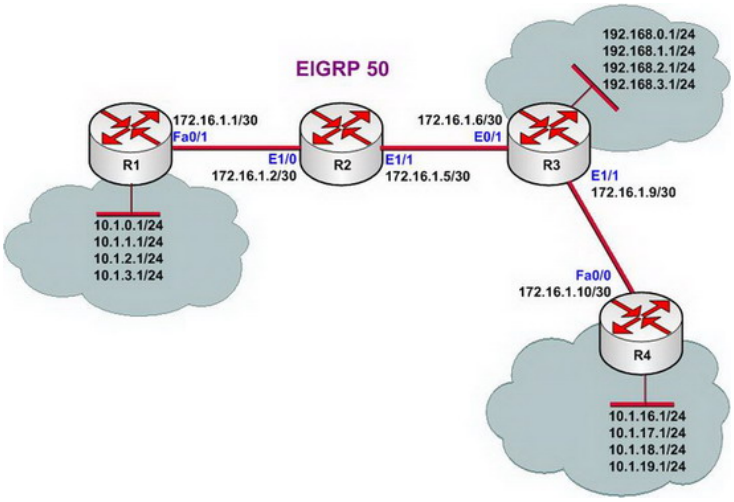
EIGRP Lab3 - Manually Summarizing EIGRP Routes

?Lab Objectives?

1. To master the shortcomings of automatic summary of EIGRP.
2. To master the configuration methods of manual auto-summary regarding EIGRP.

?Lab Topology?



?Lab Process?

1. Configure the router's IP address, and use the Ping command to confirm the connect's interoperability of each router.
2. To configure the BGP protocols for each router and not to close the auto-summary.
3. When you use ping to test the network route on R2, you will find that router R2 is not able to ping the subnet 10.1.X.0/24 which linked to router R4. And shown as below:

R2#ping 10.1.1.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/46/92 ms
R2#
R2#ping 10.1.16.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.16.1, timeout is 2 seconds:
U.U.U
Success rate is 0 percent (0/5)

R2#
R2#ping 10.1.17.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 10.1.17.1, timeout is 2 seconds:
U.U.U
Success rate is 0 percent (0/5)
R2#

4. Check the routing table of R2:

R2#show ip route
Gateway of last resort is not set
172.16.0.0/30 is subnetted, 3 subnets
D 172.16.1.8 [90/307200] via 172.16.1.6, 00:06:25, Ethernet1/1
C 172.16.1.4 is directly connected, Ethernet1/1
C 172.16.1.0 is directly connected, Ethernet1/0
D 10.0.0.0/8 [90/409600] via 172.16.1.1, 00:06:09, Ethernet1/0
D 192.168.0.0/24 [90/409600] via 172.16.1.6, 00:06:25, Ethernet1/1
D 192.168.1.0/24 [90/409600] via 172.16.1.6, 00:06:25, Ethernet1/1
D 192.168.2.0/24 [90/409600] via 172.16.1.6, 00:06:25, Ethernet1/1
D 192.168.3.0/24 [90/409600] via 172.16.1.6, 00:06:25, Ethernet1/1

5. Check topology database of router R2:

R2#show ip eigrp topology all-links
IP-EIGRP Topology Table for AS(50)/ID(172.16.1.5)
Codes: P - Passive, A - Active, U - Update, Q - Query, R - Reply,
r - Reply status
P 10.0.0.0/8, 1 successors, FD is 409600, serno 3
via 172.16.1.1 (409600/128256), Ethernet1/0
via 172.16.1.6 (435200/409600), Ethernet1/1
P 192.168.0.0/24, 1 successors, FD is 409600, serno 4
via 172.16.1.6 (409600/128256), Ethernet1/1
P 192.168.1.0/24, 1 successors, FD is 409600, serno 5
via 172.16.1.6 (409600/128256), Ethernet1/1
P 192.168.2.0/24, 1 successors, FD is 409600, serno 6
via 172.16.1.6 (409600/128256), Ethernet1/1

P 192.168.3.0/24, 1 successors, FD is 409600, serno 7
via 172.16.1.6 (409600/128256), Ethernet1/1
P 172.16.1.8/30, 1 successors, FD is 307200, serno 8
via 172.16.1.6 (307200/281600), Ethernet1/1
P 172.16.1.4/30, 1 successors, FD is 281600, serno 2
via Connected, Ethernet1/1
P 172.16.1.0/30, 1 successors, FD is 281600, serno 1
via Connected, Ethernet1/0

6. The main reason that makes R2 is not able to ping the network 10.1.X.0/24 linked by R4 is: R1 belongs to the border of the main category, it will automatically summarize the subnet of the local routing table to main-category network, while as well as R4 will perform the same action. So R2 will receive the same summary route from different interfaces, that is, network route of 10.0.0.0/8. Because R2 chooses the route with lower FD value after compared the possible distance of the two routes that is the summary route of 10.0.0.0 / 8 which is notified by R1. In fact, the real reason is not the error from the route choice but the auto-summary can not perform the precise control.
7. In order to solve the problem of summary, it needs to close auto-summary on R1 and R4, while use manual summary. The configuration is shown as below:

R1(config)#router eigrp 50
R1(config-router)#no auto-summary
R1(config-router)#exit

R1(config)#interface fastEthernet 0/1
R1(config-if)#ip summary-address eigrp 50 10.1.0.0 255.255.252.0
R1(config-if)#exit
R1(config)#exit

R4(config)#router eigrp 50
R4(config-router)#no auto-summary
R4(config-router)#exit

R4(config)#interface fastEthernet 0/0
R4(config-if)#ip summary-address eigrp 50 10.1.16.0 255.255.252.0
R4(config-if)#exit

8. Check the routing table of R2 once again:

```
R2#show ip route
Gateway of last resort   is not set
 172.16.0.0/30 is subnetted, 3 subnets
D 172.16.1.8 [90/307200] via 172.16.1.6,   00:21:08, Ethernet1/1
C 172.16.1.4 is directly connected,   Ethernet1/1
C 172.16.1.0 is directly connected,   Ethernet1/0
 10.0.0.0/22 is subnetted, 2 subnets
D 10.1.0.0   [90/409600] via 172.16.1.1, 00:03:13, Ethernet1/0
D 10.1.16.0   [90/435200] via 172.16.1.6, 00:01:02, Ethernet1/1
D 192.168.0.0/24 [90/409600] via   172.16.1.6, 00:21:08, Ethernet1/1
D 192.168.1.0/24 [90/409600] via   172.16.1.6, 00:21:08, Ethernet1/1
D 192.168.2.0/24 [90/409600] via   172.16.1.6, 00:21:08, Ethernet1/1
D  192.168.3.0/24 [90/409600] via 172.16.1.6,   00:21:08, Ethernet1/1
```

9. To confirm the network accessibility once again by using ping command:

```
R2#ping 10.1.0.1
Type escape sequence   to abort.
Sending 5, 100-byte   ICMP Echos to 10.1.0.1, timeout is 2 seconds:
!!!!!
Success rate is 100   percent (5/5), round-trip min/avg/max = 16/69/145 ms
R2#ping 10.1.1.1
Type escape sequence   to abort.
Sending 5, 100-byte   ICMP Echos to 10.1.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100   percent (5/5), round-trip min/avg/max = 16/44/64 ms
R2#ping 10.1.16.1
Type escape sequence   to abort.
Sending 5, 100-byte   ICMP Echos to 10.1.16.1, timeout is 2 seconds:
!!!!!
Success rate is 100   percent (5/5), round-trip min/avg/max = 60/97/140 ms
R2#ping 10.1.17.1
Type escape sequence   to abort.
Sending 5, 100-byte   ICMP Echos to 10.1.17.1, timeout is 2 seconds:
!!!!!
Success rate is 100   percent (5/5), round-trip min/avg/max = 48/93/149 ms
```

10. Check the routing table of R2 once again:

```
R2#show ip route
Gateway of last resort   is not set
 172.16.0.0/30 is subnetted, 3 subnets
D 172.16.1.8 [90/307200] via 172.16.1.6,   00:23:45, Ethernet1/1
C 172.16.1.4 is directly connected,   Ethernet1/1
C 172.16.1.0 is directly connected,   Ethernet1/0
 10.0.0.0/22 is subnetted, 2 subnets
D 10.1.0.0 [90/409600] via 172.16.1.1,   00:05:49, Ethernet1/0
D 10.1.16.0 [90/435200] via 172.16.1.6,   00:03:38, Ethernet1/1
D 192.168.0.0/24 [90/409600] via 172.16.1.6, 00:23:45, Ethernet1/1
D 192.168.1.0/24 [90/409600] via 172.16.1.6, 00:23:45, Ethernet1/1
D 192.168.2.0/24 [90/409600] via 172.16.1.6, 00:23:45, Ethernet1/1
D 192.168.3.0/24 [90/409600] via 172.16.1.6, 00:23:45, Ethernet1/1
```

11. In order to effectively reduce the size of the routing table, you can also to perform route summary manually on the C-type network route of 192.168.X.0/24 through EIGRP.

```
R3(config)#router   eigrp 50
R3(config-router)#no auto-summary
R3(config-router)#exit
R3(config)#
R3(config)#interface   ethernet 1/1
R3(config-if)#ip   summary-address eigrp 50 192.168.0.0 255.255.252.0
R3(config-if)#exit

R3(config)#inter   ethernet 1/0
R3(config-if)#ip   summary-address eigrp 50 192.168.0.0 255.255.252.0
R3(config-if)#exit
```

12. Check the routing table on R4 and R2:

R4#show ip route
Gateway of last resort is not set
172.16.0.0/30 is subnetted, 3 subnets
C 172.16.1.8 is directly connected, FastEthernet0/0
D 172.16.1.4 [90/284160] via 172.16.1.9, 00:02:41, FastEthernet0/0
D 172.16.1.0 [90/309760] via 172.16.1.9, 00:02:23, FastEthernet0/0
10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks
D 10.1.0.0/22 [90/437760] via 172.16.1.9, 00:02:23, FastEthernet0/0
C 10.1.19.0/24 is directly connected, Loopback0
C 10.1.18.0/24 is directly connected, Loopback0
C 10.1.17.0/24 is directly connected, Loopback0
D 10.1.16.0/22 is a summary, 00:03:33, Null0
C 10.1.16.0/24 is directly connected, Loopback0
D 192.168.0.0/22 [90/156160] via 172.16.1.9, 00:02:41, FastEthernet0/0

R2#show ip route
Gateway of last resort is not set
172.16.0.0/30 is subnetted, 3 subnets
D 172.16.1.8 [90/307200] via 172.16.1.6, 00:02:54, Ethernet1/1
C 172.16.1.4 is directly connected, Ethernet1/1
C 172.16.1.0 is directly connected, Ethernet1/0
10.0.0.0/22 is subnetted, 2 subnets
D 10.1.0.0 [90/409600] via 172.16.1.1, 00:16:13, Ethernet1/0
D 10.1.16.0 [90/435200] via 172.16.1.6, 00:02:54, Ethernet1/1
D 192.168.0.0/22 [90/409600] via 172.16.1.6, 00:02:54, Ethernet1/1

13. Use ping command to confirm the validity of the routing:

R2#ping 192.168.0.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.0.1, timeout is 2 seconds:

!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/28/60 ms

R4#ping 192.168.1.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 24/37/48 ms

14. Through this lab you will know that although the auto-summary of EIGRP will bring the convenience to network configuration, but it is dependent on the IP subnet planning. In case of bad subnet planning, you need to be careful for using this kind of automatic features.
15. Lab completed.
Hope to helpful for you!