OSPF-EIGRP Redistribution

CCNP Lab 11

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Lab 11

Purpose

The purpose of doing this lab was to learn about how to communicate between two different routing protocols, specifically OSPF and EIGRP. It was also to learn how to configure route redistribution.

Background Information

Redistribution is basically where a routing protocol is used to advertise routes that were created through other methods; such as through the implementation of another routing protocol, static routes, or directly connected routes. The most common, and important use case of redistribution is when more than one routing protocol is implemented. During redistribution configuration, one must account for the differences in the protocols such as metrics and administrative distances. If these are not accounted for, then the whole process could go wrong. For this lab specifically, we focus on OSPF and EIGRP. EIGRP, carries out routing and manages routing information through the means of 5 metrics: delay, load, reliability, MTU (Maximum Transmission Unit), and minimum bandwidth. EIGRP metric configurations are based off of what the metrics themselves were set to, and also due to switching the “K values” of the metrics: on or off. One K value is associated with one metric component. Using the K value, we can enable and disable its metric component assigned. Here are the 5 K values and their metric components:

1. **K1 - Bandwidth**
2. **K2 - Load**
3. **K3 - Delay**
4. **K4 - Reliability**
5. **K5 - MTU**

Combining these values together in the following formula:
256*[(k1*bandwidth)+{(k2*bandwidth)/256-load}+(k3*delay)]*[k5/(reliability+k4)] results in the calculation of the total EIGRP metric. An important feature that routers use to select the best path when routing is administrative distance (AD). An administrative distance is preassigned to each routing protocol, and it defines the reliability of the routing protocol. However, this value can be changed during configuration, to force other protocols to be chosen, if desired within a network.

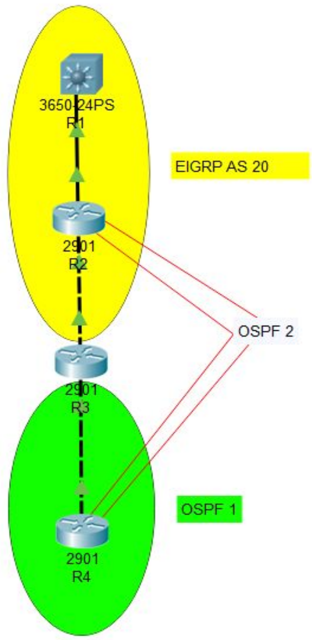
Lab Summary

In this lab we designed a network that implements OSPF and EIGRP, two routing protocols. We used a 4 router topology. First we configured OSPF on the routers using area 1. Then we configured EIGRP 20 in the network. Then, for redistribution, we configured the k values such that it would reflect what our instructor wanted us to see in the metrics: delay and reliability. Finally we changed the EIGRP administrative distance to 105, which would allow any externally learned routes to be processed through EIGRP.

Lab Commands

interface [interface-id]	Navigates to the configuration of the specified interface on routers and switches
ip address [ip address] [subnet mask]	Sets the ip address for the specified interface
router ospf [process-id]	Enables the OSPF process for IPv4
network [network address] [wildcard mask] [area-id]	Adds the network specified to the OSPF table for routing
router eigrp [administrative-system number]	Enables the EIGRP routing protocol with the desired administrative system number
network [network address] [wildcard mask]	Network statement that applies to EIGRP configuration, no area needed
redistribute eigrp [AS number] subnets	Under OSPF configuration, this command will flush all route updates learned from the EIGRP process into OSPF neighbors
redistribute ospf [process-id] metric [bandwidth] [delay] [reliability] [load] [MTU size]	Under EIGRP configuration, this command redistributes OSPF with the specified metrics that need to be changed
metric weights [type of service <0-8>] [k1 value] [k2 value] [k3 value] [k4 value] [k5 value]	Changes the k values as per the network's requirements
distance eigrp [AS number] [internal administrative distance] [external administrative distance]	Configures the administrative distances for EIGRP for both internal and external parts of the network

Network Diagram



IP Address		Device/Interface
R1		
	G6/1	172.16.2.2/24
R2		
	G0/1	172.16.2.1/24
	G0/0	172.16.1.2/24
R3		
	G0/1	172.16.1.1/24
	G0/0	192.168.3.1/24
R4		
	G0/0	192.168.3.2/24
	Lo0	192.168.5.1/24

Configurations

<u>Router 1 Configuration:</u>

R1# show run

```
hostname R1
boot-start-marker
boot system disk0:/s72033-adventerprisek9_wan-mz.122-33.SXI13.bin
boot-end-marker
no aaa new-model
vtp domain cisco
vtp mode transparent
mls netflow interface
mls cef error action reset
spanning-tree mode pvst
spanning-tree extend system-id
diagnostic bootup level minimal
```

```
redundancy
 main-cpu
  auto-sync running-config
 mode sso
vlan internal allocation policy ascending
vlan access-log ratelimit 2000
interface FastEthernet6/1
 ip address 172.16.2.2 255.255.255.0
interface Vlan1
 no ip address
 shutdown
router eigrp 20
 network 172.16.2.0 0.0.0.255
 metric weights 6 0 0 1 1 1
 distance eigrp 90 105
 eigrp router-id 172.16.2.2
ip classless
ip forward-protocol nd
no ip http server
no ip http secure-server
control-plane
dial-peer cor custom
line con 0
line vty 0 4
 login
end
```

Router 2 Configuration:

R2# show run

```
hostname R2
boot-start-marker
boot-end-marker
no aaa new-model
memory-size iomem 10
ip cef
no ipv6 cef
multilink bundle-name authenticated
voice-card 0
```

```
license udi pid CISCO2901/K9 sn FTX180180M8
license accept end user agreement
license boot module c2900 technology-package securityk9
license boot module c2900 technology-package uck9
vtp domain cisco
vtp mode transparent
redundancy
interface Embedded-Service-Engine0/0
 no ip address
 shutdown
interface GigabitEthernet0/0
 ip address 172.16.1.2 255.255.255.0
 duplex auto
 speed auto
interface GigabitEthernet0/1
 ip address 172.16.2.1 255.255.255.0
 duplex auto
 speed auto
interface Serial0/0/0
 no ip address
 shutdown
 clock rate 2000000
interface Serial0/0/1
 no ip address
 shutdown
 clock rate 2000000
router eigrp 20
 network 172.16.1.0 0.0.0.255
 network 172.16.2.0 0.0.0.255
 metric weights 6 0 0 1 1 1
 redistribute ospf 2 metric 1 900 245 255 65535
 distance eigrp 90 105
 eigrp router-id 172.16.2.1
router ospf 2
 network 172.16.1.0 0.0.0.255 area 12
 network 172.16.2.0 0.0.0.255 area 12
router ospf 12
 redistribute eigrp 20 subnets
ip forward-protocol nd
```

```
no ip http server
no ip http secure-server
control-plane
mgcp profile default
gatekeeper
 shutdown
line con 0
line aux 0
line 2
 no activation-character
 no exec
 transport preferred none
 transport output lat pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 login
 transport input all
scheduler allocate 20000 1000
end
```

Router 3 Configuration:

R3# show run

```
hostname R3
boot-start-marker
boot-end-marker
no aaa new-model
memory-size iomem 10
ip cef
no ipv6 cef
multilink bundle-name authenticated
voice-card 0
license udi pid CISCO2901/K9 sn FTX180180M5
license accept end user agreement
license boot module c2900 technology-package securityk9
license boot module c2900 technology-package uck9
vtp domain cisco
vtp mode transparent
redundancy
```

```
interface Embedded-Service-Engine0/0
 no ip address
 shutdown
interface GigabitEthernet0/0
 ip address 192.168.3.1 255.255.255.0
 duplex auto
 speed auto
interface GigabitEthernet0/1
 ip address 172.16.1.1 255.255.255.0
 delay 90
 duplex auto
 speed auto
interface Serial0/0/0
 no ip address
 shutdown
 clock rate 2000000
interface Serial0/0/1
 no ip address
 shutdown
 clock rate 2000000
interface GigabitEthernet0/1/0
 no ip address
 shutdown
 duplex auto
 speed auto
router eigrp 20
 network 172.16.1.0 0.0.0.255
 metric weights 6 0 0 1 1 1
 redistribute ospf 1 metric 1 89 245 255 65535
 redistribute ospf 2 metric 1 90 245 255 65535
 distance eigrp 90 105
 eigrp router-id 172.16.1.1
router ospf 1
 router-id 192.168.3.1
 redistribute eigrp 20 subnets
 network 192.168.3.0 0.0.0.255 area 15
router ospf 3
 network 192.168.3.0 0.0.0.255 area 12
ip forward-protocol nd
```

```
no ip http server
no ip http secure-server
control-plane
mgcp profile default
gatekeeper
 shutdown
line con 0
line aux 0
line 2
 no activation-character
 no exec
 transport preferred none
 transport output lat pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 login
 transport input all
scheduler allocate 20000 1000
end
```

Router 4 Configuration:

R4# show run

```
hostname Router
boot-start-marker
boot-end-marker
no aaa new-model
memory-size iomem 10
ip cef
no ipv6 cef
multilink bundle-name authenticated
voice-card 0
license udi pid CISCO2901/K9 sn FTX180180M5
license accept end user agreement
license boot module c2900 technology-package securityk9
license boot module c2900 technology-package uck9
vtp domain cisco
vtp mode transparent
redundancy
```

```
interface Embedded-Service-Engine0/0
 no ip address
 shutdown
interface GigabitEthernet0/0
 ip address 192.168.3.2 255.255.255.0
 duplex auto
 speed auto
interface GigabitEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
interface Serial0/0/0
 no ip address
 shutdown
 clock rate 2000000
interface Serial0/0/1
 no ip address
 shutdown
 clock rate 2000000
interface GigabitEthernet0/1/0
 no ip address
 shutdown
 duplex auto
 speed auto
router ospf 1
 router-id 192.168.3.1
 network 192.168.3.0 0.0.0.255 area 15
router ospf 3
 network 192.168.3.0 0.0.0.255 area 12
ip forward-protocol nd
no ip http server
no ip http secure-server
control-plane
mgcp profile default
gatekeeper
 shutdown
line con 0
line aux 0
```

```
line 2
 no activation-character
 no exec
 transport preferred none
 transport output lat pad telnet rlogin lapb-ta mop udptn v120 ssh
 stopbits 1
line vty 0 4
 login
 transport input all
scheduler allocate 20000 1000
```

Problems

During the lab there were certain problems that took some time to resolve. We had to show the delay attribute in our configuration, however, after the first inspection, the numbers were all wrong. After doing some research, we finally understood why K values are really important to use during redistribution, and we implemented redistribution again with the correct configurations. Another problem was the administrative distance. We only configured the AD to 105 on router 3, but that wasn't, as we had expected, communicated throughout the whole network. So after trying to set the AD for EIGRP on all routers to 105, it worked and was present throughout the network.

Conclusion

In conclusion, we successfully implemented EIGRP and OSPF in one network, using redistribution techniques. We also deepened our knowledge about EIGRP and OSPF, as we had to learn about how to merge the two protocols into one network, so that they can work seamlessly. This was pretty tough to do, but after doing research, we were able to successfully accomplish this goal. Redistribution is becoming a widely used networking strategy, as it allows a network to have the benefits of different protocols.